

COMPONENTS:	EVALUATOR:
(1) Methane; CH ₄ ; [74-82-8] (2) Electrolyte (3) Water; H ₂ O; [7732-18-5]	H. Lawrence Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1985, March

CRITICAL EVALUATION:

AN EVALUATION OF THE SOLUBILITY OF
METHANE IN AQUEOUS ELECTROLYTE SOLUTIONS.

This section contains an evaluation of the solubility of methane in aqueous electrolyte solutions. Not enough workers have measured the solubility of methane in any one aqueous electrolyte system over common ranges of temperature, pressure and electrolyte concentration to recommend solubility values. A possible exception is the methane + sodium chloride + water system for which there are many papers of reasonably concordant data. For most systems the available data are classed as tentative.

In order to have a common basis for comparison the solubility data have been converted to Sechenov (Setschenow) salt effect parameters as either $k_{\text{SCC}}/\text{dm}^3 \text{ mol}^{-1}$ or $k_{\text{SMM}}/\text{kg mol}^{-1}$ values. The k_{SCC} form is the most common for the older data while the k_{SMM} form is more commonly used by present day workers.

Many forms of the Sechenov salt effect parameter are in use. Many of the forms and conversions among them were discussed in *NITROGEN/AIR, Solubility Series Vol. 10* (ref 1). A briefer summary is on pp xiii-xix of this volume. A form with the gas solubility ratio given as a mole fraction ratio is coming more into use. Many of the conversions among Sechenov salt effect parameter forms require solution density data that are not available especially for systems studied at high temperatures and pressures.

The Sechenov salt effect parameters most commonly used in this evaluation are

$$k_{\text{SCC}}/\text{dm}^3 \text{ mol}^{-1} = (1/(c_2/\text{mol dm}^{-3})) \log ((c_1^0/\text{mol dm}^{-3})/(c_1/\text{mol dm}^{-3}))$$

$$k_{\text{SMM}}/\text{kg mol}^{-1} = (1/(m_2/\text{mol kg}^{-1})) \log ((m_1^0/\text{mol kg}^{-1})/(m_1/\text{mol kg}^{-1}))$$

$$k_{\text{SCX}}/\text{dm}^3 \text{ mol}^{-1} = (1/(c_2/\text{mol dm}^{-3})) \log (x_1^0/x_1)$$

$$k_{\text{SMX}}/\text{kg mol}^{-1} = (1/(m_2/\text{mol kg}^{-1})) \log (x_1^0/x_1)$$

where subscript 1 is the nonelectrolyte gas, subscript 2 the electrolyte.

The gas solubility ratios c_1^0/c_1 , m_1^0/m_1 and x_1^0/x_1 represent the ratio of solubility in pure water to the solubility in the electrolyte solution. The molar (mol dm^{-3}) ratio, c_1^0/c_1 , is the same as the Bunsen coefficient ratio, α^0/α , or the Ostwald coefficient ratio, L^0/L ; the molal (mol kg^{-1}) ratio, m_1^0/m_1 , is the same as the Kuenen coefficient ratio, S^0/S , or the solvomolality ratio, A^0/A ; and the mole fraction ratio, x_1^0/x_1 , is the same as the inverse of the Henry constant ratio, H_1/H_1^0 when $H/\text{atm} = (p_1/\text{atm})/x_1$. The mole fraction is usually calculated by treating each ion of the electrolyte as an entity.

Many of the methane + electrolyte + water systems have been studied as a function of pressure as well as temperature and electrolyte concentration. Although most studies are based on solubility determinations at atmospheric pressure (0.1 MPa) there are measurements to pressures as

large as 60 MPa. The studies are not in complete agreement, but it appears as if pressure has little effect on the magnitude of the salt effect parameter at a given temperature. This may be more true of k_{smm} and k_{smx} values than the k_{scc} and k_{scx} values. Several papers (3, 13, 18, 21, 23, 26) report data for either k_{scx} or k_{smx} values as a function of pressure between 400 and 600 K for the methane + sodium chloride + water system. The k_{scx} and k_{smx} values show different trends which we cannot reconcile at present because of lack of auxiliary data at these temperatures and pressures.

Other representations of the salt effect parameter are in use. A few authors prefer to use the natural logarithm instead of the base ten logarithm. Authors who want to compare the salt effect of electrolytes of different charge type use either equivalents or ionic strength for the electrolyte concentration. The ionic strength representations appear to be useful and will be used occasionally in this evaluation.

The salt effect parameters given in the evaluation were either taken from the original papers or calculated by the evaluator; the evaluator used one of two methods, which are nearly equivalent, to calculate salt effect parameters.

(i) Individual values of the salt effect parameter are calculated at each electrolyte concentration from the solubility of the gas in water and solution. If the parameter values appear statistically constant as a function of electrolyte concentration, they are averaged. If the values show a consistent change with electrolyte concentration, they are fit to an equation, usually linear, as a function of electrolyte concentration.

(ii) A graph of $\log (c_1^0/c_1)$ vs. c_2 is prepared. If linear, the slope is k_{scc} . Units of molality or mole fraction can also be used. Sometimes a better linearity is obtained with one set of units than another. If the plot is not linear a more complex function may be used to obtain the slope and k_{scc} values as a function of electrolyte concentration.

In the solubility ratio we prefer to use the author's solubility values in pure water rather than the recommended value (*this volume*, pp 1-5) in the belief that the author's systematic errors may partially cancel in the solubility ratio term. It is important to recognize that the solubility in water is not required if the solubility is known at several electrolyte concentrations. The equation can be rearranged to

$$\log c_1 = \log c_1^0 - k_{\text{scc}} c_2$$

and the slope of $\log c_1$ vs. c_2 is the negative of k_{scc} . The slope and intercept can be obtained without knowledge of c_1^0 . However, we prefer to use the c_1^0 value and consider it especially important when solubility measurements were made only at small electrolyte concentrations (ref 1).

There has been a renewed interest in the solubility of methane in aqueous electrolyte solutions probably because of the possibility of recovery of methane from brines and sea water. Five papers containing extensive data have appeared since 1980. In all there are data on about 25 aqueous electrolyte systems plus other systems containing mixed electrolytes.

The systems are presented below in the order of the standard arrangement for inorganic compounds used in publications of the US National Bureau of Standards. The number before each system is the standard order number for the electrolyte.

10(1) Methane + Hydrochloric acid [7647-01-0] + Water

Muccitelli and Wen (ref 22) measured the solubility of methane in aqueous HCl at five temperatures between 278.15 and 298.15 K and several concentrations of HCl up to 1.28 mol dm^{-3} . The ($k_{\text{scc}}/\text{dm}^3 \text{ mol}^{-1}$) values from their data are given below. The k_{scc} values decrease with electrolyte

COMPONENTS:		EVALUATOR:					
(1) Methane; CH ₄ ; [74-82-8]		H. Lawrence Clever Department of Chemistry Emory University Atlanta, GA 30322 USA					
(2) Electrolyte							
(3) Water; H ₂ O; [7732-18-5]		1985, March					
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concentration at three temperatures and increase at two temperatures. Thus, there is no clear trend and the values were averages at each temperature. Since the salt effect parameters at low electrolyte concentration are more likely to show errors than those at high concentration, the values above 0.7 mol dm ⁻³ were weighted twice and the others once in the average. At 293.15 K the 0.074 value was not included in the average. The data are classified as tentative.							
σ_2 /mol dm ⁻³		k_{SCC} /dm ³ mol ⁻¹ at temperatures					
		278.15 K	283.15 K	288.15 K			
293.15 K	298.15 K						
0.2321	-	-	-	0.074	-		
0.2822	0.065	-	-	-	-		
0.2824	-	0.048	-	-	-		
0.2864	-	-	0.061	-	-		
0.4687	-	-	-	0.050	-		
0.5330	-	0.048	-	-	-		
0.5468	-	-	-	-	0.046		
0.5501	0.063	-	-	-	-		
0.5645	-	-	0.041	-	-		
0.7324	-	-	-	-	0.043		
0.7401	-	-	-	0.053	-		
0.7979	-	0.051	-	-	-		
0.8030	0.060	-	-	-	-		
0.8164	-	-	0.033	-	-		
0.8645	-	-	0.038	-	-		
0.9703	0.056	-	-	-	-		
1.0425	-	-	-	-	0.042		
1.0914	-	0.053	-	-	-		
1.127	-	-	0.044	0.049	-		
1.2803	-	-	-	-	0.042		
Av	0.060 ± 0.004	0.051 ± 0.002	0.042 ± 0.009	0.051 ± 0.002	0.043 ± 0.002		
14(1) Methane + Sulfuric acid [7664-93-9] + Water							
Christoff (ref 2) reported values from measurements in water and aqueous sulfuric acid solutions at 293.12 K and Radakov and Lutsyk (ref 19) reported values from measurements at 298.2 and 363.2 K. Both sets of data include measurements for large molalities of sulfuric acid. Results are summarized below.							

T/K	H_2SO_4 $m_2/\text{mol kg}^{-1}$	Salt Effect Parameter	
			$k_{\text{smc}}/\text{kg mol}^{-1}$
293.2	5.69		0.056
	16.4		0.026
	222.0		0.0002 ₅
298.2	40.8		0.014
	135.0		0.0003 ₃
363.2	135.0		-0.0039
	190.0		-0.0033
	433.0		-0.0018

The methane is salted out at 293.2 and 298.2 K and salted in at 363.2 K. The data are classed as tentative.

18(1) Methane + Ammonium chloride [12125-02-9] + Water

Ben-Naim and Yaacobi (ref 15) measured the solubility of methane in water and in 1.0 mol dm⁻³ NH₄Cl solution at five temperatures between 283.15 K and 303.15 K. Their values are classed as tentative.

$c_2/\text{mol dm}^{-3}$	$k_{\text{scc}}/\text{dm}^3 \text{ mol}^{-1}$ at temperatures of				
	283.15 K	288.15 K	293.15 K	298.15 K	303.15 K
1.0	0.100	0.093	0.089	0.089	0.093

18(2) Methane + Ammonium bromide [12124-97-9] + Water

Wen and Hung (ref 12) measured the solubility of methane in pure water and in one concentration of NH₄Br of about 0.2 M at 10 degree intervals between 278.15 and 308.15 K. Their values are classed as tentative. The smoothed values were given by Wen and Hung.

$m_2/\text{mol kg}^{-1}$	$k_{\text{smm}}/\text{kg mol}^{-1}$ at temperatures of			
	278.15 K	288.15 K	298.15 K	308.15 K
0.100 (smoothed)	0.068	0.061	0.054	0.047
0.181	-	-	-	0.044
0.196	0.071	-	-	-
0.200	-	-	0.055	-
0.202	-	0.060	-	-

18(3) Methane + Tetramethylammonium bromide [64-20-0] + Water

Wen and Hung (ref 12) measured the solubility of methane in pure water

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(2) Electrolyte	
(3) Water; H ₂ O; [7732-18-5]	1985, March

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and in two concentrations of tetramethylammonium bromide at 10 degree intervals between 278.15 and 308.15 K. The values are classed as tentative. Both the values calculated by the evaluator from the published data and the smoothed values given by Wen and Hung are in the table below.

$m_2/\text{mol kg}^{-1}$	$k_{\text{smm}}/\text{kg mol}^{-1}$ at temperatures of			
	278.15 K	288.15 K	298.15 K	308.15 K
0.100 (smoothed)	0.007	-0.005	-0.017	-0.028
0.176	0.010	-	-	-
0.179	0.000	-	-0.022	-
0.190	-	-0.005	-	-
0.193	-	-	-0.009	-
0.194	-	-0.012	-	-
0.302	-	-	-	-0.032

18(4) Methane + Tetraethylammonium bromide [71-91-0] + H₂O

Both Wen and Hung (ref 12) and Blanco C and Smith (ref 17) have made measurements on the system. Wen and Hung's measurements were made at atmospheric pressure (0.1 MPa) while Blanco C and Smith worked between 10.1 and 50.7 MPa. It appears that pressure has relatively little effect on the salt effect parameter. The results from the two laboratories show similar order of magnitude. Although the results differ some, they are both classed as tentative. The Wen and Hung smoothed value at 298 K may be an error or a misprint. A value near -0.079 would fit the pattern better.

$m_2/\text{mol kg}^{-1}$	p/MPa	$k_{\text{smm}}/\text{kg mol}^{-1}$ at temperatures of						
		278.15K	288.15K	298.15K	308.15K	311.2K	324.7K	344.2K
0.093	0.1	-0.039	-	-	-	-	-	-
0.095	0.1	-0.045	-	-	-	-	-	-
0.100 (smoothed)	0.1	-0.036	-0.049	-0.049 [sic]	-0.094	-	-	-
0.173	0.1	-	-0.052	-	-	-	-	-
0.182	0.1	-	-	-0.075	-	-	-	-
0.183	0.1	-	-	-0.074	-	-	-	-
0.209	0.1	-	-	-	-0.090	-	-	-
1.0	10.1	-	-	-0.056	-	-0.046	-0.056	-0.085
	20.3	-	-	-0.055	-	-0.067	-0.077	-0.105
	30.4	-	-	-0.044	-	-0.056	-0.073	-0.105
	40.5	-	-	-	-	-0.047	-0.070	-0.102
	50.7	-	-	-	-	-0.054	-0.077	-0.104
Blanco C and Smith (av)	-	-	-0.052	-	-0.054	-0.071	-0.100	

18(5) Methane + Tetrapropylammonium bromide [1941-30-6] + Water

Wen and Hung (ref12) have made extensive measurements of the solubility of methane in pure water and in tetrapropylammonium bromide solutions. The salt effect parameters show two trends. Salting in (1) increases as temperature increases and (2) decreases as the electrolyte molality increases. At 278 K methane is salted out at concentrations above 0.4 molal electrolyte. The results are classed as tentative.

$m_2/\text{mol kg}^{-1}$	$k_{\text{smm}}/\text{kg mol}^{-1}$ at temperatures of			
	278.15 K	288.15 K	298.15 K	305.15 K
0.097	-	-	-0.074	-
0.098	-	-0.058	-	-
0.099	-0.051	-	-	-
0.100 (smoothed)	-0.045	-0.061	-0.082	-0.110
0.100	-	-	-	-
0.102	-	-	-0.086	-
0.103	-0.047	-	-	-
0.105	-	-	-	-0.108
0.223	-0.038	-0.059	-	-
0.224	-0.032	-	-	-
0.227	-	-0.049	-	-
0.230	-	-	-0.064	-
0.235	-	-	-0.071	-
0.245	-	-	-	-0.089
0.410	-	-	-0.059	-
0.415	-	-0.030	-	-
0.431	-0.0024	-	-	-
0.443	-	-	-	-0.079
0.587	+0.011	-	-	-
0.620	-	-0.026	-	-
0.632	-	-	-0.048	-
0.706	-	-	-	-0.080

18(6) Methane + Tetrabutylammonium bromide [1643-19-2] + Water

Wen and Hung (ref12) measured the solubility of methane in water and 0.1 to 1.0 molal aqueous solutions of tetrabutylammonium bromide at 10 degree intervals from 278.15 to 308.15 K. The author's smoothed values for 0.1 molal solution are listed along with the individual values of the salt effect parameters.

Feillolay and Lucas (ref 14) measured the solubility in water and 1 to 4 molal aqueous solutions. Their salt effect parameters are also in the table.

The two data sets overlap for 1 molal solutions. Agreement between the salt effect parameters in one molal solution is within 10 percent at 298 K and within 2 percent at 308 K. However, the two data sets show opposite effects in that Wen and Hung's results show a decrease in salting in but Feillolay and Lucas show an increase in salting in as the electrolyte molality increases.

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(1) Methane; CH ₄ ; [74-82-8] (2) Electrolyte (3) Water; H ₂ O; [7732-18-5]	H. Lawrence Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1985, March			
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$m_2/\text{mol kg}^{-1}$	$k_{\text{smm}}/\text{kg mol}^{-1}$ at temperatures of			
	278.15 K	288.15 K	298.15 K	308.15 K
0.096	-0.031	-0.043	-0.097	-
0.098	-0.033	-	-	-
0.099	-	-	-0.090	-0.150
0.100 (smoothed)	-0.030	-0.053	-0.096	-0.152
0.100	-0.028	-	-	-
0.102	-	-0.052	-	-
0.103	-	-0.051	-	-
0.185	-	-0.037	-	-
0.187	-0.019	-	-	-
0.192	-	-	-	-0.140
0.194	-	-	-0.068	-
0.201	-0.017	-	-	-
0.403	-	-0.026	-	-
0.409	+0.005	-	-	-
0.415	-	-	-0.063	-0.110
0.523	-	-0.019	-	-
0.526	0.010	-	-0.062	-
0.537	-	-	-	-0.105
0.693	-	-	-	-0.106
0.703	-	-0.019	-	-
0.704	-	-	-0.060	-
0.785	0.032	-	-	-
0.990	0.031	-	-	-
0.993	-	-	-	-0.104
1.005	-	-	-	-0.101
1.010	-	-	-0.072	-
1.018	-	-0.017	-	-
1.020	-	-	-0.078	-
1.022	-	-	-0.067	-
1.025	-	-	-	-0.103
1.981	-	-	-0.086	-
1.991	-	-	-0.087	-
2.075	-	-	-	-0.116
2.078	-	-	-	-0.113
3.610	-	-	-	-0.128
3.623	-	-	-0.115	-
3.640	-	-	-	-0.129
3.925	-	-	-0.111	-
4.010	-	-	-	-0.128

18(7) Methane + Tetrahydroxyethylammonium bromide [4328-04-5] + Water

Wen and Hung (ref12) have measured the solubility of methane in pure water and in 0.1 to 0.5 molal aqueous solutions of tetrahydroxyethylammonium

bromide at 10 degree intervals between 278.15 and 308.15 K. Wen and Hung's smoothed values for a 0.1 molal solution are included in the table below along with the individual values of the salt effect parameter. Methane is salted out. The salting out decreases as the temperature increases and a small salting in is apparent at 308.15 K. There is little change in the salt effect parameter with electrolyte concentration. The data are classed as tentative.

$m_2/\text{mol kg}^{-1}$	$k_{\text{smm}}/\text{kg mol}^{-1}$ at temperatures of			
	278.15 K	288.15 K	298.15 K	308.15 K
0.085	-	-	0.025	0.002
0.086	0.039	-	-	-
0.091	-	0.034	-	-
0.100 (smoothed)	0.042	0.033	0.022	-0.001
0.152	0.045	-	-	-
0.155	0.035	-	-	-
0.167	-	-	0.028	-
0.173	0.052	-	0.025	-0.008
0.174	-	0.030	-	-
0.177	-	0.034	-	-
0.339	-	-	-	-0.001
0.341	0.042	-	-	-
0.347	-	-	0.022	-
0.355	-	0.037	-	-
0.488	0.047	-	-	-
0.508	-	-	-	0.000
0.510	-	-	0.026	-
0.517	-	0.036	-	-

18(8) Methane + Triethylenediamine hydrochloride [2099-72-1] + Water

Muccitelli and Wen (ref 22) have measured the solubility of methane in pure water and in aqueous solutions of 0.1 to 0.9 molar triethylenediamine hydrochloride at five degree intervals between 278.15 and 298.15 K. The triethylenediamine hydrochloride salts out while triethylenediamine (see data sheet) salts in. The authors did not report salt effect parameters. The evaluator calculated the values below. In general the salting out decreases as temperature increases and as the electrolyte concentration increases. The solubility data at 293.15 K appears to be out of line with the data at other temperatures. All of these solutions were adjusted to a pH of 5.40 ± 0.01 by addition of constant boiling HCl. The pure water values were used to calculate the salt effect parameters. The values are classed as tentative.

recalculated the values as $k_{\text{SMM}}/\text{kg mol}^{-1}$. Both sets of values, which should differ by a factor of three, are given below. The authors recommend a value of $k_{\text{SMM}} = 0.063$. The values are classed as tentative.

T/K	$m_2/\text{mol kg}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$ at pressures of		
		2.41 MPa	3.79 MPa	5.17 MPa
298.15	0.5	0.063	0.073	0.070
	1.0	0.068	0.069	0.066
	2.16	0.061	0.064	0.064
	Average 0.066 ± 0.004			
$k_{\text{SMM}}/\text{kg mol}^{-1}$ at pressures of				
		2.41 MPa	3.79 MPa	5.17 MPa
298.15	0.5	0.188	0.219	0.210
	1.0	0.204	0.207	0.198
	2.16	0.183	0.192	0.192
	Average 0.199 ± 0.012			

13(2) Methane + Magnesium sulfate [7785-87-7] + Water

Stoessel and Byrne (ref 24) measured the solubilities of methane in water and in 0.5 to 1.5 molal aqueous MgSO_4 solutions at 298.15 K and pressures of 2.41, 3.79 and 5.17 MPa. The salt effect parameter shows no definitive trend with changes in either molality or pressure at this temperature.

The authors report the salt effect parameter as a function of ionic strength, $k_{\text{SMM}}/\text{kg mol}^{-1}$, with the ionic strength in molality units. The evaluator has recalculated the salt effect parameter as $k_{\text{SMM}}/\text{kg mol}^{-1}$. The values, which differ by a factor of 4, are given below. The authors recommend the value $k_{\text{SMM}}/\text{kg mol}^{-1} = 0.066$, which is the same as the numerical average of the values, 0.066 ± 0.003 , of all molalities and pressures. The values are classed as tentative.

T/K	$m_2/\text{mol kg}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$ at pressures of		
		2.41 MPa	3.79 MPa	5.17 MPa
298.15	0.5	0.068	0.069	0.058
	1.0	0.066	0.067	0.064
	1.5	0.066	0.067	0.065
	Average 0.066 ± 0.003			
$k_{\text{SMM}}/\text{kg mol}^{-1}$ at pressures of				
		2.41 MPa	3.79 MPa	5.17 MPa
298.15	0.5	0.272	0.276	0.232
	1.0	0.264	0.268	0.256
	1.5	0.264	0.268	0.260
	Average 0.262 ± 0.013			

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<p>93(3) Methane + Magnesium chloride [7786-30-3] + Magnesium sulfate [7785-87-7] + Water</p> <p>Byrne and Stoessell (ref 25) report the solubility of methane in water and in two equal molal mixtures of MgCl₂ (m_2) and MgSO₄ (m_3) at 298.15 K and a pressure of 3.79 MPa. Both k_{sIm} and k_{smm} values of the salt effect parameter are given below. The mixed electrolyte salts out slightly more than one would predict from the salt effect parameter values of the individual electrolytes. The values are classed as tentative.</p>	
$T/K \quad m_2/\text{mol kg}^{-1} \quad m_3/\text{mol kg}^{-1}$ Salt Effect Parameter at 3.79 MPa Pressure	
$k_{sIm}/\text{kg mol}^{-1}$ $k_{smm}/\text{kg mol}^{-1}$	
298.15	0.25 0.25 0.074 0.260
	0.50 0.50 0.070 0.245
<p>94(1) Methane + Calcium chloride [10043-52-4] + Water</p> <p>The solubility of methane in water and in aqueous CaCl₂ solution has been measured by Michels, Gerver and Bijl (ref 3) at 298.15 K in 2.7 mol dm⁻³ CaCl₂ at four pressures up to 21.0 MPa, by N. O. Smith and coworkers at 298.15 and 303.15 K at several concentrations up to saturated CaCl₂ and pressures up to 7.48 MPa in 1961 (ref 7) and at five temperatures between 298.2 and 398.2 K in 1.0 mol kg⁻¹ CaCl₂ at six pressures up to 60.8 MPa in 1978 (ref 17), and by Stoessell and Byrne (ref 24) in 0.5, 1.0 and 2.0 mol kg⁻¹ CaCl₂ at pressures of 2.41, 3.79 and 5.17 MPa.</p>	
<p>The evaluator prepared graphs of the data of Michels <i>et al.</i> (ref 3) and Duffy <i>et al.</i> (ref 7) and calculated the $k_{scx}/\text{dm}^3 \text{mol}^{-1}$ salt effect parameters. The solubility values from both papers showed significant scatter. There is fair agreement between salt effect parameters of the two papers at 298.15 K and 2.5 - 2.7 mol dm⁻³ CaCl₂, but when converted to $k_{smm}/\text{kg mol}^{-1}$ values they are smaller than more recent data. In general, the molar scale values from the two papers are smaller and show more scatter than the data from the more recent papers (ref 17 and 24).</p>	
<p>The data of Blanco C and Smith (ref 17) and Stoessell and Byrne (ref 24) are on a molal basis. Stoessell and Byrne report their salt effect parameters on an ionic strength (molal scale) basis. Both $k_{smm}/\text{kg mol}^{-1}$ and $k_{sIm}/\text{kg mol}^{-1}$ values are given in the following table. The molal scale data show no significant trend with pressure or with salt concentration. At 298.15 K the Stoessell and Byrne value is about 10 percent less than the Blanco C and Smith value. The average values at 298.15 K are 0.215 ± 0.004 and 0.235 ± 0.010 from the two papers regardless of concentration or pressure. The Blanco C and Smith values go through a minimum at 344.15 K.</p>	

Salt Effect Parameters: Methane + Calcium Chloride + water.
 A. Molar ($c_2/\text{mol dm}^{-3}$) Scale.

T/K	$c_2/\text{mol dm}^{-3}$	p_1/MPa	$k_{\text{SCX}}/\text{dm}^3 \text{ mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$	Reference
298.15	0.25	2	0.160		Duffy <i>et al.</i> (7)
		3	0.159		
	0.50	2	0.220		
		3	0.219		
	1.35	2	0.243		
		3	0.240		
	2.5	2	0.194		
		3	0.194		
	2.7	5.6	0.192	(0.165)	Michels <i>et al.</i> (3)
		11.0	0.157	(0.132)	
		15.7	0.155	(0.130)	
		21.0	0.161	(0.136)	
303.15	1.35	2	0.243		Duffy <i>et al.</i> (7)
		3	0.223		
	4.75	2	0.172		
		3	0.168		
	7.35 (sat) ^a	2	0.148		
		3	0.146		

B. Molal ($m_2/\text{mol kg}^{-1}$) Scale.

T/K	$m_2/\text{mol kg}^{-1}$	p_1/MPa	$k_{\text{SMM}}/\text{kg mol}^{-1}$	$k_{\text{SIM}}/\text{kg mol}^{-1}$	Reference
298.15	0.5	2.41	0.213	0.071	Stoessell and Byrne (24)
		3.79	0.219	0.073	
		5.17	0.210	0.070	
		2.41	0.222	0.074	
		3.79	0.213	0.071	
	1.0	5.17	0.213	0.071	Blanco C and Smith (17)
		10.1	0.244		
		20.3	0.225		
		30.4	0.225		
		40.5	0.235		
324.7	1.0	50.7	0.247		Blanco C and Smith (17)
		Av.	0.235 ± 0.010		
		2.41	0.215	0.071	
		3.79	0.216	0.072	
		5.17	0.210	0.070	
		Av.	0.215 ± 0.004	(All S & B data at 298 K)	
		10.1	0.224		
		20.3	0.197		
		30.4	0.197		
		40.5	0.201		
344.2	1.0	50.7	0.203		Blanco C and Smith (17)
		60.8	0.199		
		Av.	0.204 ± 0.010		
		10.1	0.204		
		20.3	0.182		
		30.4	0.182		
		40.5	0.185		
		50.7	0.187		
		60.8	0.184		
		Av.	0.187 ± 0.008		
375.7	1.0	10.1	0.211		Blanco C and Smith (17)
		20.3	0.187		
		30.4	0.190		
		40.5	0.198		
		50.7	0.203		
		60.8	0.201		
		Av.	0.198 ± 0.009		
		10.1	0.222		
		20.3	0.199		
		30.4	0.203		
398.15	1.0	40.5	0.212		Blanco C and Smith (17)
		50.7	0.217		
		60.8	0.215		
		Av.	0.211 ± 0.009		

COMPONENTS:	EVALUATOR:
(1) Methane; CH ₄ ; [74-82-8] (2) Electrolyte (3) Water; H ₂ O; [7732-18-5]	H. Lawrence Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1985, March

CRITICAL EVALUATION:

The Michels *et al.* and the Duffy *et al.* data are classed as doubtful and the Blanco C and Smith and the Stoessell and Byrne data are classed as tentative. Although the Stoessell and Byrne data show a better standard deviation, the Blanco C and Smith data are preferred because they cover both a large temperature and pressure range.

94(2) Methane + Magnesium chloride [7786-30-3]

+ Calcium chloride [10043-52-4] + Water

Byrne and Stoessell (ref 25) report the solubility of methane in water and in an equal molar mixture of MgCl₂ (m_2) and CaCl₂ (m_3) in water at 298.15 K and a pressure of 3.79 MPa. Both k_{SIm} and k_{SMM} values of the salt effect parameter are given below. The values are classed as tentative.

T/K	Salt Effect Parameter at 3.79 MPa			
	$m_2/\text{mol kg}^{-1}$	$m_3/\text{mol kg}^{-1}$	$k_{\text{SIm}}/\text{kg mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$
298.15	1.0	1.0	0.074	0.223

98(1) Methane + Lithium chloride [7447-41-8] + Water

The solubility of methane in water and aqueous LiCl solutions is reported by Michels, Gerver and Bijl (ref 3), Morrison and Billett (ref 6) and Ben-Naim and Yaacobi (ref 15).

Values of the salt effect parameter from their work are summarized below. Values in () were calculated by the evaluator.

T/K	Lithium chloride		Salt Effect Parameter				Ref	
	$c_2/\text{mol dm}^{-3}$	$m_2/\text{mol kg}^{-1}$	P_1/MPa	k_{SCC}	k_{SCX}	k_{SMM}	k_{SMX}	
283.15	1.0	-	0.1	0.121	(0.129)	(0.112)	(0.127)	(15)
285.15	-	1.0	0.1	(0.139)	-	0.130	0.145	(6)
288.15	1.0	-	0.1	0.115	-	-	-	(15)
293.15	1.0	-	0.1	0.111	-	-	-	(15)
298.15	1.0	-	0.1	0.109	(0.117)	0.099	(0.114)	(15)
	2.7	-	4.80	(0.138)	0.145	-	-	(3)
	-	-	10.15	(0.077)	0.084	-	-	(3)
	-	-	14.70	(0.057)	0.064	-	-	(3)
	-	-	19.78	(0.050)	0.057	-	-	(3)
303.15	1.0	-	0.1	0.108	-	(0.098)	(0.113)	(15)
	-	1.0	0.1	(0.107)	(0.115)	0.097	0.112	(6)
322.55	-	1.0	0.1	-	-	0.082	0.097	(6)
344.85	-	1.0	0.1	-	-	0.077	0.092	(6)

At 298 and 303 K the values of Ben-Naim and Yaacobi and of Morrison and Billett agree to within one percent when converted to a common salt effect parameter as k_{SMX} or k_{SMM} . At 283/285 K their values differ by 15 percent. The values of Michels *et al.* cannot be compared directly with the others without knowledge of the compressibility of the aqueous LiCl solutions.

99(1) Methane + Sodium chloride [7647-14-5] + Water

The solubility of methane in water and aqueous NaCl solution is reported in twelve papers. The salt effect parameters as a function of temperature, pressure and NaCl concentration are summarized in the following table. The table is in two parts; part A gives the results from seven papers on a salt molar ($c_2/\text{mol dm}^{-3}$) basis and part B was the results from five papers on a salt molal ($m_2/\text{mol kg}^{-1}$) basis.

Salt Effect Parameters. Methane + Sodium Chloride + water.

A. Molar Scale.

T/K	$c_2/\text{mol dm}^{-3}$	p_1/MPa	$k_{\text{SCC}}/\text{dm}^3 \text{ mol}^{-1}$	$k_{\text{SCX}}/\text{dm}^3 \text{ mol}^{-1}$	Reference
277.15	1.06	0.1	0.162		Mishnina <i>et al.</i> (9)
	2.10	0.1	0.157		
	3.08	0.1	0.161		
	4.12	0.1	0.167		
	5.31	0.1	0.165		
283.15	1.06	0.1	0.150		Mishnina <i>et al.</i> (9)
	2.10	0.1	0.156		
	3.08	0.1	0.155		
	4.12	0.1	0.155		
	5.31	0.1	0.162		
	0.25	0.1	0.177		Ben-Naim, Yaccobi (15)
	0.50	0.1	0.166		
	1.0	0.1	0.167		
	2.0	0.1	0.162		
	0.25	0.1	0.167		
288.15	0.50	0.1	0.159		Ben-Naim, Yaccobi (15)
	1.0	0.1	0.160		
	2.0	0.1	0.156		
	0.25	0.1	0.138		Mishnina <i>et al.</i> (9)
293.15	1.77	0.1	0.148		
	2.60	0.1	0.149		
	3.90	0.1	0.147		
	5.31	0.1	0.145		
	0.25	0.1	0.160		Ben-Naim, Yaccobi (15)
298.15	0.50	0.1	0.151		
	1.0	0.1	0.154		
	2.0	0.1	0.149		
	0.50	0.1	0.158		Ben-Naim, Yaccobi (15)
	1.00	0.1	0.146		
303.15	1.50	0.1	0.163		Yano <i>et al.</i> (16)
	2.5	10		0.117	
		15		0.096	
		20		0.097	
	5.4	10		0.114	
		15		0.106	Michaels <i>et al.</i> (3)
		20		0.115	
	1.04	0.1	0.135		
	2.00	0.1	0.135		Mishnina <i>et al.</i> (9)
	2.60	0.1	0.139		
323.15	3.90	0.1	0.137		
	5.31	0.1	0.135		
	0.25	0.1	0.158		Ben-Naim, Yaccobi (15)
	0.50	0.1	0.142		
	1.0	0.1	0.145		
	2.0	0.1	0.138		
	0.50	1,2,3,4		0.158±0.041	Duffy <i>et al.</i> (7)
	1.0	1,2,3,4		0.154±0.025	
	2.7	1,2,3,4		0.107±0.013	
	5.4	1,2,3,4		0.103±0.006	
323.15	1.02	0.1	0.131		Mishnina <i>et al.</i> (9)
	1.98	0.1	0.134		
	2.80	0.1	0.130		
	3.90	0.1	0.131		
	5.31	0.1	0.129		
	1.00	29.5		0.108	Namiot <i>et al.</i> (21)

Methane + Sodium Chloride + Water
 A. Molar Scale (continued)

<i>T/K</i>	$\sigma_2/$ mol dm^{-3}	p_1/MPa	$k_{\text{SCC}}/$ $\text{dm}^3 \text{mol}^{-1}$	$k_{\text{SCX}}/$ $\text{dm}^3 \text{mol}^{-1}$	Reference
323.15 (cont.)	2.5	10		0.100	Michaels <i>et al.</i> (3)
		15		0.097	
		20		0.093	
	5.4	10		0.105	
		15		0.103	
		20		0.101	
	1.0	10.1		0.123	
		20.3		0.129	
		30.4		0.128	
		40.5		0.126	
		50.7		0.126	
		60.8		0.125	
		20.3		0.113	
		30.4		0.115	
		40.5		0.115	
		50.7		0.114	
		60.8		0.113	
342.15	1.02	0.1	0.129		Mishnina <i>et al.</i> (9)
	1.98	0.1	0.121		
	3.95	0.1	0.121		
	5.31	0.1	0.126		
348.15	2.5	10		0.100	Michaels <i>et al.</i> (3)
		15		0.095	
		20		0.093	
	5.4	10		0.102	
		15		0.101	
		20		0.099	
	1.02	0.1	0.111		Mishnina <i>et al.</i> (9)
		2.12	0.1	0.112	
		3.28	0.1	0.108	
		5.31	0.1	0.108	
363.15	1.06	0.1	0.108		Mishnina <i>et al.</i> (9)
	2.10	0.1	0.107		
	3.08	0.1	0.113		
	5.31	0.1	0.113		
	1.0	29.5		0.114	Namiot <i>et al.</i> (21) Michaels <i>et al.</i> (3)
	2.5	10		0.105	
		15		0.098	
		20		0.092	
	5.4	10		0.103	
		15		0.100	
		20		0.098	
375.65	1.0	20.4		0.115	O'Sullivan, Smith (13)
		30.6		0.112	
		40.8		0.113	
		51.0		0.125	
		61.2		0.117	
		20.4		0.107	
	4.0	30.6		0.106	
		40.8		0.110	
		51.0		0.116	
		61.2		0.116	
398.15	2.5	10		0.115	Michaels <i>et al.</i> (3)
		15		0.105	
		20		0.099	
		5.4		0.105	
	5.4	10		0.101	
		15		0.099	
		20		0.099	
	1.0	10.4		0.132	O'Sullivan, Smith (13)
		20.7		0.122	
		30.9		0.124	
		41.0		0.120	
		51.4		0.129	
		61.6		0.122	

Methane + Sodium Chloride + Water
 A. Molar Scale (continued)

T/K	$c_2/$ mol dm ⁻³	p_1/MPa	$k_{\text{SCC}}/$ dm ³ mol ⁻¹	$k_{\text{SCX}}/$ dm ³ mol ⁻¹	Reference
398.15 (cont.)	4.0	20.7	0.112		
		30.9	0.117		O'Sullivan, Smith (13)
		41.0	0.117		
		51.4	0.119		
		61.6	0.119		
423.15	2.5	10	0.145		
		15	0.109		Michaels <i>et al.</i> (3)
		20	0.106		
		5.4	0.104		
	1.0	10	0.102		
		15	0.102		
		20	0.099		
		1.0	0.098		Namiot <i>et al.</i>
473.15	1.0	29.5	0.084		Namiot <i>et al.</i>
523.15	1.0	29.5	0.134		Namiot <i>et al.</i>
573.15	1.0	29.5	0.205		Namiot <i>et al.</i>
623.15	1.0	29.5	0.295		Namiot <i>et al.</i> (21)

B. Molal Scale

T/K	$m_2/$ mol kg ⁻¹	p_1/MPa	$k_{\text{SMC}}/$ kg mol ⁻¹	$k_{\text{SMM}}/$ kg mol ⁻¹	$k_{\text{SMX}}/$ kg mol ⁻¹	Reference
273.15	0.68	0.1	0.188			
	1.37	0.1	0.178			Eucken, Hertzberg (5)
	2.77	0.1	0.186			
	0.81-4.70	1.9-3.3		(0.150)	0.165	Cramer (26)
	285.75	1.0	0.1	0.153	(0.168)	Morrison, Billett (6)
293.15	0.795	0.1	0.163			Eucken, Hertzberg (5)
	2.63	0.1	0.157			
	0.81-4.70	2.2-4.1		(0.126)	0.141	Cramer (26)
	298.15	0.5	2.41	0.101		
		3.79	0.138			Stoessell, Byrne (24)
		5.17	0.117			
	1.0	2.41	0.116			
		3.79	0.137			
		5.17	0.124			
	2.0	2.41	0.124			
		3.79	0.125			
		5.17	0.124			
	4.0	2.41	0.120			
		3.79	0.122			
		5.17	0.119			
303.15			0.122±0.010	(0.137)		
	1.0	0.1	0.127	(0.142)		Morrison, Billett (6)
313.15	0.81-4.70	1.1-4.1	(0.112)	0.127		Cramer (26)
322.55	1.0	0.1	0.111	(0.126)		Morrison, Billett (6)
333.15	0.81-4.70	1.1-3.9	(0.104)	0.119		Cramer (26)
344.85	1.0	0.1	0.102	(0.117)		Morrison, Billett (6)
353.15	0.81-4.70	1.1-4.0	(0.101)	0.116		Cramer (26)
373.15	0.81-4.70	1.1 5.5	(0.101)	0.116		Cramer (26)
	0.05-5.7	13.6-153	0.103	(0.118)		Blount <i>et al.</i> (18,23)

Methane + Sodium Chloride + Water
 B. Molal Scale (continued)

T/K	$m_2/$ mol kg^{-1}	p_1/MPa	$k_{\text{smc}}/$ kg mol^{-1}	$k_{\text{smm}}/$ kg mol^{-1}	$k_{\text{smx}}/$ kg mol^{-1}	Reference
393.15	0.81-4.70	1.2-5.4		(0.103)	0.118	Cramer (26)
407	0.05-5.7	13.6-153		0.103	(0.118)	Blount <i>et al.</i> (18,23)
413.15	0.81-4.70	1.1-6.3		(0.107)	0.122	Cramer (26)
433.15	0.81-4.70	1.1-5.5		(0.111)	0.126	Cramer (26)
444	0.05-5.7	13.6-153		0.103	(0.118)	Blount <i>et al.</i> (18,23)
453.15	0.81-4.70	5.7-6.8		(0.115)	0.130	Cramer (26)
473.15	0.81-4.70	5.7-7.1		(0.119)	0.134	Cramer (26)
478	0.05-5.7	13.6-153		0.103	(0.118)	Blount <i>et al.</i> (18,23)
493.15	0.81-4.70	7.3-8.9		(0.121)	0.136	Cramer (26)
512	0.05-5.7	13.6-153		0.103	(0.118)	Blount <i>et al.</i> (18,23)
513.15	0.81-4.70	6.9-8.9		(0.122)	0.137	Cramer (26)
533.15	0.81-4.70	6.9-8.9		(0.121)	0.136	Cramer (26)
553.15	0.81-4.70	10.1-12.0		(0.118)	0.133	Cramer (26)
573.15	0.81-4.70	11.9-13.2		(0.113)	.128	Cramer (26)

Values in () calculated by the compiler.

COMPONENTS:	EVALUATOR:
(1) Methane; CH ₄ ; [74-82-8] (2) Electrolyte (3) Water; H ₂ O; [7732-18-5]	H. Lawrence Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1985, March

CRITICAL EVALUATION:

Molar Scale. All of the results are classed as tentative, but the salt effect parameters based on the work of Michels, Gerver and Bijl (ref 3), Duffy, Smith and Nagy (ref 7), and the Yano, Suetaka, Umehara and Horiuchi (ref 16) at 0.50 molar are considered less reliable than the other values. Mishnina, Avdeeva, and Bozhovskaya (ref 8,9) give salt effect parameters in two papers. The values in (ref 8) appear to be an average based on their result in (ref 9) and the results of Morrison and Billelt (ref 6). Only the values based on the experimental solubility values in (ref 9) are given in the table.

The results of Mishnina *et al.* (ref 9), O'Sullivan and Smith (ref 13), Ben-Naim and Yaacobi (ref 15) and Namiot, Skripka and Ashmyan (ref 21) do not always agree well, but they do show similar trends with temperature, pressure and sodium chloride concentration.

Molal Scale. Again all of the data are classed as tentative. The solubility data of Blount *et al.* (ref 18, 23) show the most scatter. They propose an average solubility parameter of $k_{\text{smm}}^{\text{smm}}/\text{kg mol}^{-1} = 0.1025 \pm 0.0047$ for all pressure and NaCl concentrations between temperatures of 373 and 512 K, while Cramer's (ref 26) data show a steady increase from 0.101 to 0.122 over the temperature range. Blount *et al.* (ref 23) point out that Susak and McGee (ref 28) calculate a $k_{\text{smm}}^{\text{smm}}$ value of (0.120 ± 0.003) from data compiled and evaluated by Haas (ref 27) at these temperatures.

The data of Eucken and Hertzberg (ref 5), Morrison and Billelt (ref 6), Stoessell and Byrne (ref 24), and Cramer (ref 26) show similar trends. Neither increasing sodium chloride molality nor pressure seem to affect the salt effect parameter at a given temperature.

The work of Namiot *et al.* (ref 21) and Cramer (ref 26) covers temperatures up to 623 and 573 K respectively. The two data sets are not directly comparable because one is on the molar scale and the other the molal scale. Both groups have taken fugacity into account. The $k_{\text{scx}}^{\text{scx}}$ values of Namiot *et al.* are much larger than the $k_{\text{smx}}^{\text{smx}}$ values of Cramer at the highest temperatures. Cramer's values actually show a slight decrease with temperature. More work is needed on salt effect parameters at the high temperatures and pressures.

99(2) Methane + Magnesium chloride [7786-30-3]

+ Sodium chloride [7647-14-5] + Water

Byrne and Stoessell (ref 15) report the solubility of methane in water and in an equal molal mixture of MgCl₂ and NaCl at 298.15 K and a pressure of 3.79 MPa. The value of $k_{\text{sIm}}^{\text{sIm}}$ and $k_{\text{smm}}^{\text{smm}}$ are classed as tentative.

T/K	MgCl ₂	NaCl	Salt Effect Parameter at 3.79 MPa Pressure
298.15	1.0	1.0	0.066 0.137

99(3) Methane + Calcium chloride [10043-52-4]

+ Sodium chloride [7647-14-5] + Water

Duffy, Smith and Nagy (ref 7) report the solubility of methane in water and an aqueous solution that is 3.0 mol dm⁻³ CaCl₂ and 1.53 mol dm⁻³ NaCl at 303 K and pressures of 2.54 and 3.17 MPa. Byrne and Stoessell (ref 25) report the solubilities in equi molal solution of CaCl₂ and NaCl at 298.15 K and 3.79 MPa. No effort was made to directly compare the results. The values are classed as tentative.

T/K	CaCl ₂	NaCl	P ₁ /MPa	Salt Effect Parameter		
	c ₂ /mol dm ⁻³	c ₃ /mol dm ⁻³		k _{scx}	k _{xIm}	k _{smm}
	or	or	m ₂ /mol kg ⁻¹	m ₃ /mol kg ⁻¹	k _{scx}	
298.15	1.0(m)	1.0 (m)	3.79		0.086(m)	0.172
303.15	3.0(c)	1.53(c)	2.54	0.155	0.067(x)	
			5.19	0.144	0.062(x)	

99(4) Methane + Sodium bromide [7647-15-6] + Water

Both Michels, Gerver and Bijl (ref 3) and Ben-Naim and Yaacobi (ref 15) have measured the solubility of methane in water and in aqueous NaBr solution. Salt effect parameters from their work are given below.

T/K	c ₂ /mol dm ⁻³	P ₁ /MPa	Salt Effect Parameters	
			k _{scc} /dm ³ mol ⁻¹	k _{scx} /dm ³ mol ⁻¹
283.15	1.0	0.1	0.165	-
288.15	1.0	0.1	0.157	-
293.15	1.0	0.1	0.149	-
298.15	1.0	0.1	0.142	-
	2.7	52.8	-	0.152
	-	102.6	-	0.131
	-	153.6	-	0.118
	-	200.4	-	0.117
303.15	1.0	0.1	0.136	-

The two data sets are not directly comparable because of differences in NaBr concentration and methane pressure. The data are classed as tentative, but we prefer the values of Ben-Naim and Yaacobi measured at 0.1 MPa for use because they give a self-consistent set of values for use over the 283-303 K temperature interval.

99(5) Methane + Sodium iodide [7681-82-5] + Water

Both Michels, Gerver and Bijl (ref 3) and Ben-Naim and Yaacobi (ref 15)

COMPONENTS:	EVALUATOR:
(1) Methane; CH ₄ ; [74-82-8] (2) Electrolyte (3) Water; H ₂ O; [7732-18-5]	H. Lawrence Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1985, March

CRITICAL EVALUATION:

have measured the solubility of methane in water and aqueous NaI solution. The salt effect parameters calculated by the evaluator from their data are given below.

T/K	$c_2/\text{mol dm}^{-3}$	P_1/mPa	Salt Effect Parameter	
			$k_{\text{SCC}}/\text{dm}^3 \text{ mol}^{-1}$	$k_{\text{SCX}}/\text{dm}^3 \text{ mol}^{-1}$
283.15	1.0	0.1	0.160	-
288.15	1.0	0.1	0.152	-
293.15	1.0	0.1	0.142	-
298.15	1.0	0.1	0.130	-
	2.7	56.2	-	0.113
	-	111.7	-	0.086
	-	152.0	-	0.074
	-	204.9	-	0.064
303.15	1.0	0.1	0.118	-

It is somewhat unusual to observe a low molecular weight gas salted out more by NaI than NaBr as is the case with the Ben-Naim and Yaacobi data. However, our recommendation is the same as with the NaBr data above. The salt effect parameters are classed as tentative but we prefer the Ben-Naim and Yaacobi values measured at 0.1 MPa because they give a self-consistent set of values for use over the 283-303 K temperature interval.

99(6) Methane + Sodium Sulfate [7757-82-6] + Water

Mishnina, Audeeva and Bozhovskaya (ref 9) and Stoessell and Byrne (ref 24) report the solubility of methane in water and aqueous Na₂SO₄ solutions at temperatures of 293 and 298 K, respectively.

T/K	$c_2/\text{mol dm}^{-3}$	P_1/MPa	Salt Effect Parameters		
			$k_{\text{SCC}}/\text{dm}^3 \text{ mol}^{-1}$	$k_{\text{SIm}}/\text{kg mol}^{-1}$	$k_{\text{SMm}}/\text{kg mol}^{-1}$
293.15	0.48 (c_2)	0.1	0.391	-	(0.376)
	0.90 (c_2)	0.1	0.390	-	(0.375)
298.15	0.5 (m_2)	2.41	-	0.120	0.359
	1.0 (m_2)	2.41	-	0.124	0.373
	0.5 (m_2')	3.79	-	0.127	0.381
	1.0 (m_2')	3.79	-	0.122	0.366
	0.5 (m_2'')	5.17	-	0.120	0.360
	1.0 (m_2'')	5.17	-	0.116	0.348
Average 0.122 ± 0.004 (Authors)					
Average 0.365 ± 0.012					

The Mishnina *et al.* k_{SCC} values when converted to k_{SMM} values agree well with the Stoessell and Byrne values, although they were measured under quite different pressures and temperatures that differed by 5 K. Both sets of values are classed as tentative.

99(7) Methane + Sulfuric acid [7664-93-9]

+ Sodium sulfate [7757-82-6] + Water

Kobe and Kenton (ref 4) measured the solubility of methane in a solution that was 0.90 mol kg^{-1} H_2SO_4 and 1.76 mol kg^{-1} Na_2SO_4 at 298.15 K. The salt effect parameter $k_{\text{SMM}}/\text{kg mol}^{-1} = 0.20$ is classed as tentative.

99(8) Methane + Magnesium sulfate [7785-87-7]

+ Sodium sulfate [7757-82-6] + Water

Stoessell and Byrne (ref 24) report the following salt effect parameter for the $\text{MgSO}_4 + \text{Na}_2\text{SO}_4$ mixed electrolyte solvent at 298.15 K and 3.79 MPa. The value is classed as tentative.

T/K	$m_2/\text{mol kg}^{-1}$	$m_3/\text{mol kg}^{-1}$	P_1/MPa	Salt Effect Parameter	
				$k_{\text{SIM}}/\text{kg mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$
298.15	0.5	0.5	3.79	0.097	0.340

19(9) Methane + Sodium chloride [7647-14-5]

+ Sodium sulfate [7757-82-6] + Water

Stoessell and Byrne (ref 24) report the following salt effect parameters for $\text{NaCl} + \text{Na}_2\text{SO}_4$ at 298.15 K and 3.79 MPa. The value is classed as tentative.

T/K	$m_2/\text{mol kg}^{-1}$	$m_3/\text{mol kg}^{-1}$	P_1/MPa	Salt Effect Parameter	
				$k_{\text{SIM}}/\text{kg mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$
298.15	1.0	1.0	3.79	0.111	0.223

99(10) Methane + Sodium bicarbonate [144-55-8] + Water

Stoessell and Byrne (ref 24) report the solubility of methane in water and in aqueous NaHCO_3 solution at 298.15 K and methane partial pressures of 2.41, 3.79 and 5.17 MPa. The salt effect parameters are classed as tentative.

COMPONENTS:		EVALUATOR:		
(1) Methane; CH ₄ ; [74-82-8]		H. Lawrence Clever Department of Chemistry Emory University Atlanta, GA 30322 USA		
(2) Electrolyte				
(3) Water; H ₂ O; [7732-18-5]		1985, March		
CRITICAL EVALUATION:				
T/K	$m_2/\text{mol kg}^{-1}$	P_1/MPa	$k_{\text{SIm}} \text{ or } k_{\text{Smm}}/\text{kg mol}^{-1}$	
298.15 0.25 2.41 0.130 0.50 0.145 0.25 3.79 0.123 0.50 0.164 0.25 5.17 0.132 0.50 0.129 Authors 0.146 Average 0.137 ± 0.015				
For a 1-1 electrolyte k_{SIm} and k_{Smm} will be the same.				
99(11) Methane + Sodium carbonate [497-19-8] + Water				
Stoessel and Byrne (ref 24) measured the solubility of methane in water and several aqueous Na ₂ CO ₃ solutions at 298.15 K and methane partial pressures of 2.41, 3.79 and 5.17 MPa. The solubility parameters calculated from these data are classed as tentative.				
T/K	$m_2/\text{mol kg}^{-1}$	P_1/MPa	Salt Effect Parameters	
			$k_{\text{SIm}}/\text{kg mol}^{-1}$	$k_{\text{Smm}}/\text{kg mol}^{-1}$
298.15 0.5 2.41 0.120 0.360 1.0 0.124 0.372 1.5 0.121 0.363 0.5 3.79 0.127 0.381 1.0 0.125 0.375 1.5 0.114 0.342 0.5 5.17 0.125 0.375 1.0 0.125 0.375 1.5 0.118 0.354				
Average (0.122 ± 0.004)				
Authors 0.118				
99(12) Water + Sodium chloride [7647-14-5]				
+ Sodium carbonate [497-19-8] + Water				
Stoessell and Byrne (ref 24) report the following salt effect				

parameters for the NaCl + Na₂CO₃ mixed electrolyte solvent at 298.15 K and a methane partial pressure of 3.79 MPa. The value is classed as tentative.

T/K	NaCl	Na ₂ CO ₃	P ₁ /MPa	Salt Effect Parameter	
	$m_2/\text{mol kg}^{-1}$	$m_3/\text{mol kg}^{-1}$		$k_{\text{SIm}}/\text{kg mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$
298.15	1.0	1.0	3.79	0.113	0.225

99(13) Methane + Sodium sulfate [7757-82-6]

+ Sodium carbonate [497-19-8] + Water

Stoessell and Byrne (ref 24) report the following salt effect parameter for the Na₂SO₄ + Na₂CO₃ mixed electrolyte solvent at 298.15 K and at methane partial pressure of 3.79 MPa. The value is classed as tentative.

T/K	Na ₂ SO ₄	Na ₂ CO ₃	P ₁ /MPa	Salt Effect Parameter	
	$m_2/\text{mol kg}^{-1}$	$m_3/\text{mol kg}^{-1}$		$k_{\text{SIm}}/\text{kg mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$
298.15	0.5	0.5	3.79	0.120	0.360

100(1) Methane + Potassium hydroxide [1310-58-3] + Water

Shoor, Walker and Gubbins (ref 11) measured the solubility of methane in water and up to 10 molar KOH solution at four temperatures between 298 and 353 K. Their salt effect parameters as $k_{\text{SCX}}/\text{dm}^3 \text{ mol}^{-1}$ values are classed as tentative.

KOH	Salt Effect Parameters $k_{\text{SCX}}/\text{dm}^3 \text{ mol}^{-1}$ at temperatures of			
$c_2/\text{mol dm}^{-3}$	298.15 K	313.15 K	333.15 K	353.15 K
1.03	0.214	0.174	0.165	0.139
2.77	0.203	0.179	0.163	0.144
5.13	0.197	0.177	0.164	0.154
7.35	0.194	0.176	0.166	0.158
10.15	0.198	0.178	0.168	0.156
Average	$(0.201 \pm 0.008)(0.177 \pm 0.002)(0.165 \pm 0.002)(0.151 \pm 0.009)$			
Author's value	0.197	0.176	0.164	0.154

100(2) Methane + Potassium chloride [7447-40-7] + Water

Four papers report data of the solubility of methane in water and aqueous KCl solutions. Three of the papers use a molar ($c_2/\text{mol dm}^{-3}$) scale and one a molal ($m_2/\text{mol kg}^{-1}$) scale. Two report values from solubility measurements at one atm. while two report values as a function of pressure.

The data of Michels *et al.* (ref 3) show the most scatter and are the least reliable. At 298.15 K the data of Stoessell and Byrne (ref 24) average $k_{\text{SMM}}/\text{kg mol}^{-1} = (0.111 \pm 0.010)$, but the authors suggest the value 0.101, based primarily on the 4.0 molal KCl solution for use. Yano *et al.*

COMPONENTS:	EVALUATOR:
(1) Methane; CH ₄ ; [74-82-8]	H. Lawrence Clever
(2) Electrolyte	Department of Chemistry
(3) Water; H ₂ O; [7732-18-5]	Emory University Atlanta, GA 30322 USA

1985, March

CRITICAL EVALUATION:

(ref 16) suggest a value of $k_{\text{scc}} / \text{dm}^3 \text{ mol}^{-1} = 0.137$ which agrees well with the Ben-Naim and Yaacobi (ref 15) value of $k_{\text{scc}} / \text{dm}^3 \text{ mol}^{-1} = 0.138$. The last two values are equivalent to $k_{\text{sum}} / \text{kg mol}^{-1} = 0.120 - 0.121$ which is about 8 percent larger than the Stoessell and Byrne value.

All of the data are classed as tentative but the salt effect parameters of Ben-Naim and Yaacobi are preferred because they are a set of self-consistent values for use over a 20 degree temperature interval.

T/K	$c_2/\text{mol dm}^{-3}$	P_1/MPa	Salt Effect Parameter				Ref
			k_{scc}	k_{scx}	k_{sIm}	k_{smm}	
283.15	1.0	0.1	0.156	-	-	-	15
288.15	1.0	0.1	0.147	-	-	-	15
293.15	1.0	0.1	0.141	-	-	-	15
298.15	1.0	0.1	0.138	-	-	(0.121)	15
298.15	0.5	0.1	0.128	-	-	-	16
	1.0	0.1	0.139	-	-	-	16
	1.5	0.1	0.140	-	-	-	16
298.15	0.5 (m)	2.41	-	-	0.107	0.107	24
	1.0 (m)	-	-	-	0.111	0.111	24
	2.0 (m)	-	-	-	0.108	0.108	24
	4.0 (m)	-	-	-	0.101	0.101	24
	0.5 (m)	3.79	-	-	0.130	0.130	24
	1.0 (m)	-	-	-	0.129	0.129	24
	2.0 (m)	-	-	-	0.112	0.112	24
	4.0 (m)	-	-	-	0.104	0.104	24
298.15	0.5 (m)	5.17	-	-	0.108	0.108	24
	1.0 (m)	-	-	-	0.114	0.114	24
	2.0 (m)	-	-	-	0.111	0.111	24
	4.0 (m)	-	-	-	0.100	0.100	24
	2.7	4.85	-	0.119	-	-	3
298.15	-	9.85	-	0.098	-	-	3
	-	15.07	-	0.084	-	-	3
	-	20.06	-	0.110	-	-	3
	303.15	1.0	0.1	0.138	-	-	15

100(3) Methane + Magnesium chloride [7786-30-3]

+ Calcium chloride [10043-52-4]

+ Sodium chloride [7647-14-5]

+ Potassium chloride [7447-40-7] + Water

Stoessel and Byrne (ref 24) report the following salt effect parameter

for the $MgCl_2 + CaCl_2 + NaCl + KCl$ mixed electrolyte solvent at 298.15 K and a methane partial pressure of 3.79 MPa. The value is classed as tentative.

T/K	m_2	m_3	m_4	m_5	P_1/MPa	$k_{\text{SIM}}/\text{kg mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$
298.15	0.5	0.5	0.5	0.5	3.79	0.074	0.147

100(4) Methane + Sodium chloride [7647-14-5]

+ Potassium chloride [7447-40-7] + Water

Stoessell and Byrne (ref 24) report the following salt effect parameter for the $NaCl + KCl$ mixed electrolyte solvent at 298.15 K and a methane partial pressure 3.79 MPa. The value is classed as tentative.

T/K	NaCl	KCl	P_1/MPa	Salt Effect Parameter	
	$m_2/\text{mol kg}^{-1}$	$m_3/\text{mol kg}^{-1}$		$k_{\text{SIM}}/\text{kg mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$
298.15	1.0	1.0	3.79	0.114	0.114

100(5) Methane + Potassium iodide [7681-11-0] + Water

Morrison and Billett (ref 6) measured the solubility of methane in water and one mol kg^{-1} KI solution at four temperatures. The salt effect parameters are classed as tentative.

T/K	KI	P_1/MPa	Salt Effect Parameter	
	$m_2/\text{mol kg}^{-1}$		$k_{\text{SMM}}/\text{kg mol}^{-1}$	$k_{\text{SMX}}/\text{kg mol}^{-1}$
285.75	1.0	0.1	0.130	0.145
303.15	1.0	0.1	0.097	0.112
322.55	1.0	0.1	0.071	0.086
344.85	1.0	0.1	0.064	0.069

100(6) Methane + Potassium sulfate [7778-80-5] + Water

Stoessel and Byrne (ref 24) measured the solubility of methane in water and in K_2SO_4 solution at several concentrations and methane partial pressures. The salt effect parameters from their data are classed as tentative.

COMPONENTS:	EVALUATOR:
(1) Methane; CH ₄ ; [74-82-8] (2) Electrolyte (3) Water; H ₂ O; [7732-18-5]	H. Lawrence Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1985, March

CRITICAL EVALUATION:

T/K	$m_2/\text{mol kg}^{-1}$	P_1/MPa	Salt Effect Parameter	
			$k_{\text{SIm}}/\text{kg mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$
298.15	0.25	2.41	0.116	0.348
	0.50	-	0.104	0.312
	0.25	3.79	0.119	0.357
	0.50	-	0.115	0.345
	0.25	5.17	0.105	0.315
	0.50	-	0.104	0.312
Average 0.111 ± 0.007				
Authors 0.108				

100(7) Methane + Magnesium sulfate [7785-87-7]

+ Potassium sulfate [7778-80-5] + Water

Stoessell and Byrne (ref 24) report the following salt effect parameter for the MgSO₄ + K₂SO₄ mixed electrolyte solvent at 298.15 K and a methane partial pressure of 3.79 MPa. The value is classed as tentative.

T/K	$m_2/\text{mol kg}^{-1}$	$m_3/\text{mol kg}^{-1}$	P_1/MPa	Salt Effect Parameter	
				$k_{\text{SIm}}/\text{kg mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$
298.15	0.25	0.25	3.79	0.084	0.292

100(8) Methane + Sodium sulfate [7757-82-6]

+ Potassium sulfate [7778-80-5] + Water

Stoessell and Byrne (ref 24) report the following value for the salt effect parameter for the Na₂SO₄ + K₂SO₄ mixed electrolyte solution at 298.15 K and a methane partial pressure of 3.79 MPa. The value is classed as tentative.

T/K	Na ₂ SO ₄ $m_2/\text{mol kg}^{-1}$	K ₂ SO ₄ $m_3/\text{mol kg}^{-1}$	P_1/MPa	Salt Effect Parameter	
				$k_{\text{SIm}}/\text{kg mol}^{-1}$	$k_{\text{SMM}}/\text{kg mol}^{-1}$
298.15	0.25	0.25	3.79	0.117	0.351

100(9) Methane + Potassium bicarbonate [298-14-6] + Water

Stoessell and Byrne (ref 24) measured the solubility of methane in water and aqueous KHCO_3 solutions at 298.15 K and methane partial pressures of 2.41, 3.79 and 5.17 MPa. The salt effect parameters calculated from their data are classed as tentative.

T/K	$m_2/\text{mol kg}^{-1}$	P_1/MPa	Salt Effect Parameter	
			$k_{\text{sIm}}/\text{kg mol}^{-1}$	$k_{\text{smm}}/\text{kg mol}^{-1}$
298.15	0.25	2.41	0.130	0.130
	0.50	-	0.131	0.131
	0.25	3.79	0.096	0.096
	0.50	-	0.151	0.151
	0.25	5.17	0.125	0.125
	0.50	-	0.132	0.132
				Average (0.128 ± 0.018)
				Authors 0.145

100(10) Methane + Potassium carbonate [584-08-7] + Water

Stoessell and Byrne (ref 24) measured the solubility of methane in water and in aqueous K_2CO_3 solution of three concentrations at 298.15 K and methane partial pressures of 2.41, 3.79 and 5.17 MPa. The salt effect parameters calculated from their solubility data are classed as tentative.

T/K	$m_2/\text{mol kg}^{-1}$	P_1/MPa	Salt Effect Parameters	
			$k_{\text{sIm}}/\text{kg mol}^{-1}$	$k_{\text{smm}}/\text{kg mol}^{-1}$
298.15	0.5	2.41	0.109	0.327
	1.0	-	0.117	0.351
	2.0	-	0.107	0.321
	0.5	3.79	0.116	0.348
	1.0	-	0.116	0.348
	2.0	-	0.112	0.336
	0.5	5.17	0.107	0.321
	1.0	-	0.109	0.327
	2.0	-	0.114	0.342
			Average (0.112 ± 0.004)	
			Authors 0.111	

100(11) Methane + Potassium chloride [7447-40-7]

+ Potassium carbonate [584-08-7] + Water

Stoessell and Byrne (ref 24) report the following value of the salt effect parameter for the $\text{KCl} + \text{K}_2\text{CO}_3$ mixed electrolyte solution at 298.15 K and a methane partial pressure of 3.79 MPa. The value is classed as tentative.

COMPONENTS:		EVALUATOR:	
(1) Methane; CH ₄ ; [74-82-8]		H. Lawrence Clever Department of Chemistry Emory University Atlanta, GA USA	
(2) Electrolyte			
(3) Water; H ₂ O; [7732-18-5]			
		1985, March	
CRITICAL EVALUATION:			
<i>T/K</i>	KCl <i>m</i> ₂ /mol kg ⁻¹	K ₂ CO ₃ <i>m</i> ₃ /mol kg ⁻¹	<i>P</i> ₁ /MPa
298.15	1.0	1.0	3.79
			Salt Effect Parameter <i>k</i> _{sIm} /kg mol ⁻¹ <i>k</i> _{sMM} /kg mol ⁻¹
			0.109 0.218
101 Methane + Cesium chloride [9647-17-8] + Water			
Ben-Naim and Yaacobi (ref 15) measured the solubility of methane in water and in 1.0 mol dm ⁻³ CsCl solution at five degree temperature intervals between 283 and 303 K. The salt effect parameters are classed as tentative.			
<i>T/K</i>	CsCl <i>c</i> ₂ /mol dm ⁻³	<i>P</i> ₁ /MPa	Salt Effect Parameter <i>k</i> _{sCC} /dm ³ mol ⁻¹
283.15	1.0	0.1	0.139
288.15	1.0	0.1	0.140
293.15	1.0	0.1	0.135
298.15	1.0	0.1	0.127
303.15	1.0	0.1	0.114
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COMPONENTS:	EVALUATOR:
(1) Methane; CH ₄ ; [74-82-8] (2) Electrolyte (3) Water; H ₂ O; [7732-18-5]	H. Lawrence Clever Department of Chemistry Emory University Atlanta, GA 30322 USA 1985, March
CRITICAL EVALUATION:	
<p>10. Wetlaufer, D. B.; Malik, S. K.; Stoller, L.; Coffin, R. L. <i>J. Am. Chem. Soc.</i> <u>1964</u>, <u>86</u>, 580-14.</p> <p>11. Shoor, S. K.; Walker, R. D., Jr.; Gubbins, K. E. <i>J. Phys. Chem.</i> <u>1969</u>, <u>73</u>, 312-7.</p> <p>12. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u>, <u>74</u>, 170-80.</p> <p>13. O'Sullivan, T. D.; Smith, N. O. <i>J. Phys. Chem.</i> <u>1970</u>, <u>74</u>, 1460-6.</p> <p>14. Feillolay, A.; Lucas, M. <i>J. Phys. Chem.</i> <u>1972</u>, <u>76</u>, 3068-72.</p> <p>15. Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974</u>, <u>78</u>, 170-5.</p> <p>16. Yano, T.; Suetaka, T.; Umehara, T.; Horiuchi, A. <i>Kagaku Kogaku</i> <u>1974</u>, <u>38</u>, 320-3.</p> <p>17. Blanco C, L. H.; Smith N. O. <i>J. Phys. Chem.</i> <u>1978</u>, <u>82</u>, 186-91.</p> <p>18. Blount, C. W.; Price, L. C.; Wenger, L. M.; Tarullo, M. <i>Proc.-US Gulf Coast Geopressured Geotherm. Energy Conf.</i> <u>1979</u> (Pub. <u>1980</u>), <u>4(3)</u>, 1225-62.</p> <p>19. Rudakov, E. S.; Lutsyk, A. I. <i>Zh. Fiz. Khim.</i> <u>1979</u>, <u>53</u>, 1298-1300; <i>Russ. J. Phys. Chem.</i> <u>1979</u>, <u>53</u>, 731-3.</p> <p>20. Barone, G.; Castronuovo, G.; Volpe, D.; Elia, V.; Grassi, L. <i>J. Phys. Chem.</i> <u>1979</u>, <u>83</u>, 2703-14.</p> <p>21. Namiot, A. Yu.; Skripka, V. G.; Ashmyan, K. D. <i>Geokhimiya</i> <u>1979</u>, <u>(1)</u>, 147-8.</p> <p>22. Muccitelli, J. A.; Wen, W.-Y. <i>J. Solution Chem.</i> <u>1980</u>, <u>9</u>, 141-61.</p> <p>23. Blount, C. W.; Price, C. W. <i>REPORT 1982 DOE/ET12145-1</i>, 159 pp.; <i>Chem. Abstr.</i> <u>1983</u>, <u>98</u>, 22026p.</p> <p>24. Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> <u>1982</u>, <u>46</u>, 1327-32.</p> <p>25. Byrne, P. A.; Stoessell, R. K. <i>Ibid.</i> <u>1982</u>, <u>46</u>, 2395-7.</p> <p>26. Cramer, S. D. <i>Ind. Eng. Chem. Process Des. Dev.</i> <u>1984</u>, <u>23</u>, 533-8.</p> <p>27. Haas, J. L., Jr. US Geological Survey Open-file Report <u>1978</u>, No. 78-1004, 42 pp.</p> <p>28. Susak, N. J.; McGee, K. A. US Geological Survey Open-file Report <u>1980</u>, No. 80-371.</p>	

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Hydrochloric Acid; HCl; [7647-01-0] (3) Water; H ₂ O; [7732-18-5]		ORIGINAL MEASUREMENTS: Muccitelli, J. A.; Wen, W.-Y. <i>J. Solution Chem.</i> <u>1980</u> , <u>9</u> , 141 - 161.	
VARIABLES: $T/K: 278.15 - 298.15$ $p/kPa: 101.325 \text{ (1 atm)}$		PREPARED BY: H. L. Clever	
EXPERIMENTAL VALUES:			
	T/K	HCl	
		$c_2/\text{mol dm}^{-3}$	Ostwald Coefficient $10^3 \text{ L/cm}^3 \text{ cm}^{-3}$
	278.15	0.0000 0.2822 0.5501 0.8030 0.9703	51.12 \pm 0.35 49.01 47.19 45.76 45.11
	283.15	0.0000 0.2824 0.5330 0.7979 1.0914	45.04 \pm 0.17 43.67 42.49 41.05 39.45
	288.15	0.0000 0.2864 0.5645 0.8164 0.8645 1.127	40.39 \pm 0.18 38.81 38.31 37.94 37.45 36.04
	293.15	0.0000 0.2321 0.4687 0.7401 1.127	37.42 \pm 0.10 35.97 35.46 34.20 32.91
	298.15	0.0000 0.5468 0.7324 1.0425 1.2803	34.26 \pm 0.15 32.34 31.84 30.99 30.35
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:			
<p>The solubility apparatus and procedure employed were similar to that described by Ben-Naim and Baer (1) with modifications suggested by Wen and Hung (2). The apparatus consists mainly of a mercury manometer, a gas-volume measuring buret, a dissolution cell of about 450 cm³ capacity, and a mercury reservoir.</p> <p>The degassing apparatus and procedure used were similar to that described by Battino <i>et al.</i> (3).</p> <p>From published ionization constants the authors estimated that nearly 100 per cent of the triethylene-diamine is unprotonated when the solution pH is 12 or above, and about 99.7 per cent is in the monoprotonated form when the solution pH is 5.7 to 5.9.</p>			
SOURCE AND PURITY OF MATERIALS:			
<p>(1) Methane. Matheson Co., Inc. Specified to have a purity of 99.95 per cent.</p> <p>(2) Hydrochloric acid. Source not given. Reagent grade. Diluted with water and distilled at 1 atm to prepare constant boiling HCl solution.</p> <p>(3) Water. Carbon dioxide free.</p>			
ESTIMATED ERROR:			
$\delta T/K = \pm 0.005$ $\delta P/\text{mmHg} = \pm 3$ $\delta L/L = \pm 0.005$			
REFERENCES:			
<ol style="list-style-type: none"> 1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1964</u>, <u>60</u>, 1736. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u>, <u>74</u>, 170. 3. Battino, R.; Banzhof, M.; Bogan, M.; Wilhelm, E. <i>Anal. Chem.</i> <u>1971</u>, <u>43</u>, 806. 			

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Methane; CH ₄ ; [74-82-8] (2) Sulfuric acid; H ₂ SO ₄ ; [7664-93-9] (3) Water; H ₂ O; [7732-18-5]	Christoff, A. Z. Phys. Chem. 1906, 55, 622-34.
VARIABLES:	PREPARED BY:
T/K = 293.15 p ₁ /kPa = Atmospheric H ₂ SO ₄ /wt % = 0 ~ 95.6	H. L. Clever

EXPERIMENTAL VALUES:

Temperature t/°C	T/K	Sulfuric Acid		Ostwald Coefficient L/cm ³ cm ⁻³
		H ₂ SO ₄ /wt %	m ₂ /mol kg ⁻¹	
20	293.15	0.0	0.0	0.03756
		35.82	5.69	0.01815
		61.62	16.37	0.01407
		95.6	222.	0.03303

The compiler calculated the acid molality values.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was an Ostwald type (ref 1) with a lead capillary tube through which the gas flows to the absorption flask, gas buret, and gasometer.	(1) Methane. Prepared by heating soda lime and anhydrous sodium acetate in an iron dish. (2) Sulfuric acid. Merck. Specific gravity 1.271, 1.523, and 1.839 for the 35.82, 61.62, and 95.6 wt % acid, respectively. (3) Water. Distilled.
The acid solution was degassed by boiling under reflux. The author estimates a one percent change in the acid concentration due to the degassing procedure. The adsorption flask was filled with solvent, the gas was introduced, and the system shaken until equilibrium was reached.	ESTIMATED ERROR: $\delta T/K = \pm 0.02$ for solvent ± 0.5 for gas Barometric fluctuations were stated to be negligible.
REFERENCES:	<ol style="list-style-type: none"> 1. Ostwald, W. <i>Lehrbuch der allgem. Chemie</i> (2 Aufl.), 1, 615.

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Methane; CH ₄ ; [74-82-8]			Rudakov, E. S.; Lutsyk, A. I.		
(2) Sulfuric acid; H ₂ SO ₄ ; [7664-93-9]			Zh. Fiz. Khim. 1979, 53, 1298-1300.		
(3) Water; H ₂ O; [7732-18-5]			* Russ. J. Phys. Chem. 1979, 53, 731-3.		
VARIABLES:			PREPARED BY:		
T/K = 298.2, 363.2 H ₂ SO ₄ / wt % = 80.0 97.7			H. L. Clever		
EXPERIMENTAL VALUES:					
Temperature <i>t</i> / ⁰ C	Sulfuric Acid /wt %	Partition Coefficient ^a <i>k</i> /cm ³ cm ⁻³	Ostwald Coefficient ^b <i>L</i> /cm ³ cm ⁻³	Bunsen Coefficient ^b <i>a</i> /cm ³ (STP)cm ⁻³ atm ⁻¹	
25.0	298.2	0 80.0 93.0	29 ± 2 110 ± 8 32 ± 2	0.034 0.0091 0.031	0.031 0.0083 0.028
90.0	363.2	0 93.0 94.9 97.7	148 ± 10 43 ± 3 35 ± 3 25 ± 2	0.0068 0.023 0.029 0.040	0.0051 0.017 0.022 0.030
^a original data from the paper.					
^b The Ostwald and Bunsen coefficient values were calculated by the compiler on the basis that the partition coefficient is equivalent to the inverse of the Ostwald coefficient and assuming that the ideal gas law is obeyed.					
The enthalpy of solution of methane in 93.0 wt % sulfuric acid is estimated by the authors to be, ΔH/kcal mol ⁻¹ = -(1.0 ± 0.5).					
AUXILIARY INFORMATION					
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:				
A gas chromatographic method was used to evaluate the partition coefficients. A reactor containing methane and aqueous acid solution was mechanically shaken for 10 m to establish equilibrium. Equal volumes of samples of the gas and solution phases were introduced by syringe into a special cell for stripping the methane by the carrier gas. The carrier gas entered a gas chromatograph and the partition coefficient was obtained from the ratio of areas of the peaks from each phase.	(1) Methane. (2) Sulfuric acid. (3) Water. Sources and purities were not given.				
The actual partial pressure of the methane was not specified.	ESTIMATED ERROR: $\delta k/k = \pm 0.10$ (authors)				
	REFERENCES:				

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Methane; CH ₄ ; [74-82-8] 2. Ammonium chloride; NH ₄ Cl [12125-02-9] 3. Water; H ₂ O; [7732-18-5]		Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974</u> , 78, 175-8.		
VARIABLES:		PREPARED BY:		
Temperature		C. L. Young		
EXPERIMENTAL VALUES:				
T/K	Conc. of ammonium chloride /mol l ⁻¹	Ostwald coefficient, [*] <i>L</i>		
283.15	1.0	0.03556		
288.15		0.03273		
293.15		0.03017		
298.15		0.02786		
303.15		0.02577		
<p>* Smoothed values of Ostwald coefficient obtained from</p> $kT \ln L = 1,721.5 - 9.329 (T/K) + 0.01195 (T/K)^2 \text{ cal mol}^{-1}$ <p>where k is in units of $\text{cal mol}^{-1} \text{ K}^{-1}$.</p>				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	1. Matheson sample, purity 99.97 mole per cent. 2. AR grade. 3. Deionised, doubly distilled.			
ESTIMATED ERROR:				
$\delta T/K = \pm 0.01; \delta L/L = \pm 0.005$ (estimated by compiler).				
REFERENCES:				
1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u> , 59, 2735. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u> , 74, 170.				

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Water; H ₂ O; [7732-18-5] (3) Ammonium bromide; NH ₄ Br; [12124-97-9]		ORIGINAL MEASUREMENTS: Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> 1970, 74, 170 - 180.	
VARIABLES: T/K: 278.15 - 308.15 P/kPa: 101.325 (1 atm) $m_3/\text{mol kg}^{-1}$: 0 - 0.202		PREPARED BY: H. L. Clever	
EXPERIMENTAL VALUES:			
	T/K Ammonium bromide Molality $m_3/\text{mol kg}^{-1}$	Methane Solubility $S_1/\text{cm}^3(\text{STP}) \text{ kg}^{-1}$	Setchenow Constant¹ $k/\text{kg mol}^{-1}$
	278.15	0 0.196	49.48 ± 0.08 47.93
	288.15	0 0.202	38.49 ± 0.11 37.43
	298.15	0 0.200	31.35 ± 0.10 30.56
	308.15	0 0.181	26.51 ± 0.08 26.03
¹ Setchenow constant, $k/\text{kg mol}^{-1} = (1/(m_3/\text{mol kg}^{-1})) \log (S_1^{\circ}/S_1)$			
The authors specify the value of the constant for $m_3/\text{mol kg}^{-1} = 0.1$.			
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE: The apparatus was similar to that described by Ben-Naim and Baer (1). Teflon needle valves were used in place of stopcocks. The apparatus consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	SOURCE AND PURITY OF MATERIALS: (1) Methane. Matheson Co. Stated to be better than 99.9 per cent pure. (2) Water. Distilled from an all Pyrex apparatus. Specific conductivity 1.5×10^{-6} (ohm cm) ⁻¹ . (3) Ammonium bromide. Baker Chemical Co. Analyzed reagent grade. Used as received.	ESTIMATED ERROR: $\delta T/K = \pm 0.005$ $\delta S_1/S_1 = \pm 0.003$	
		REFERENCES: 1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> 1963, 59, 2735.	

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Water; H ₂ O; [7732-18-5] (3) N,N,N-Trimethylmethanaminium bromide or tetramethylammonium bromide; C ₄ H ₁₂ NBr; [64-20-0]		ORIGINAL MEASUREMENTS: Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> 1970, 74, 170 - 180.																				
VARIABLES: T/K: 278.15 - 308.15 P/kPa: 101.325 (1 atm) $m_3/\text{mol kg}^{-1}$: 0 - 0.302		PREPARED BY: H. L. Clever																				
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	<table border="1"> <thead> <tr> <th>T/K</th> <th>Salt Molality $m_3/\text{mol kg}^{-1}$</th> <th>Methane Solubility $S_1/\text{cm}^3 \text{ (STP)}$</th> <th>Setchenow Constant¹ k/kg mol^{-1}</th> </tr> </thead> <tbody> <tr> <td>278.15</td><td>0 0.179 0.176</td><td>49.48 ± 0.08 49.48 49.27</td><td>+0.007</td></tr> <tr> <td>288.15</td><td>0 0.190 0.194</td><td>38.49 ± 0.11 38.57 38.70</td><td>-0.005</td></tr> <tr> <td>298.15</td><td>0 0.179 0.193</td><td>31.35 ± 0.10 31.64 31.47</td><td>-0.017</td></tr> <tr> <td>308.15</td><td>0 0.302</td><td>26.51 ± 0.08 27.10</td><td>-0.028</td></tr> </tbody> </table>	T/K	Salt Molality $m_3/\text{mol kg}^{-1}$	Methane Solubility $S_1/\text{cm}^3 \text{ (STP)}$	Setchenow Constant ¹ k/kg mol^{-1}	278.15	0 0.179 0.176	49.48 ± 0.08 49.48 49.27	+0.007	288.15	0 0.190 0.194	38.49 ± 0.11 38.57 38.70	-0.005	298.15	0 0.179 0.193	31.35 ± 0.10 31.64 31.47	-0.017	308.15	0 0.302	26.51 ± 0.08 27.10	-0.028	
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Aqueous Electrolyte Solutions

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Water; H ₂ O; [7732-18-5] (3) N,N,N-Triethylethanaminium bromide or tetraethylammonium bromide; C ₈ H ₂₀ NBr; [71-91-0]	ORIGINAL MEASUREMENTS: Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> 1970, 74, 170 - 180.																																											
VARIABLES: T/K: 278.15 - 308.15 P/kPa: 101.325 (1 atm) m ₃ /mol kg ⁻¹ : 0 - 0.209	PREPARED BY: H. L. Clever																																											
EXPERIMENTAL VALUES:																																												
<table border="1"> <thead> <tr> <th>T/K</th> <th>Salt Molality m₃/mol kg⁻¹</th> <th>Methane Solubility S₁/cm³ (STP)</th> <th>Setchenow Constant¹ k/kg mol⁻¹</th> </tr> </thead> <tbody> <tr> <td>278.15</td><td>0</td><td>49.48 ± 0.08</td><td>-0.036</td></tr> <tr> <td></td><td>0.093</td><td>49.89</td><td></td></tr> <tr> <td></td><td>0.095</td><td>49.97</td><td></td></tr> <tr> <td>288.15</td><td>0</td><td>38.49 ± 0.11</td><td>-0.049</td></tr> <tr> <td></td><td>0.173</td><td>39.30</td><td></td></tr> <tr> <td>298.15</td><td>0</td><td>31.35 ± 0.10</td><td>-0.049</td></tr> <tr> <td></td><td>0.182</td><td>32.36</td><td></td></tr> <tr> <td></td><td>0.183</td><td>32.34</td><td></td></tr> <tr> <td>308.15</td><td>0</td><td>26.51 ± 0.08</td><td>-0.094</td></tr> <tr> <td></td><td>0.209</td><td>27.68</td><td></td></tr> </tbody> </table>	T/K	Salt Molality m ₃ /mol kg ⁻¹	Methane Solubility S ₁ /cm ³ (STP)	Setchenow Constant ¹ k/kg mol ⁻¹	278.15	0	49.48 ± 0.08	-0.036		0.093	49.89			0.095	49.97		288.15	0	38.49 ± 0.11	-0.049		0.173	39.30		298.15	0	31.35 ± 0.10	-0.049		0.182	32.36			0.183	32.34		308.15	0	26.51 ± 0.08	-0.094		0.209	27.68	
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COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Methane; CH ₄ ; [74-82-8]			Blanco C, L. H.; Smith, N. O.		
<i>J. Phys. Chem.</i> 1978, 82, 186-91.					
(2) <i>N, N, N</i> -Triethylethaninium bromide or tetraethylammonium bromide; C ₈ H ₂₀ NBr; [71-91-0]					
(3) Water; H ₂ O; [7732-18-5]					
EXPERIMENTAL VALUES:					
Temperature <i>t/°C</i>	Total Pressure <i>T/K</i>	C ₈ H ₂₀ ^{NBr} <i>m₂/mol kg⁻¹</i>	Total Pressure <i>p/MPa</i>	Mol Fraction 10 ³ <i>x₁</i>	Salt Effect Parameter <i>k_{smm}/kg mol⁻¹</i>
25.0	298.2	1.0	10.1 20.3 30.4 40.5	2.025 3.117 3.740 3.914	-0.056 -0.055 -0.044 -
38.0	311.2	1.0	10.1 20.3 30.4 40.5 50.7 60.8	1.747 2.759 3.436 3.994 4.451 4.496	-0.046 -0.067 -0.056 -0.047 -0.054 -
51.5	324.7	1.0	10.1 20.3 30.4 40.5 50.7 60.8	1.591 2.602 3.264 3.817 4.274 4.448	-0.056 -0.077 -0.073 -0.070 -0.077 -
55.0	328.2	1.0	20.3	2.580	-
60.0	333.2	1.0	20.3	2.550	-
65.0	338.2	1.0	20.3	2.527	-
71.0	344.2	1.0	10.1 20.3 30.4 40.5 50.7 60.8	1.541 2.517 3.304 3.880 4.350 4.618	-0.085 -0.105 -0.105 -0.102 -0.104 -
75.0	348.2	1.0	20.3	2.433	-
80.0	353.2	1.0	20.3	2.549	-
85.0	358.2	1.0	20.3	2.579	-
89.5	362.7	1.0	20.3	2.595	-
95.0	368.2	1.0	20.3	2.625	-
100.0	373.3	1.0	20.3	2.659	-
102.5	375.7	1.0	20.3	2.636	-
115.0	388.2	1.0	20.3	2.676	-

The total pressures given in the paper were 100, 200, 300, 400, 500 and 600 atm. They are given above as 10.1, 20.3, 30.4, 40.5, 50.7, and 60.8 MPa.

The salt effect parameters were calculated from smoothed data. The solubility in water was smoothed data from an earlier paper, O'Sullivan, T. D.; Smith, N. O. *J. Phys. Chem.* 1970, 74, 1460. For the salt effect parameter calculation the methane solubility was converted to molality, thus the salt effect parameter is *ksmm/kg mol⁻¹*.

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Methane; CH ₄ ; [74-82-8]		Blanco C, L. H.; Smith, N. O.		
(2) <i>N,N,N-Triethyllethaninium bromide or tetraethylammonium bromide; C₈H₂₀NBr; [71-91-0]</i>		<i>J. Phys. Chem.</i> 1978, 82, 186-91.		
(3) Water; H ₂ O; [7732-18-5]				
VARIABLES:	PREPARED BY:			
$T/K = 298.2 - 388.2$ $p/MPa = 10.1 - 60.8$ $m_2/mol\ kg^{-1} = 1.0$	C. L. Young H. L. Clever			
ADDITIONAL INFORMATION:				
The authors fitted the mole fraction solubility by the method of least squares to the equation				
$x_1 = a(p/atm) + b(p/atm)^2 + c(p/atm)^3$				
The constants are:				
T/K	10^5a	10^8b	$10^{11}c$	
298.2	2.6462	-6.9850	7.7333	
311.2	2.0875	-4.1892	3.6007	
324.7	1.8972	-3.5513	2.9404	
344.2	1.7631	-2.8433	2.1206	
At each temperature the solubility value at the largest pressure was not included in the curve fitting.				
The solubility values of methane in one molal (C ₂ H ₅) ₄ NBr at 200 atm (20.3 MPa) total pressure were fitted by the method of least squares to two equations as a function of temperature. The equations are:				
$\ln(f_1/x_1) = 154.8978 - 7445.408/(T/K) - 20.909 \ln(T/K)$ and				
$\ln(x_1 \text{ at } 200 \text{ atm}) = -135.2291 + 650.371/(T/K) + 18.892 \ln(T/K)$				
From the equations they calculated the thermodynamic changes for the transfer of one mole of gas at unit fugacity to the hypothetical dissolved state ($x_1 = 1$) at 298.15 K and 200 atm (20.3 MPa) are $\Delta H^\circ/\text{kcal mol}^{-1} = -2.41$, $\Delta S^\circ/\text{cal K}^{-1} \text{ mol}^{-1} = -29.5$; $\Delta C_p^\circ/\text{cal K}^{-1} \text{ mol}^{-1} = 41.6$; temperature of minimum solubility is 71 °C (344.2 K).				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The apparatus employed and the procedures used were described in earlier work (1, 2).	(1) Methane. Matheson Co., Inc. Gold label sample, purity 99.97 mole percent.			
Solubilities were determined in a stirred, thermostated one gallon stainless steel autoclave, samples of the liquid phase were withdrawn into a thermostated buret system for analysis when equilibrium was reached.	(2) Tetraethylammonium bromide. Eastman Kodak Co. Recrystallized.			
Pressure was measured with a Bourdon gauge. Temperature was measured with an iron-constantan thermocouple. Salt concentration was determined by gravimetric analysis.	(3) Water. Distilled and boiled.			
ESTIMATED ERROR:				
$\delta T/K = \pm 0.5$ $\delta p/MPa = \pm 0.05 \%$ $\delta x_1/x_1 = \pm 0.004$				
REFERENCES:				
1. O'Sullivan, T. D.; Smith, N. O. <i>J. Phys. Chem.</i> 1970, 74, 1460.				
2. Gardiner, G. E.; Smith, N. O. <i>J. Phys. Chem.</i> 1972, 76, 1195. <i>J. Phys. Chem.</i> 1973, 77, 2928.				

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Water; H ₂ O; [7732-18-5] (3) N,N,N-Tripropylpropanaminium bromide or tetrapropylammonium bromide; C ₁₂ H ₂₈ NBr; [1941-30-6]		ORIGINAL MEASUREMENTS: Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u> , <u>74</u> , 170 - 180.		
VARIABLES: T/K: 278.15 - 308.15 P/kPa: 101.325 (1 atm) $m_3/\text{mol kg}^{-1}$: 0 - 0.706		PREPARED BY: H. L. Clever		
EXPERIMENTAL VALUES:				
	T/K Salt Molality $m_3/\text{mol kg}^{-1}$	Methane Solubility $S_1/\text{cm}^3(\text{STP}) \text{ kg}^{-1}$	Setchenow Constant ¹ k/kg mol^{-1}	
	278.15	0 0.099 0.103 0.224 0.223 0.431 0.587	49.48 ± 0.08 50.06 50.03 50.31 50.46 49.60 48.74	-0.045
	288.15	0 0.098 0.223 0.227 0.415 0.620	38.49 ± 0.11 39.00 39.67 39.48 39.60 39.97	-0.061
	298.15	0 0.097 0.102 0.230 0.235 0.410 0.632	31.35 ± 0.10 31.87 31.99 32.43 32.58 33.14 33.63	-0.082
	308.15	0 0.105 0.245 0.443 0.706	26.51 ± 0.08 27.21 27.87 28.73 30.17	-0.110
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS: (1) Methane. Matheson Co. Stated to be better than 99.9 per cent pure. (2) Water. Distilled from an all Pyrex apparatus. Specific conductivity 1.5×10^{-6} (ohm cm) ⁻¹ . (3) Tetrapropylammonium bromide. Eastman Kodak Co. Recrystallized and analyzed. Better than 99.9 per cent pure.			
The apparatus was similar to that described by Ben-Naim and Baer (1). Teflon needle valves were used in place of stopcocks.				
The apparatus consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer.				
The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath.				
Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.				
¹ Setchenow constant, $\text{k/kg mol}^{-1} = (1/(m_3/\text{mol kg}^{-1})) \log (S_1^\circ/S_1)$	ESTIMATED ERROR: $\delta T/K = \pm 0.005$ $\delta S_1/S_1 = \pm 0.003$			
The authors specify the value of the constant for $m_3/\text{mol kg}^{-1} = 0.1$.	REFERENCES: 1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u> , <u>59</u> , 2735.			

COMPONENTS:

- (1) Methane; CH₄; [74-82-8]
 (2) Water; H₂O; [7732-18-5]
 (3) N,N,N-Tributylbutanaminium bromide or tetrabutylammonium bromide; C₁₆H₃₆NBr; [1643-19-2]

ORIGINAL MEASUREMENTS:

Wen, W.-Y.; Hung, J. H.

J. Phys. Chem. 1970, 74, 170 - 170.

EXPERIMENTAL VALUES:

T/K	Salt Molality $m_3/\text{mol kg}^{-1}$	Methane Solubility $s_1/\text{cm}^3 (\text{STP}) \text{ kg}^{-1}$	Setchenow Constant ¹ k/kg mol^{-1}
278.15	0	49.48 ± 0.08	-0.030
	0.096	49.82	
	0.098	49.85	
	0.100	49.80	
	0.187	49.88	
	0.201	49.86	
	0.409	49.27	
	0.526	48.91	
	0.785	46.67	
	0.990	46.10	
288.15	0	38.49 ± 0.11	-0.053
	0.096	38.86	
	0.102	38.95	
	0.103	38.96	
	0.185	39.10	
	0.403	39.44	
	0.523	39.40	
	0.703	39.69	
	1.018	40.10	
	298.15	31.35 ± 0.10	-0.096
308.15	0	32.03	
	0.096	32.00	
	0.099	32.32	
	0.194	33.30	
	0.415	33.79	
	0.526	34.53	
	0.704	36.72	
	1.022		
	0	26.51 ± 0.08	-0.152
	0.099	27.43	
	0.192	28.20	
	0.415	29.45	
	0.537	30.18	
	0.693	31.38	
	0.993	33.60	

¹ Setchenow constant, $\text{k/kg mol}^{-1} = (1/(m_3/\text{mol kg}^{-1})) \log (s_1^{\circ}/s_1)$

The authors specify the value of the constant for $m_3/\text{mol kg}^{-1} = 0.1$.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Methane; CH ₄ ; [74-82-8] 2. 1-Methyl-2-pyrrolidinone; C ₅ H ₉ NO ; [872-50-4] 3. Water; H ₂ O ; [7732-18-5]	Wu, Z.; Zeck, S.; Knapp, H. <i>Ber. Bunsenges. Phys. Chem.</i> , 1985, 89, 1009-1013.
VARIABLES:	PREPARED BY:
Composition of solvent	C. L. Young.

EXPERIMENTAL VALUES:

T/K	Mole fraction of water	Henry's constant /MPa	Ostwald coefficient	Mole fraction of gas x 10 ⁴
298.15	1.000	39.06	0.0349	0.2594
	0.950	30.80	0.0367	0.3290
	0.883	22.78	0.0406	0.4448
	0.806	15.80	0.0483	0.6413
	0.645	7.192	0.0768	1.409
	0.494	3.862	0.113	2.624
	0.361	2.401	0.153	4.220
	0.193	1.581	0.193	6.409
	0.075	1.236	0.221	8.198
	0.000	1.059	0.242	9.568

^a

Calculated by compiler for a partial pressure of 1 atmosphere

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Precision volumetric apparatus described in detail in ref. (1). Pressure measured with mercury manometer. Composition of solvent estimated from density and refractive index as composition changed on degassing.	1. Purity better than 99 volume per cent. 2. Merck sample, dried with molecular sieve 4 X. Final water content less than 0.01 mass per cent, purity 99.9 mole per cent by GC. 3. Twice distilled.
	ESTIMATED ERROR: $\partial T/K = \pm 0.01$; $\partial P/Pa = \pm 50$; $\partial x(\text{solvent}) = \pm 0.003$; $\partial x = 0.005$
	REFERENCES: 1. Zeck, S.; Dissertation, TU Berlin, 1985.

COMPONENTS:			
(1) Methane; CH ₄ ; [74-82-8]		ORIGINAL MEASUREMENTS:	
(2) N,N,N-Tributyl-1-butanaminium bromide or tetrabutyl ammonium bromide; C ₁₆ H ₃₆ NBr; [1643-19-2]		Feillolay, A.; Lucas, M. <i>J. Phys. Chem.</i> 1972, 76, 3068-72.	
(3) Water; H ₂ O; [7732-18-5]			
VARIABLES:			
T/K = 298.15, 308.15 $p_1/k\text{Pa} = 101.325$ $m_2/\text{mol kg}^{-1} = 0 - 4.010$		PREPARED BY: H. L. Clever	
EXPERIMENTAL VALUES:			
	Temperature	Tetrabutyl Ammonium Bromide $m_2/\text{mol kg}^{-1}$	Methane Solubility /cm ³ (STP) kg ⁻¹
<i>t/°C</i>	<i>T/K</i>		Salt Effect Parameter $k_{\text{SMM}}/\text{kg mol}^{-1}$
25	298.15	0 1.010 1.020 1.981 1.991 3.623 3.925	29.87, 29.99, 30.05, Av. 29.97 35.40 36.00 44.31 44.59 78.01 81.68
35	308.15	0 1.025 1.005 2.025 2.078 3.610 3.640 4.010	25.32, 25.38 Av. 25.35 32.30 32.05 43.52 43.60 73.49 74.55 82.40
The salt effect parameters were calculated by the compiler.			
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
The apparatus is modeled after the apparatus used by Hung (ref 1). The procedure was the same as that used by Hung except that the time allowed for equilibration is longer. In the present work gas equilibration required about 16 h.		(1) Methane. l'Air Liquide. Stated to be of 99.99 percent purity.	
		(2) Tetrabutyl ammonium bromide. Southwestern Analytical Chemical. Polarographic grade, used as received.	
		ESTIMATED ERROR:	
		Methane solubility ± 0.5 percent.	
		REFERENCES:	
		1. Hung, J. H. 1968, Ph. D. thesis, Clark University, Worcester, MA	

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Water; H ₂ O; [7732-18-5] (3) 2-Hydroxy-N,N,N-tris(2-hydroxyethyl)-ethanaminium bromide or tetraethanolammonium bromide; C ₈ H ₂₀ NO ₄ Br; [4328-04-5]		ORIGINAL MEASUREMENTS: Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> 1970, 74, 170 - 180.	
VARIABLES: T/K: 278.15 - 308.15 P/kPa: 101.325 (1 atm) $m_3/\text{mol kg}^{-1}$: 0 - 0.517		PREPARED BY: H. L. Clever	
EXPERIMENTAL VALUES:			
T/K	Salt Molality $m_3/\text{mol kg}^{-1}$	Methane Solubility $S_1/\text{cm}^3 (\text{STP}) \text{ kg}^{-1}$	Setchenow Constant k/kg mol^{-1}
278.15	0 0.086 0.152 0.155 0.173 0.341 0.488	49.48 ± 0.08 49.10 48.70 48.86 48.47 47.87 46.92	0.042
288.15	0 0.091 0.174 0.177 0.355 0.517	38.49 ± 0.11 38.22 38.03 37.96 37.34 36.87	0.033
298.15	0 0.085 0.167 0.173 0.347 0.510	31.35 ± 0.10 31.20 31.02 31.04 30.81 30.42	0.022
308.15	0 0.085 0.173 0.339 0.508	26.51 ± 0.08 26.50 26.59 26.53 26.51	-0.001
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE: The apparatus was similar to that described by Ben-Naim and Baer (1). Teflon needle valves were used in place of stopcocks. The apparatus consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	SOURCE AND PURITY OF MATERIALS: (1) Methane. Matheson Co. Stated to be better than 99.9 per cent pure. (2) Water. Distilled from an all Pyrex apparatus. Specific conductivity 1.5×10^{-6} (ohm cm) ⁻¹ . (3) Tetraethanolammonium bromide. Prepared and analyzed. Better than 99.9 per cent pure. m.p., t/°C 102.		
ESTIMATED ERROR: $\delta T/K = \pm 0.005$ $\delta S_1/S_1 = \pm 0.003$			
REFERENCES: 1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> 1963, 59, 2735.			
$^1 \text{ Setchenow constant, } \text{k/kg mol}^{-1} = (1/(m_3/\text{mol kg}^{-1})) \log (S_1^0/S_1)$ The authors specify the value of the constant for $m_3/\text{mol kg}^{-1} = 0.1$.			

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Methane; CH ₄ ; [74-82-8] (2) N, N, N-Trimethyl-1-hexadecanaminium bromide or cetyltrimethylammonium bromide; C ₁₉ H ₄₂ NBr; [57-09-0] (3) Water; H ₂ O; [7732-18-5]	Prapaitrakul, W.; King, A. D. Jr. <i>J. Coll. Interface Sci.</i> <u>1985</u> , 106 186-93.
VARIABLES:	PREPARED BY: H. L. Clever
T/K = 299.0 $p_1/\text{kPa} = 120 - 690$ (Est., see ref 1)	

EXPERIMENTAL VALUES:

Temperature <i>t</i> /°C	Cetyltrimethyl ammonium bromide <i>m</i> ₂ /mol kg ⁻¹	Henry's Constant ^a 10 ³ <i>H</i> /mol kg ⁻¹ atm ⁻¹
26	299.0	
	0.0	1.55 ^b
	0.10	1.79
	0.20	2.08
	0.30	2.41

^a The authors reported these results as 10³*m*₁/mol kg⁻¹ at 1 atm.

Henry's constnat is defined as

$$H/\text{mol kg}^{-1} \text{ atm}^{-1} = (m_1/\text{mol kg}^{-1})/(p_1/\text{atm}).$$

^b The solubility value in water is from (ref 2).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus and procedure are described in detail in earlier papers (ref 1, 2). The solvent, contained in a glass-lined brass equilibrium cell resting on a magnetic stirrer, is degassed by evacuation and stirring. The gas is introduced at pressures above atmospheric and the solution stirred until equilibrium is reached. The pressure is reduced to atmospheric over the still liuqid. The liquid is stirred and the gas evolved from the super-saturated solution is collected at atmospheric pressure and ambient temperature in a Warburg manometer, and its volume is measured.	(1) Methane. Matheson Co., Inc. Stated to be 99.0 mol % or better. (2) Cetyltrimethylammonium bromide. Aldrich Chemical Co. Lot No. 5814AJ. Recrystallized once from 2-propanol and dried <i>in vacuo</i> . (3) Water. Double distilled.
ESTIMATED ERROR:	
Corrections are made for the gas lost during the venting procedure, for the differences in temperature and pressure, and for the water vapor pressure in the calculation of Henry's constant.	$\delta T/K = \pm 0.1$ $\delta m_1/\text{mol kg}^{-1} = \pm 0.00002$ (authors)
REFERENCES:	
	1. Matheson, I. B. C.; King, A. D. Jr. <i>J. Coll. Interface Sci.</i> <u>1978</u> , 66, 464. 2. Hoskins, J. C.; King, A. D. Jr. <i>J. Coll. Interface Sci.</i> <u>1981</u> , 82, 264.

COMPONENTS:		ORIGINAL MEASUREMENTS:															
(1) Methane; CH ₄ ; [74-82-8]		Prapaitrakul, W.; King, A. D. Jr.															
(2) N,N,N-Trimethyl-1-decanaminium bromide or decyltrimethylammonium bromide; C ₁₃ H ₃₀ NBr; [2082-84-0]		<i>J. Coll. Interface Sci.</i> 1985, 106, 186-93.															
(3) Water; H ₂ O; [7732-18-5]																	
VARIABLES:		PREPARED BY:															
$T/K = 299.0$		H. L. Clever															
$p_1/kPa = 120 - 690$ (est., see ref 1)																	
EXPERIMENTAL VALUES:																	
Temperature $t/^\circ C$	Decyltrimethyl ammonium bromide $m_2/\text{mol kg}^{-1}$	Henry's Constant ^a $10^3 H/\text{mol kg}^{-1} \text{ atm}^{-1}$															
26	299	<table> <tbody> <tr><td>0.0</td><td>1.55^b</td></tr> <tr><td>0.04</td><td>1.50</td></tr> <tr><td>0.10</td><td>1.56</td></tr> <tr><td>0.20</td><td>1.71</td></tr> <tr><td>0.30</td><td>1.93</td></tr> <tr><td>0.40</td><td>2.06</td></tr> <tr><td>0.50</td><td>2.25</td></tr> </tbody> </table>		0.0	1.55 ^b	0.04	1.50	0.10	1.56	0.20	1.71	0.30	1.93	0.40	2.06	0.50	2.25
0.0	1.55 ^b																
0.04	1.50																
0.10	1.56																
0.20	1.71																
0.30	1.93																
0.40	2.06																
0.50	2.25																

^a The authors reported these results as $10^3 m_1/\text{mol kg}^{-1}$ at 1 atm.

Henry's constant is defined,

$$H/\text{mol kg}^{-1} \text{ atm}^{-1} = (m_1/\text{mol kg}^{-1})/(p_1/\text{atm}).$$

^b The solubility value in water is from (ref 2).

AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:		
The apparatus and procedure are described in detail in earlier papers (ref 1,2). The solvent, contained in a glass-lined brass equilibrium cell resting on a magnetic stirrer, is degassed by evacuation and stirring. The gas is introduced at pressures above atmospheric and the solution stirred until equilibrium is reached. The pressure is reduced to atmospheric over the still liquid. The liquid is stirred and the gas evolved from the super-saturated solution is collected at atmospheric pressure and ambient temperature in a Warburg manometer, and its volume is measured.	(1) Methane. Matheson Co. Inc. Stated to be 99.0 mol % or better. (2) Decyltrimethylammonium bromide. Eastman Kodak Co. Lot No. A10E and A10F. Recrystallized once from 2-propanol and dried <i>in vacuo</i> . CMC agreed well with accepted value. (3) Water. Double distilled.		
Corrections are made for the gas lost during the venting procedure, the differences in temperature and pressure, and the water vapor pressure in the calculation of Henry's constant.	ESTIMATED ERROR:		
	$\delta T/K = \pm 0.1$ $\delta m_1/\text{mol kg}^{-1} = \pm 0.000$ (authors)		
	REFERENCES:		
	1. Matheson, I.B.C.; King, A.D.Jr. <i>J. Coll. Interface Sci.</i> 1978, 66, 464. 2. Hoskins, J.C.; King, A.D. Jr. <i>J. Coll. Interface Sci.</i> 1981, 82, 264.		

COMPONENTS: (1) Methane; CH_4 ; [74-82-8] (2) Triethylenediamine hydrochloride or 1,4-diazabicyclo[2.2.2]octane hydrochloride; $\text{C}_6\text{H}_{13}\text{ClN}_2$ (3) Water; H_2O ; [7732-18-5]		ORIGINAL MEASUREMENTS: Muccitelli, J. A.; Wen, W.-Y. <i>J. Solution Chem.</i> 1980, 9, 141 - 161.																																																																																				
VARIABLES: T/K : 278.15 - 298.15 p/kPa : 101.325 (1 atm)		PREPARED BY: H. L. Clever																																																																																				
EXPERIMENTAL VALUES:																																																																																						
	<table border="1"> <thead> <tr> <th>T/K</th> <th>$\text{C}_6\text{H}_{13}\text{ClN}_2$ $c_2/\text{mol dm}^{-3}$</th> <th>pH</th> <th>Ostwald Coefficient $10^3 \text{L}/\text{cm}^3 \text{cm}^{-3}$</th> </tr> </thead> <tbody> <tr><td>278.15</td><td>0.1225</td><td>5.37</td><td>49.58</td></tr> <tr><td></td><td>0.2312</td><td>5.53</td><td>48.29</td></tr> <tr><td></td><td>0.6291</td><td>5.40</td><td>44.40</td></tr> <tr><td></td><td>0.9023</td><td>5.59</td><td>42.65</td></tr> <tr><td>283.15</td><td>0.1560</td><td>5.60</td><td>43.43</td></tr> <tr><td></td><td>0.2538</td><td>5.07</td><td>42.45</td></tr> <tr><td></td><td>0.5346</td><td>5.46</td><td>40.20</td></tr> <tr><td></td><td>0.8120</td><td>5.72</td><td>38.70</td></tr> <tr><td>288.15</td><td>0.1601</td><td>5.79</td><td>38.92</td></tr> <tr><td></td><td>0.2799</td><td>5.62</td><td>38.24</td></tr> <tr><td></td><td>0.6299</td><td>5.87</td><td>36.91</td></tr> <tr><td></td><td>0.8029</td><td>5.80</td><td>35.31</td></tr> <tr><td>293.15</td><td>0.1367</td><td>5.44</td><td>35.90</td></tr> <tr><td></td><td>0.2340</td><td>5.59</td><td>35.32</td></tr> <tr><td></td><td>0.5267</td><td>5.77</td><td>33.70</td></tr> <tr><td></td><td>0.8510</td><td>5.74</td><td>31.74</td></tr> <tr><td>298.15</td><td>0.1469</td><td>5.49</td><td>34.10</td></tr> <tr><td></td><td>0.2340</td><td>5.59</td><td>35.32</td></tr> <tr><td></td><td>0.5267</td><td>5.77</td><td>33.70</td></tr> <tr><td></td><td>0.8510</td><td>5.74</td><td>31.74</td></tr> </tbody> </table>	T/K	$\text{C}_6\text{H}_{13}\text{ClN}_2$ $c_2/\text{mol dm}^{-3}$	pH	Ostwald Coefficient $10^3 \text{L}/\text{cm}^3 \text{cm}^{-3}$	278.15	0.1225	5.37	49.58		0.2312	5.53	48.29		0.6291	5.40	44.40		0.9023	5.59	42.65	283.15	0.1560	5.60	43.43		0.2538	5.07	42.45		0.5346	5.46	40.20		0.8120	5.72	38.70	288.15	0.1601	5.79	38.92		0.2799	5.62	38.24		0.6299	5.87	36.91		0.8029	5.80	35.31	293.15	0.1367	5.44	35.90		0.2340	5.59	35.32		0.5267	5.77	33.70		0.8510	5.74	31.74	298.15	0.1469	5.49	34.10		0.2340	5.59	35.32		0.5267	5.77	33.70		0.8510	5.74	31.74	
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METHOD/APPARATUS/PROCEDURE: <p>The solubility apparatus and procedure employed were similar to that described by Ben-Naim and Baer (1) with modifications suggested by Wen and Hung (2). The apparatus consists mainly of a mercury manometer, a gas-volume measuring buret, a dissolution cell of about 450 cm^3 capacity, and a mercury reservoir. The degassing apparatus and procedure used were similar to that described by Battino <i>et al.</i> (3).</p> <p>From published ionization constants the authors estimated that nearly 100 per cent of the triethylenediamine is unprotonated when the solution pH is 12 or above, and about 99.7 per cent is in the monoprotonated form when the solution pH is 5.7 to 5.9.</p>	SOURCE AND PURITY OF MATERIALS: <p>(1) Methane. Matheson Co., Inc. Specified to have a purity of 99.95 per cent.</p> <p>(2) Triethylenediamine hydrochloride. The pH of the triethylenediamine solution was adjusted to a pH of 5.40 \pm 0.01 by constant boiling HCl.</p> <p>(3) Water. Carbon dioxide free.</p>	ESTIMATED ERROR: $\delta T/\text{K} = \pm 0.005$ $\delta P/\text{mmHg} = \pm 3$ $\delta L/L = \pm 0.005$																																																																																				
REFERENCES: 1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> 1964, 60, 1736. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> 1970, 74, 170. 3. Battino, R.; Banzhof, M.; Bogan, M.; Wilhelm, E. <i>Anal. Chem.</i> 1971, 43, 806.																																																																																						

COMPONENTS:		ORIGINAL MEASUREMENTS:	
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. Guanidine monohydrochloride (Guanidinium chloride); CH ₆ ClN ₃ ; [50-01-1]		Wetlaufer, D. B.; Malik, S. K.; Stoller, L.; Coffin, R. L. <i>J. Am. Chem. Soc.</i> <u>1964</u> , 86, 508-514.	
VARIABLES:		PREPARED BY:	
Temperature		C. L. Young	
EXPERIMENTAL VALUES:			
T/K	Conc. of guanidinium chloride in soln. /mol dm ⁻³	10 ³ Conc. of methanet [†] in soln. /mol dm ⁻³	Mole fraction* of methane <i>x</i> _{CH₄}
278.2	4.86	1.15	0.0000280
298.2	4.86	0.96	0.0000234
318.2	4.86	0.805	0.0000196
[†] at a partial pressure of 101.3 kPa.			
[*] calculated by compiler.			
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS: 1. Matheson c.p. grade, purity 99 mole per cent or better. 2. Distilled. 3. Prepared from the action of reagent grade hydrochloric acid on twice or three times recrys- tallized guanidinium carbonate.		
Modified Van Slyke-Neill apparatus fitted with a magnetic stirrer. Solution was saturated with gas and then sample transferred to the Van Slyke extraction chamber.	ESTIMATED ERROR: $\delta T/K = \pm 0.05$; $\delta x_{CH_4} = \pm 2\%$.		
	REFERENCES:		

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Magnesium chloride; MgCl ₂ ; [7786-30-3] (3) Water; H ₂ O; [7732-18-5]				ORIGINAL MEASUREMENTS: Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> <u>1982</u> , 46, 1327-32.		
VARIABLES: $T/K = 298.15$ $p_1/\text{kPa} = 2410-5170$ $m_2/\text{mol kg}^{-1} = 0-2.16$				PREPARED BY: H. L. Clever		
EXPERIMENTAL VALUES:						
$t/^\circ\text{C}$	T/K	Temperature p_1/psia	Pressure p_1/kPa	Magnesium Chloride $m_2/\text{mol kg}^{-1}$	Methane $m_1/\text{mol kg}^{-1}$	Salt Effect Parameter $k_{\text{smm}}/\text{kg mol}^{-1}$
25	298.15	350	2410	0 0.5 1.0 2.16	0.0319 0.0257 0.0199 0.0128	- 0.063 0.068 0.061
		550	3790	0 0.5 1.0 2.16	0.0483 0.0376 0.0300 0.0185	- 0.073 0.069 0.064
		750	5170	0 0.5 1.0 2.16	0.0617 0.0485 0.0390 0.0237	- 0.070 0.066 0.064
						0.063 (authors)
The salt effect parameter is defined as $k_{\text{smm}} = \log \gamma_1 / I$ where I is the ionic strength (molality) and $\gamma_1 = (m_1^* f_1 / m_1 f_1^*)$ with m_1 and f_1 the solubility and fugacity, respectively, of methane at p and T . The "*" refers to saturation in distilled water.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for three h to allow equilibration between the methane and solution.					
	The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an anion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of released gas assuming ideal behavior. A correction was made for the gas not released on flashing.					
SOURCE AND PURITY OF MATERIALS:	(1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to be a minimum of 99.97 mole present methane.					
	(2) Magnesium chloride. The salt solutions were made up gravimetrically using analytical grade chemicals.					
	(3) Water. Distilled.					
ESTIMATED ERROR:	$\delta p_1/\text{psia} = \pm 1$ $\delta m_1/m_1 = \pm 0.01$					
REFERENCES:						

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Methane; CH ₄ ; [74-82-8]	Stoessell, R. K.; Byrne, P. A.
(2) Magnesium sulfate; MgSO ₄ ; [7785-87-7]	<i>Geochim. Cosmochim. Acta</i> 1982, 46, 1327-32.
(3) Water; H ₂ O; [7732-18-5]	

VARIABLES: T/K = 298.15 p ₁ /kPa = 2410-5170 m ₂ /mol kg ⁻¹ = 0-1.5	PREPARED BY: H. L. Clever
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EXPERIMENTAL VALUES:

Temperature	Pressure	Magnesium Sulfate	Methane	Salt Effect Parameter	
t/°C	T/K	p ₁ /psia	p ₁ /kPa	m ₂ /mol kg ⁻¹	k _{smm} /kg mol ⁻¹
25	298.15	350	2410	0	0.0319
				0.5	0.0233
				1.0	0.0174
				1.5	0.0128
		550	3790	0	0.0483
				0.5	0.0352
				1.0	0.0261
				1.5	0.0192
		750	5170	0	0.0617
				0.5	0.0472
				1.0	0.0342
				1.5	0.0253
					0.066 (authors)

The salt effect parameter is defined as $k_{smm} = \log \gamma_1 / I$

where I is the ionic strength (molality) and $\gamma_1 = (m_1^* f_1 / m_1 f_1^*)_{p,T}$

with m_1 and f_1 the solubility and fugacity, respectively, of methane at p and T . The "*" refers to saturation in distilled water.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for three h to allow equilibration between the methane and solution. The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an ansion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of released gas assuming ideal behavior. A correction was made for the gas not released on flashing.	SOURCE AND PURITY OF MATERIALS: (1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to be a minimum of 99.97 mole present methane. (2) Magnesium sulfate. The salt solutions were made up gravimetrically using analytical grade chemicals. (3) Water. Distilled.
	ESTIMATED ERROR: $\delta p_1/\text{psia} = \pm 1$ $\delta m_1/m_1 = \pm 0.01$
	REFERENCES:

COMPONENTS:				ORIGINAL MEASUREMENTS:		
(1) Methane; CH ₄ ; [74-82-8]				Byrne, P. A.; Stoessell, R. K.		
(2) Electrolytes, see below				<i>Geochim. Cosmochim. Acta</i> 1982, 46, 2395-7.		
(3)						
(4) Water; H ₂ O; [7732-18-5]						
VARIABLES:				PREPARED BY:		
$T/K = 298.15$				H. L. Clever		
$p_1/\text{kPa} = 3790$						
EXPERIMENTAL VALUES:						
Temperature	Pressure	Electrolyte	Methane	Salt Effect		
$t/^\circ\text{C}$	T/K	p_1/psia	p_1/kPa	$m_i/\text{mol kg}^{-1}$	$m_1/\text{mol kg}^{-1}$	Parameter
25	298.15	550	3790	-	0.0483 ^a	-
				MgCl ₂	0.25	
				MgSO ₄	0.25	
25	298.15	550	3790	-	0.0483 ^a	-
				MgCl ₂	0.5	
				MgSO ₄	0.5	

^a Value of methane solubility in water, m_1° , from (ref 1)

The salt effect parameter, $k_{\text{smim}}/\text{kg mol}^{-1}$ =

$$(\Sigma((k_{\text{smim}}/\text{kg mol}^{-1})(I_i/\text{mol kg}^{-1}))/(I/\text{mol kg}^{-1})$$

where I_i and I are ionic strength due to component i and the total ionic strength, respectively, and $k_{\text{smim}}/\text{kg mol}^{-1}$ =

$$\log((m_1^\circ/\text{mol kg}^{-1})/(m_1/\text{mol kg}^{-1}))/(I_i/\text{mol kg}^{-1})$$

Magnesium chloride; MgCl₂; [7786-30-3]

Magnesium sulfate; MgSO₄; [7785-87-7]

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketted by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for 3 h to allow equilibration between the methane and the solution.

The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an expansion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of gas assuming ideal behavior. A correction was made for the gas not released on flashing.

Solution densities were measured gravimetrically with pycnometers.

SOURCE AND PURITY OF MATERIALS:

(1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to have a minimum purity of 99.97 mole percent.

(2) Electrolytes. The salt solutions (3) were made up gravimetrically using analytical grade chemicals.

(4) Water. Distilled.

ESTIMATED ERROR:

$$\begin{aligned}\delta p_1/\text{psia} &= \pm 1 \\ \delta m_1/\text{mol kg}^{-1} &= \pm 0.0003 - 0.0005 \\ \delta m_2/\text{mol kg}^{-1} &= \pm 0.0001\end{aligned}$$

REFERENCES:

1. Stoessell, R. K.; Byrne, P. A. *Geochim. Cosmochim. Acta* 1982, 46, 1327.

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. Calcium chloride; CaCl ₂ ; [10043-52-4]		Michels A.; Gerver, J.; Bijl, A. <i>Physica</i> , 1936, 3, 797-808.				
VARIABLES:		PREPARED BY:				
Pressure		C.L. Young				
EXPERIMENTAL VALUES:						
T/K	Conc. of CaCl ₂ /mol l ⁻¹	p/10 ⁵ Pa	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}			
298.15	2.7	56.2 110.4 157.2 209.9	0.34 0.56 0.69 0.80			
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Simple rocking equilibrium cell. Amount of gas absorbed calculated from volume and pressure change in charging vessel. Details in source.	No details given.					
ESTIMATED ERROR: δT/K = ±0.1; δp/10 ⁵ Pa = ±0.05 to 0.5%; δx _{CH₄} = ±3-5%. (estimated by compiler.)						
REFERENCES:						

COMPONENTS:		ORIGINAL MEASUREMENTS:					
1. Methane; CH ₄ ; [74-82-8]		Blanco, L. H.; Smith, N. O.					
2. Water; H ₂ O; [7732-18-5]		<i>J. Phys. Chem.</i>					
3. Calcium chloride; CaCl ₂ ; [10043-52-4]		<u>1978</u> , 82, 186-191.					
VARIABLES:		PREPARED BY:					
		C. L. Young					
EXPERIMENTAL VALUES:							
T/K	Conc. of CaCl ₂ /mol dm ⁻³	P/MPa	P/atm	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}			
298.2	1.0	10.1 20.3 30.4 40.5 50.7 60.8	100 200 300 400 500 600	1.032 1.591 1.956 2.202 2.471 2.720			
324.7	1.0	10.1 20.3 30.4 40.5 50.7 60.8	100 200 300 400 500 600	0.834 1.360 1.724 2.004 2.232 2.455			
344.2	1.0	10.1 20.3 30.4 40.5 50.7 60.8	100 200 300 400 500 600	0.787 1.286 1.665 1.963 2.215 2.443			
375.7	1.0	10.1 20.3 30.4	100 200 300	0.803 1.347 1.740			
(cont.)							
AUXILIARY INFORMATION							
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:					
Large steel stirred equilibrium cell. Pressure measured with Bourdon gauge. Temperature measured with iron-constantan thermocouple. Cell charged with liquid, compressed gas added. After equilibrium obtained samples removed and analysed using volumetric techniques. Salt concentration determined by gravimetric analysis.		1. Matheson, gold label sample, purity 99.97 mole per cent. 2. Distilled and boiled. 3. Fisher Certified grade used without further purification.					
ESTIMATED ERROR:							
$\delta T/K = \pm 0.5$; $\delta P/MPa = \pm 0.05\%$ $\delta x_{CH_4} = \pm 0.4\%$.							
REFERENCES:							

COMPONENTS:

ORIGINAL MEASUREMENTS:

1. Methane; CH₄; [74-82-8] Blanco, L. H.; Smith, N. O.
 2. Water; H₂O; [7732-18-5] *J. Phys. Chem.*
 3. Calcium chloride; CaCl₂; 1978, 82, 186-191.
 [10043-52-4]

EXPERIMENTAL VALUES:

T/K	Conc. of CaCl ₂ /mol dm ⁻³	P/MPa	P/atm	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}
375.7	1.0	40.5	400	2.018
		50.7	500	2.281
		60.8	600	2.477
		10.1	100	0.826
		20.3	200	1.371
		30.4	300	1.709
398.2	1.0	40.5	400	2.034
		50.7	500	2.252
		60.8	600	2.477

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Methane; CH ₄ ; [74-82-8]	Duffy, J. R.; Smith, N. O.; Nagy, B.
(2) Calcium chloride; CaCl ₂ ; [10043-52-4]	<i>Geochim. Cosmochim. Acta</i> <u>1961</u> , 24, 23-31.
(3) Water; H ₂ O; [7732-18-5]	

EXPERIMENTAL VALUES:

Temperature	Calcium Chloride		Pressure		Mol Fraction		
	t/°C	T/K	c ₂ /mol dm ⁻³	p ₁ /psia	p ₁ /MPa		
25	298.15	0	160	1.10	2.14		
			215	1.48	2.73		
			230	1.59	3.76		
			430	2.96	7.08		
			445	3.07	7.03		
			514	3.54	8.00		
			585	4.03	9.39		
			680	4.69	9.79		
			750	5.17	11.30		
			0.25	165	1.14		
0.50			328	2.26	4.49		
			493	3.40	6.72		
			631	4.35	8.98		
			118	0.81	1.26		
			212	1.46	2.39		
			281	1.94	3.30		
			377	2.60	4.50		
			578	3.99	6.50		
			683	4.71	8.33		
			1.35	163	1.12		
1.35			210	1.45	1.36		
			277	1.94	2.02		
			455	3.14	3.34		
			555	3.83	3.89		
			925	6.38	7.10		
			2.50	293	2.02		
			441	3.04	2.39		
			746	5.14	3.58		
			1085	7.48	5.49		
			0				
30	303.15	0	46	0.32	0.60		
			80	0.55	1.15		
			115	0.79	1.84		
			136	0.94	2.32		
			286	1.97	4.90		
			297	2.05	4.93		
			398	2.74	6.12		
			523	3.61	7.64		
			1.35	278	1.92		
			550	3.79	4.38		
4.75			415	2.86	0.54		
			574	3.96	1.04		
			770	5.31	1.86		
			955	6.58	2.71		
			7.35 (sat) ^a	190	1.31		
7.35 (sat) ^a			460	3.17	0.43		
			840	5.79	1.39		

^a The solid in equilibrium with the saturated solution is CaCl₂·6H₂O.

The authors gave the CaCl₂ concentrations in normality, c₂/eq dm⁻³.

At 25 °C the values were 0.5, 1.0, 2.7 and 5.0 N, and at 30 °C the normality values were 2.7, 9.5, and 14.7 N.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Methane; CH ₄ ; [74-82-8] (2) Calcium chloride; CaCl ₂ ; [10043-52-4] (3) Water; H ₂ O; [7732-18-5]	Duffy, J. R.; Smith, N. O.; Nagy, B. <i>Geochim. Cosmochim. Acta</i> <u>1961</u> , 24, 23-31.
VARIABLES:	PREPARED BY:
$T/K = 298.15, 303.15$ $p_1/\text{MPa} = 1.14 - 7.48$ $c_2/\text{mol l}^{-1} = 0.25 - 7.35$	H. L. Clever C. L. Young

EXPERIMENTAL VALUES:

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Rocking equilibrium cell. The pressure is measured with a Bourdon gage. The cell is charged with salt solution, the gas is admitted to a known pressure, and the cell contents allowed to equilibrate. The final pressure is measured and used to calculate the amount of gas dissolved.	(1) Methane. Source not given. Stated to be <i>c.p.</i> grade. (2) Calcium chloride. Source not given. Stated to be reagent grade of known water content. (3) Water. Distilled, degassed.
	ESTIMATED ERROR: $\delta T/K = \pm 1$; $\delta p/\text{MPa} = \pm 0.03$; $\delta x_1 = \pm 5 \times 10^{-6}$.
	REFERENCES:

COMPONENTS:		ORIGINAL MEASUREMENTS:				
(1) Methane; CH ₄ ; [74-82-8]		Stoessell, R. K.; Byrne, P. A.				
(2) Calcium chloride; CaCl ₂ ; [10043-52-4]		<i>Geochim. Cosmochim. Acta</i> 1982, 46, 1327-32.				
(3) Water; H ₂ ; [7732-18-5]						
VARIABLES: T/K = 298.15 $p_1/\text{kPa} = 2410-5170$ $m_2/\text{mol kg}^{-1} = 0-2.0$		PREPARED BY: H. L. Clever				
EXPERIMENTAL VALUES:						
Temperature	Pressure	Calcium Chloride	Methane Salt Effect Parameter			
t/°C	T/K	p_1/psia	p_1/kPa	$m_2/\text{mol kg}^{-1}$	$m_1/\text{mol kg}^{-1}$	$k_{\text{smm}}/\text{kg mol}^{-1}$
25 298.15 350 2410				0	0.0319	-
				0.5	0.0250	0.071
				1.0	0.0191	0.074
				2.0	0.0120	0.071
550 3790				0	0.0483	-
				0.5	0.0375	0.073
				1.0	0.0295	0.071
				2.0	0.0179	0.072
750 5170				0	0.0617	-
				0.5	0.0485	0.070
				1.0	0.0379	0.071
				2.0	0.0236	0.070
						0.071 (authors)
The salt effect parameter is defined as $k_{\text{smm}} = \log \gamma_1/I$ where I is the ionic strength (molality) and $\gamma_1 = (m_1^* f_1 / m_1 f_1^*)_{p,T}$ with m_1 and f_1 the solubility and fugacity, respectively, of methane at p and T. The "*" refers to saturation in distilled water.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for three h to allow equilibration between the methane and solution.	(1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to be a minimum of 99.97 mole present methane. (2) Calcium chloride. The salt solutions were made up gravimetrically using analytical grade chemicals. (3) Water. Distilled.					
ESTIMATED ERROR:	$\delta p_1/\text{psia} = \pm 1$ $\delta m_1/m_1 = \pm 0.01$					
REFERENCES:						

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2), (3), (4), (5) Electrolytes see below (6) Water; H ₂ O; [7732-18-5]				ORIGINAL MEASUREMENTS: Byrne, P. A.; Stoessell, R. K. <i>Geochim. Cosmochim. Acta</i> 1982, 46, 2395-7.		
VARIABLES: $T/K = 298.15$ $p_1/\text{kPa} = 3790$				PREPARED BY: H. L. Clever		
EXPERIMENTAL VALUES:						
$t/\text{°C}$	T/K	Pressure p_1/psia	Pressure p_1/kPa	Electrolyte $m_i/\text{mol kg}^{-1}$	Methane $m_1/\text{mol kg}^{-1}$	Salt Effect Parameter
25	298.15	550	3790	- MgCl ₂ CaCl ₂	0 1.0 1.0	0.0483 ^a 0.0173 0.074
25	298.15	550	3790	- NaCl KCl MgCl ₂ CaCl ₂	0 0.5 0.5 0.5 0.5	0.0483 ^a 0.0245 0.074
^a Value of methane solubility in water, m_1° , from (ref 1).						
The salt effect parameter, $k_{\text{smm}}/\text{kg mol}^{-1} = (\sum ((k_{\text{smim}}/\text{kg mol}^{-1})(I_i/\text{mol kg}^{-1}))/I/\text{mol kg}^{-1})$ where I_i and I are ionic strength due to component i and the total ionic strength, respectively, and $k_{\text{smim}}/\text{kg mol}^{-1} = \log((m_1^{\circ}/\text{mol kg}^{-1})/(m_1/\text{mol kg}^{-1}))/I_i/\text{mol kg}^{-1}$						
Sodium chloride; NaCl; [7647-14-5] Magnesium chloride; MgCl ₂ ; [7786-30-3] Potassium chloride; KCl; [7447-40-7] Calcium chloride; CaCl ₂ ; [10043-52-4]						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE: Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketted by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for 3 h to allow equilibration between the methane and the solution.				SOURCE AND PURITY OF MATERIALS: (1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to have a minimum purity of 99.97 mole percent. (2), (3), (4), (5) Electrolytes. The salt solutions were made up gravimetrically using analytical grade chemicals. (6) Water. Distilled.		
The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an expansion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of gas assuming ideal behavior. A correction was made for the gas not released on flashing.				ESTIMATED ERROR: $\delta p_1/\text{psia} = \pm 1$ $\delta m_1/\text{mol kg}^{-1} = \pm 0.0003-0.0005$ $\delta m_{2,3}/\text{mol kg}^{-1} = \pm 0.0001$		
Solution densities were measured gravimetrically with pycnometers.				REFERENCES: 1. Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> 1982, 46, 1327.		

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. Lithium chloride; LiCl; [7447-41-8]		Michels, A.; Gerver, J.; Bijl, A. <i>Physica</i> , <u>1936</u> , 3, 797-808.				
VARIABLES:		PREPARED BY:				
Pressure		C.L. Young				
EXPERIMENTAL VALUES:						
T/K	Conc. of LiCl/mol l ⁻¹	p/10 ⁵ Pa	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}			
298.15	2.7	48.0 101.5 147.0 197.8	0.43 0.85 1.17 1.46			
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Simple rocking equilibrium cell. Amount of gas absorbed calculated from volume and pressure change in charging vessel. Details in source.	No details given					
ESTIMATED ERROR:						
$\delta T/K = \pm 0.1$; $\delta p/10^5 Pa = \pm 0.05$ to 0.5% ; $\delta x_{CH_4} = \pm 3-5\%$. (estimated by compiler).						
REFERENCES:						

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Lithium chloride; LiCl; [7447-41-8] (3) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Morrison, T. J.; Billett, F. <i>J. Chem. Soc.</i> 1952, 3819 - 3822.
VARIABLES: $T/K: 285.75 - 344.85$ $p/kPa: 101.325 \text{ (1 atm)}$	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Salt Effect Parameters		
t/°C	T/K	1/(T/K)	(1/m ₂) log(S°/S) ¹	(1/m ₂) log(x°/x)
12.6	285.75	0.0035	0.130	0.145
30.0	303.15	0.0033	0.097	0.112
49.4	322.55	0.0031	0.082	0.097
71.7	344.85	0.0029	0.077	0.092

¹ The authors used $(1/c) \log(S^{\circ}/S)$ with c defined as g eq salt per kg of water. For the 1-1 electrolyte the compiler changed the c to an m for $m_2/\text{mol kg}^{-1}$. The methane solubility S is $\text{cm}^3(\text{STP}) \text{ kg}^{-1}$.

The salt effect parameters were calculated from two measurements. The solubility of methane in water, S° , and in the one molal salt solution, S. Only the solubility of the methane in water, and the value of the salt effect parameter are given in the paper. The solubility values in the salt solution are not given.

The compiler calculated the values of the salt effect parameter using the mole fraction gas solubility ratio.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: The degassed solvent flows in a thin film down an absorption helix containing the methane gas plus solvent vapor at a total pressure of one atmosphere. The volume of gas absorbed is measured in an attached buret system (1).	SOURCE AND PURITY OF MATERIALS: (1) Methane. Prepared from Grignard reagent. (2) Lithium chloride. "AnalaR" material. (3) Water. No information given.
ESTIMATED ERROR: $\delta k/\text{kg}^{-1} \text{ mol} = 0.010$	
REFERENCES: 1. Morrison, T. J.; Billett, F. <i>J. Chem. Soc.</i> 1948, 2033.	

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Methane; CH ₄ ; [74-82-8] 2. Lithium chloride; LiCl; [7447-41-8] 3. Water; H ₂ O; [7732-18-5]		Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974</u> , 78, 175-8.		
VARIABLES:		PREPARED BY:		
Temperature		C. L. Young		
EXPERIMENTAL VALUES:				
T/K	Conc. of lithium chloride /mol l ⁻¹	Ostwald coefficient, [*] L		
283.15	0.1	0.03394		
288.15		0.03106		
293.15		0.02864		
298.15		0.02661		
303.15		0.02488		
<p>* Smoothed values of Ostwald coefficient obtained from</p> $kT \ln L = 7,264.1 - 47.609 (T/K) + 0.05380 (T/K)2 \text{ cal mol}^{-1}$ <p>where k is in units of cal mol⁻¹ K⁻¹.</p>				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	1. Matheson sample, purity 99.97 mole per cent. 2. AR grade. 3. Deionised, doubly distilled.			
ESTIMATED ERROR:				
$\delta T/K = \pm 0.01; \delta L/L = \pm 0.005$ (estimated by compiler).				
REFERENCES:				
1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u> , 59, 2735. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u> , 74, 170.				

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. Sodium chloride; NaCl; [7647-14-5]		Michels, A.; Gerver, J.; Bijl, A. <i>Physica</i> , 1936, 3, 797-808.				
VARIABLES:		PREPARED BY:				
Temperature, pressure, concentration		C.L. Young				
EXPERIMENTAL VALUES:						
T/K	Conc. of NaCl / mol l ⁻¹	p/10 ⁵ Pa	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}			
298.15	1.0	41.8 102.6 142.0 177.0 206.8 1.7 50.8 105.9 151.7 201.6 2.5 53.0 87.8 117.8 144.4 182.9 224.5 325.3 456.0 2.7 53.4 105.8 152.6 195.7 3.2 48.5 99.2 151.8	0.58 1.14 1.42 1.62 1.73 0.55 1.00 1.26 1.47 0.49 0.72 0.91 1.06 1.22 1.36 1.55 1.67 0.47 0.77 0.98 1.12 0.35 0.62 0.82			
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Simple rocking equilibrium cell. Amount of gas absorbed calculated from volume and pressure change in charging vessel. Details in source.	No details given.					
ESTIMATED ERROR:						
$\delta T/K = \pm 0.1$; $\delta p/10^5 Pa = \pm 0.05$ to 0.5% ; $\delta x_{CH_4} = \pm 3-5\%$. (estimated by compiler)						
REFERENCES:						

COMPONENTS:

1. Methane; CH₄; [74-82-8]
2. Water; H₂O; [7732-18-5]
3. Sodium chloride; NaCl;
[7647-14-5]

ORIGINAL MEASUREMENTS:

Michels, A.; Gerver, J.;
Bijl, A.
Physica, 1936, 3, 797-808.

EXPERIMENTAL VALUES:

T/K	Conc. of NaCl/mol l ⁻¹	p/10 ⁵ Pa	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}
298.15	3.2	200.8	0.95
		59.8	0.31
		109.3	0.49
		160.9	0.63
		206.1	0.70
		47.6	0.21
		82.1	0.32
		111.2	0.41
		140.9	0.49
		177.8	0.56
323.15	2.5	216.4	0.62
		324.2	0.75
		445.3	0.85
		53.6	0.44
		88.5	0.67
		118.4	0.85
		142.7	0.95
		182.9	1.13
		224.0	1.26
		55.9	0.39
348.15	2.5	87.6	0.62
		117.7	0.78
		145.9	0.90
		182.0	1.05
		224.1	1.18
		51.9	0.33
		85.2	0.55
		115.8	0.74
		144.1	0.85
		177.2	0.99
373.15	2.5	224.5	1.12
		56.6	0.36
		87.2	0.52
		117.8	0.69
		147.5	0.83
		182.2	0.94
		224.2	1.04
		56.9	0.33
		87.2	0.50
		117.4	0.66
398.15	2.5	147.5	0.77
		182.6	0.88
		224.4	0.99
		49.1	0.195
		83.1	0.295
		113.4	0.383
		142.6	0.461
		179.9	0.536
		217.1	0.601
		50.9	0.189
423.15	2.5	83.0	0.281
		113.1	0.373
		141.8	0.444
		175.2	0.510
		223.4	0.585
		50.4	0.186
		85.2	0.281
		114.2	0.365
		143.4	0.425
		181.3	0.495
323.15	5.4	217.2	0.565
		50.4	0.186
		85.2	0.281
		114.2	0.365
		143.4	0.425
		181.3	0.495
		217.2	0.565
		50.4	0.186
		85.2	0.281
		114.2	0.365
348.15	5.4	143.4	0.425
		181.3	0.495
		217.2	0.565
		50.4	0.186
		85.2	0.281
		114.2	0.365
		143.4	0.425
		181.3	0.495
		217.2	0.565
		50.4	0.186
373.15	5.4	85.2	0.281
		114.2	0.365
		143.4	0.425
		181.3	0.495
		217.2	0.565
		50.4	0.186
		85.2	0.281
		114.2	0.365
		143.4	0.425
		181.3	0.495

COMPONENTS:

1. Methane; CH₄; [74-82-8]
2. Water; H₂O; [7732-18-5]
3. Sodium chloride; NaCl; [7647-14-5]

ORIGINAL MEASUREMENTS:

Michels, A.; Gerver, J.;
Bijl, A.
Physica, 1936, 3, 797-808.

EXPERIMENTAL VALUES:

T/K	Conc. of NaCl/mol l ⁻¹	p/10 ⁵ Pa	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}
398.15	5.4	50.5	0.177
		82.4	0.262
		113.5	0.351
		142.0	0.409
		175.8	0.475
		223.8	0.548
		49.5	0.173
423.15	5.4	81.9	0.254
		115.0	0.337
		142.8	0.395
		176.8	0.455
		222.7	0.539

COMPONENTS:		ORIGINAL MEASUREMENTS:																																									
(1) Methane; CH ₄ ; [74-82-8]		Eucken, A.; Hertzberg, G.																																									
(2) Sodium chloride; NaCl; [7647-14-5]		Z. Phys. Chem. 1950, 195, 1-23.																																									
(3) Water; H ₂ O; [7732-18-5]																																											
VARIABLES:		PREPARED BY:																																									
$T/K = 273.15, 293.15$		H. L. Clever																																									
$p_1/kPa = 101.325$																																											
$m_2/mol\ kg^{-1} = 0 - 2.77$																																											
EXPERIMENTAL VALUES:																																											
<table border="1"> <thead> <tr> <th>Temperature $t/^\circ C$</th><th>Sodium Chloride T/K</th><th>Ostwald Coefficient $L/cm^3\ cm^{-3}$</th><th>Salt Effect Parameter $k_{smc}/kg\ mol^{-1}$</th></tr> </thead> <tbody> <tr> <td colspan="2">0</td><td>0.0550</td><td>-</td></tr> <tr> <td colspan="2">0.68</td><td>0.0409</td><td>0.188</td></tr> <tr> <td colspan="2">1.37</td><td>0.0313</td><td>0.178</td></tr> <tr> <td colspan="2">2.77</td><td>0.0167</td><td>0.186</td></tr> <tr> <td colspan="2"></td><td colspan="2">Av. 0.184</td></tr> <tr> <td colspan="2">20</td><td>0.0359</td><td>-</td></tr> <tr> <td colspan="2">0.795</td><td>0.0266</td><td>0.163</td></tr> <tr> <td colspan="2">2.63</td><td>0.0139</td><td>0.157</td></tr> <tr> <td colspan="2"></td><td colspan="2" rowspan="7">Av. 0.160</td></tr> </tbody> </table>				Temperature $t/^\circ C$	Sodium Chloride T/K	Ostwald Coefficient $L/cm^3\ cm^{-3}$	Salt Effect Parameter $k_{smc}/kg\ mol^{-1}$	0		0.0550	-	0.68		0.0409	0.188	1.37		0.0313	0.178	2.77		0.0167	0.186			Av. 0.184		20		0.0359	-	0.795		0.0266	0.163	2.63		0.0139	0.157			Av. 0.160	
Temperature $t/^\circ C$	Sodium Chloride T/K	Ostwald Coefficient $L/cm^3\ cm^{-3}$	Salt Effect Parameter $k_{smc}/kg\ mol^{-1}$																																								
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AUXILIARY INFORMATION																																											
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:																																										
The apparatus consists of a gas buret and an absorption flask connected by a capillary tube. The whole apparatus is shaken. The capillary tube is a two m long glass helix. An amount of gas is measured at STP and placed in the gas buret. After shaking, the difference from the original amount of gas placed in the buret is determined.	(1) Methane. (2) Sodium chloride. (3) Water. No information.																																										
ESTIMATED ERROR: $\delta L/L = \pm 0.01$ (authors)																																											
REFERENCES:																																											

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Sodium chloride; NaCl; [7647-14-5] (3) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Morrison, T. J.; Billett, F. <i>J. Chem. Soc.</i> <u>1952</u> , 3819 - 3822.
VARIABLES: · T/K: 285.75 - 344.85 p/kPa: 101.325 (1 atm)	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Salt Effect Parameters		
t/°C	T/K	1/(T/K)	(1/m ₂) log(S°/S) ¹	(1/m ₂) log(x°/x)
12.6	285.75	0.0035	0.153	0.168
30.0	303.15	0.0033	0.127	0.142
49.4	322.55	0.0031	0.111	0.126
71.7	344.85	0.0029	0.102	0.117

¹ The authors used $(1/c)\log(S^*/S)$ with c defined as g eq salt per kg of water. For the 1-1 electrolyte the compiler changed the c to an m for $m_2/\text{mol kg}^{-1}$. The methane solubility S is $\text{cm}^3 \text{(STP)} \text{ kg}^{-1}$.

The salt effect parameters were calculated from two measurements. The solubility of methane in water, S^* , and in the one molal salt solution, S. Only the solubility of the methane in water, and the value of the salt effect parameter are given in the paper. The solubility values in the salt solution are not given.

The compiler calculated the values of the salt effect parameter using the mole fraction gas solubility ratio.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: The degassed solvent flows in a thin film down an absorption helix containing the methane gas plus solvent vapor at a total pressure of one atmosphere. The volume of gas absorbed is measured in an attached buret system (1).	SOURCE AND PURITY OF MATERIALS: (1) Methane. Prepared from Grignard reagent. (2) Sodium chloride. "AnalaR" material. (3) Water. No information given.
	ESTIMATED ERROR: $\delta k/\text{kg}^{-1} \text{ mol} = 0.010$
	REFERENCES: 1. Morrison, T. J.; Billett, F. <i>J. Chem. Soc.</i> <u>1948</u> , 2033.

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8]		Duffy, J.R.; Smith, N.O.; Nagy, B.				
2. Water; H ₂ O; [7732-18-5]		<i>Geochim. Cosmochim. Acta</i> , <u>1961</u> , 24, 23-31.				
3. Sodium chloride; NaCl; [7647-14-5]						
VARIABLES:		PREPARED BY:				
Concentration, pressure		C.L. Young				
EXPERIMENTAL VALUES:		10^4 Mole fraction of methane, $10^4 x_{\text{CH}_4}$				
T/K	Conc. /mol l ⁻¹	p/MPa				
303.15	0.5	21.48 41.64 52.99 60.29 64.14 36.68 53.70 65.05 2.7	2.54 5.36 6.53 7.72 8.53 4.00 6.22 6.82 1.41 2.73 3.30 4.44 6.00 6.34 0.73 1.28 1.11 1.56 2.58 2.78 2.95 3.25 4.26			
	1.0	33.64 46.41 54.11 77.21 77.31 22.29 32.42 38.00 42.05 57.25 67.38 69.41 71.33 95.75				
	5.4					
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Rocking equilibrium cell. Pressure measured with a Bourdon gauge. Cell charged with salt solution; gas admitted to known pressure cell contents allowed to equilibrate. Final pressure measured and used to calculate amount of gas dissolved. Details in source ref.	1. C.P. grade. No other details given. 2. Degassed. 3. Reagent grade of known water content.					
ESTIMATED ERROR:						
REFERENCES:						

COMPONENTS:			ORIGINAL MEASUREMENTS:	
(1) Methane; CH ₄ ; [74-82-8]			Mishnina, T. A.; Avdeeva, O. I. Bozhovskaya, T. K.	
(2) Sodium chloride; NaCl; [7647-14-5]			<i>Inf. Sb., Vses. Nauchn-Issled.</i> <i>Geol. Inst. 1962, No. 56, 137-45.</i>	
(3) Water; H ₂ O; [7732-18-5]			<i>Chem. Abstr. 1964, 60, 8705g</i>	
EXPERIMENTAL VALUES:				
Temperature	Sodium Chloride	Solubility	Salt Effect Parameter	
<i>t/°C</i>	<i>c₂/mol dm⁻³</i>	<i>cm³ (STP) dm⁻³</i>	<i>k_{scc}/dm³ mol⁻¹</i>	
4	277.15	0 1.06 2.10 3.08 4.12 5.31	50.6 34.1 23.7 16.2 10.4 6.7	- 0.162 0.157 0.161 0.167 0.165 0.162 av.
10	283.15	0 1.06 2.10 3.08 4.12 5.31	43.8 30.4 20.6 14.6 10.1 6.3	- 0.150 0.156 0.155 0.155 0.162 0.155 av.
20	293.15	0 1.00 1.77 2.60 3.90 5.31	33.9 24.7 18.6 13.9 9.1 5.7	- 0.138 0.148 0.149 0.147 0.145 0.145 av.
30	303.15	0 1.04 2.00 2.60 3.90 5.31	28.5 20.6 15.3 12.4 8.3 5.4	- 0.135 0.135 0.139 0.137 0.135 0.136 av.
50	323.15	0 1.02 1.98 2.80 3.90 5.31	23.4 17.2 12.7 10.1 7.2 4.8	- 0.131 0.134 0.130 0.131 0.129 0.131 av.
70	343.15	0 1.02 1.98 3.95 5.31	20.7 15.3 11.9 6.7 4.4	- 0.129 0.121 0.121 0.126 0.124 av.
80	353.15	0 1.02 2.12 3.28 5.31	20.4 15.7 11.8 9.0 5.4	- 0.111 0.112 0.108 0.108 0.110 av.
90	363.15	0 1.06 2.10 3.08 5.31	22.1 17.0 13.2 9.9 5.6	- 0.108 0.107 0.113 0.111 0.110 av.

COMPONENTS:		ORIGINAL MEASUREMENTS:
(1) Methane; CH ₄ ; [74-82-8]		Mishnina, T. A.; Avdeeva, O. I. Bozhovskaya, T. K.
(2) Sodium chloride; NaCl; [7647-14-5]		<i>Inf. Sb., Vses. Nauchn-Issled.</i> <i>Geol. Inst. 1962</i> , No. 56, 137-45.
(3) Water; H ₂ O; [7732-18-5]		<i>Chem. Abstr. 1964</i> , 60, 8705g.
VARIABLES:		PREPARED BY:
$T/K = 277.15 - 363.15$		H. L. Clever
$p_1/kPa = 101.3$		
$c_2/\text{mol dm}^{-3} = 0 - 5.31$		
EXPERIMENTAL VALUES:		
See preceding page.		
<p>The values at 50, 70, 80, and 90 °C were first published in the authors' earlier paper (1). In (1) the description of the table says "methane solubility in solutions of sodium chloride at various temperatures and atmospheric pressure above the solution.</p> <p>Reference (1) also gives a table of smoothed values. The experimental values are about 7 percent greater than the smoothed values, and the salt effect parameter values are about 20 percent larger than the smoothed values.</p>		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
See authors' earlier paper (1).	(1) Methane. Source not given. Stated to contain one percent air.	
COMMENTS:	(2) Sodium chloride. (3) Water.	
The compiler estimated the values of the solubility of methane in water from a figure in the paper and values of the salt effect parameter. The other values were tabulated in the paper.	ESTIMATED ERROR:	
The methane solubility is equivalent to the Bunsen coefficient, $10^2 \alpha/cm^3$ (STP) $cm^{-3} atm^{-1}$.	$\delta T/K = \pm 0.1$ ± 0.5 at $50 ^\circ C$ and above.	
The Kelven temperature values were added by the compiler.	REFERENCES:	
	1. Mishnina, T. A.; Avdeeva, O. I.; Bozhovskaya, T. K. <i>Materialy Vses. Nauchn. Issled.</i> <i>Geol. Inst. 1961</i> , 46, 93.	

COMPONENTS:			ORIGINAL MEASUREMENTS:			
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. Sodium chloride; NaCl; [7647-14-5]			O'Sullivan, T.D.; Smith, N.O. <i>J. Phys. Chem.</i> , <u>1970</u> , 74 , 1460-1466			
VARIABLES: Temperature, pressure, concentration			PREPARED BY: C.L. Young			
EXPERIMENTAL VALUES:						
			10^3 Mole fraction of methane in liquid, $10^3 x_{\text{CH}_4}$			
T/K	Conc./mol l ⁻¹		10^3 Mole fraction of methane in liquid, $10^3 x_{\text{CH}_4}$			
324.65	1.000					
324.65	20.26					
324.65	30.40					
324.65	40.53					
324.65	50.66					
324.65	60.79					
375.65	20.37		10^3 Mole fraction of methane in liquid, $10^3 x_{\text{CH}_4}$			
375.65	30.60					
375.65	40.83					
375.65	50.97					
375.65	61.20					
398.15	10.44		10^3 Mole fraction of methane in liquid, $10^3 x_{\text{CH}_4}$			
398.15	20.67					
398.15	30.90					
398.15	41.04					
398.15	51.37					
398.15	61.61					
324.65	4.000		10^3 Mole fraction of methane in liquid, $10^3 x_{\text{CH}_4}$			
324.65	20.26					
324.65	30.40					
324.65	40.53					
324.65	50.66					
324.65	60.79					
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:				
<p>Large steel stirred equilibrium cell. Pressure measured with Bourdon gauge. Temperature measured with iron-constantan thermocouple. Cell charged with liquid, compressed gas added. After equilibrium obtained samples removed and analysed using volumetric techniques. Details in ref. (1).</p>		<p>1. Matheson Co. sample purity 99.95 mole per cent.</p> <p>2. Distilled and de-ionised air removed.</p> <p>3. Baker analysed reagent dried at 388K.</p>				
ESTIMATED ERROR:						
$\delta T/K = \pm 0.5$; $\delta P/\text{MPa} = \pm 0.05\%$; $\delta x_{\text{CH}_4} = \pm 0.4\%$						
REFERENCES:						
<p>1. O'Sullivan, T.D.; Smith, N.O. <i>Geochim. Cosmochim. Acta</i>, <u>1966</u>, 30, 617.</p>						

COMPONENTS:		ORIGINAL MEASUREMENTS:	
1.	Methane; CH ₄ ; [74-82-8]	O'Sullivan, T.D.; Smith, N.O.	
2.	Water; H ₂ O; [7732-18-5]		
3.	Sodium chloride; NaCl; [7647-14-5]	J. Phys. Chem. 1970, 74, 1460-1466.	
EXPERIMENTAL VALUES:			
T/K	Conc. /mol l ⁻¹	P/MPa	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}
375.65	4.000	20.37 30.60 40.83 50.97 61.20	0.826 1.079 1.211 1.319 1.433
398.15		20.67 30.90 41.04 51.37 61.61	0.825 1.005 1.164 1.322 1.438

COMPONENTS:		ORIGINAL MEASUREMENTS:								
1. Methane; CH ₄ ; [74-82-8] 2. Sodium chloride; NaCl; [7647-14-5] 3. Water; H ₂ O; [7732-18-5]		Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974, 78, 170-5.</u>								
VARIABLES:		PREPARED BY:								
Temperature, concentration		C. L. Young								
EXPERIMENTAL VALUES:										
T/K	Conc. of salt /mol l ⁻¹	Ostwald coefficient,* L	T/K	Conc. of salt /mol l ⁻¹	Ostwald coefficient,* L					
283.15	0.25	0.04047	283.15	1.0	0.03048					
288.15		0.03679	288.15		0.02800					
293.15		0.03375	293.15		0.02594					
298.15		0.03123	298.15		0.02424					
303.15		0.02914	303.15		0.02285					
283.15	0.50	0.03700	283.15	2.0	0.02123					
288.15		0.03374	288.15		0.01977					
293.15		0.03108	293.15		0.01860					
298.15		0.02890	298.15		0.01765					
303.15		0.02711	303.15		0.01691					
* Smoothed values of Ostwald coefficient obtained from $kT \ln L = 8,677.1 - 56.405 (T/K) + 0.06846 (T/K)^2 \text{ cal mol}^{-1}$ $kT \ln L = 9,392.2 - 61.966 (T/K) + 0.07855 (T/K)^2 \text{ cal mol}^{-1}$ $kT \ln L = 8,645.6 - 57.885 (T/K) + 0.07209 (T/K)^2 \text{ cal mol}^{-1}$ $kT \ln L = 9,327.1 - 64.964 (T/K) + 0.08605 (T/K)^2 \text{ cal mol}^{-1}$ (where k is in units of $\text{cal mol}^{-1} \text{ K}^{-1}$) for concentrations of 0.25, 0.50, 1.0 and 2.0 mol l ⁻¹ , respectively.										
AUXILIARY INFORMATION										
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:									
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	1. Matheson sample, purity 99.97 mole per cent. 2. AR grade. 3. Deionised, doubly distilled.									
ESTIMATED ERROR: $\delta T/K = \pm 0.01; \delta L/L = \pm 0.005$ (estimated by compiler).										
REFERENCES:										
1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u> , 59, 2735. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u> , 74, 170.										

COMPONENTS:		ORIGINAL MEASUREMENTS:																									
(1) Methane; CH ₄ ; [74-82-8]		Yano, T.; Suetaka, T.; Umehara, T.; Horiuchi, A.																									
(2) Sodium chloride; NaCl; [7647-14-5]		<i>Kagaku Kogaku</i> <u>1974</u> , 38, 320-3.																									
(3) Water; H ₂ O; [7732-18-5]																											
VARIABLES: $T/K = 298.15$ $p_1/kPa = 101.325$ $c_2/mol\ dm^{-3} = 0 - 1.500$		PREPARED BY: H. L. Clever C. L. Young																									
EXPERIMENTAL VALUES:																											
<table border="1"> <thead> <tr> <th>Temperature $t/{}^{\circ}\text{C}$</th><th>Sodium Chloride $c_2/mol\ dm^{-3}$</th><th>Methane Solubility $10^3 c_1/mol\ dm^{-3}$</th><th>Salt Effect Parameter $k_{\text{scc}}/dm^3\ mol^{-1}$</th></tr> </thead> <tbody> <tr> <td>25</td><td>298.15</td><td>0</td><td>-</td></tr> <tr> <td></td><td></td><td>0.500</td><td>0.113</td></tr> <tr> <td></td><td></td><td>1.000</td><td>0.146</td></tr> <tr> <td></td><td></td><td>1.500</td><td>0.163</td></tr> <tr> <td></td><td></td><td></td><td>0.149 (authors)</td></tr> </tbody> </table>				Temperature $t/{}^{\circ}\text{C}$	Sodium Chloride $c_2/mol\ dm^{-3}$	Methane Solubility $10^3 c_1/mol\ dm^{-3}$	Salt Effect Parameter $k_{\text{scc}}/dm^3\ mol^{-1}$	25	298.15	0	-			0.500	0.113			1.000	0.146			1.500	0.163				0.149 (authors)
Temperature $t/{}^{\circ}\text{C}$	Sodium Chloride $c_2/mol\ dm^{-3}$	Methane Solubility $10^3 c_1/mol\ dm^{-3}$	Salt Effect Parameter $k_{\text{scc}}/dm^3\ mol^{-1}$																								
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$k_{\text{scc}}/dm^3\ mol^{-1} = (1/(c_2/mol\ dm^{-3})) \log((c_1^0/mol\ dm^{-3})/(c_1/mol\ dm^{-3}))$ The compiler added the salt effect parameter values at the individual salt concentrations. The authors defined the salt effect parameter in terms of the electrolyte ionic strength.																											
AUXILIARY INFORMATION																											
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:																										
Volumetric apparatus. Salt solution allowed to enter stirred absorption chamber. Pressure within absorption chamber adjusted to be as near atmospheric pressure as possible. Details in source and ref. 1.	1. High purity sample, purity better than 99.5 mole per cent. 2. Special grade. 3. Distilled.																										
ESTIMATED ERROR:																											
REFERENCES:																											
1. Yano, T.; Suetaka, T.; Umehara, T. <i>Nippon Kagaku Kaishi</i> <u>1972</u> , 11, 2194.																											

COMPONENTS:		ORIGINAL MEASUREMENTS:																																																																												
(1) Methane; CH ₄ ; [74-82-8]		Namiot, A. Yu.; Skripka, V. G. Ashmyan, K. D.																																																																												
(2) Sodium chloride; NaCl; [7647-14-5]		<i>Geokhimiya</i> 1979, (1), 147-9.																																																																												
(3) Water; H ₂ O; [7732-18-5]																																																																														
VARIABLES: $T/K = 323 - 623$ $p_t/MPa = 29.5$ $c_2/mol\ dm^{-3} = 0 - 1.11$		PREPARED BY: H. L. Clever																																																																												
EXPERIMENTAL VALUES:																																																																														
<table border="1"> <thead> <tr> <th>Temperature $t/^\circ C$</th><th>Temperature T/K</th><th>Sodium Chloride $c_2/mol\ dm^{-3}$</th><th>Methane Solubility S_1/cm^3 (STP) g^{-1}</th><th>Salt Effect Parameter $k_{sex}/dm^3 mol^{-1}$</th></tr> </thead> <tbody> <tr><td>50</td><td>323</td><td>0.0</td><td>3.59</td><td></td></tr> <tr><td></td><td></td><td>1.00</td><td>2.80</td><td>0.108</td></tr> <tr><td>100</td><td>373</td><td>0.0</td><td>3.66</td><td></td></tr> <tr><td></td><td></td><td>1.00</td><td>2.81</td><td>0.114</td></tr> <tr><td>150</td><td>423</td><td>0.0</td><td>4.76</td><td></td></tr> <tr><td></td><td></td><td>1.00</td><td>3.79</td><td>0.098</td></tr> <tr><td>200</td><td>473</td><td>0.0</td><td>7.83</td><td></td></tr> <tr><td></td><td></td><td>1.00</td><td>6.48</td><td>0.084</td></tr> <tr><td>250</td><td>523</td><td>0.0</td><td>12.68</td><td></td></tr> <tr><td></td><td></td><td>1.02</td><td>8.95</td><td>0.134</td></tr> <tr><td>300</td><td>573</td><td>0.0</td><td>21.78</td><td></td></tr> <tr><td></td><td></td><td>1.08</td><td>13.58</td><td>0.205</td></tr> <tr><td>350</td><td>623</td><td>0.0</td><td>31.97</td><td></td></tr> <tr><td></td><td></td><td>1.11</td><td>16.66</td><td>0.295</td></tr> </tbody> </table>				Temperature $t/^\circ C$	Temperature T/K	Sodium Chloride $c_2/mol\ dm^{-3}$	Methane Solubility S_1/cm^3 (STP) g^{-1}	Salt Effect Parameter $k_{sex}/dm^3 mol^{-1}$	50	323	0.0	3.59				1.00	2.80	0.108	100	373	0.0	3.66				1.00	2.81	0.114	150	423	0.0	4.76				1.00	3.79	0.098	200	473	0.0	7.83				1.00	6.48	0.084	250	523	0.0	12.68				1.02	8.95	0.134	300	573	0.0	21.78				1.08	13.58	0.205	350	623	0.0	31.97				1.11	16.66	0.295
Temperature $t/^\circ C$	Temperature T/K	Sodium Chloride $c_2/mol\ dm^{-3}$	Methane Solubility S_1/cm^3 (STP) g^{-1}	Salt Effect Parameter $k_{sex}/dm^3 mol^{-1}$																																																																										
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METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:																																																																												
See earlier paper on methane + water system (1, 2).		(1) Methane. Stated to be 99.9 percent. (2) Sodium chloride. (3) Water. Distilled.																																																																												
The salt effect parameter was calculated from a Henry's constant ratio which included the fugacity of methane. The fugacity ratio was corrected for the amount of water in pure water and in the salt solution. The correction is very important at temperatures of 523 K and above.		ESTIMATED ERROR: $\delta T/K = \pm 0.1$ $\delta p_t/MPa = \pm 0.15$																																																																												
REFERENCES:																																																																														
1. Sultanov, R. G.; Skripka, V. G.; Namiot, A. Yu. <i>Gazov. Prom.</i> 1972, 17 (5), 6-7. 2. Sultanov, R. G.; Skripka, V. G.; Namiot, A. Yu. <i>Zh. Fiz. Khim.</i> 1972, 46, 2160.																																																																														

COMPONENTS:				ORIGINAL MEASUREMENTS:			
1. Methane; CH ₄ ; [74-82-8]				Blount, C. W.; Price, L. C.; Wenger, L. M.; Tarullo, M. DOE Contract report DE-A508- 78ET12145.			
2. Sodium chloride; NaCl; [7647-14-5]							
3. Water; H ₂ O; [7732-18-5]							
VARIABLES:				PREPARED BY:			
Temperature, pressure, concentration of component 2.				C. L. Young			
EXPERIMENTAL VALUES:							
T/°F	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹	Mole fraction x_{CH_4}	
212.36	373.35	22365	154.2	0.0	0.3563	0.00638	
212.36	373.35	22364	154.2	0.0	0.3636	0.00651	
212.36	373.35	22336	154.0	0.0	0.3833	0.00686	
211.10	372.65	19102	131.7	0.0	0.3556	0.00636	
211.10	372.65	19102	131.7	0.0	0.3483	0.00623	
211.10	372.65	19102	131.7	0.0	0.3505	0.00627	
211.10	372.65	19102	131.7	0.0	0.3636	0.00651	
211.10	372.65	19102	131.7	0.0	0.3600	0.00644	
212.36	373.35	16027	110.5	0.0	0.3169	0.00568	
212.36	373.35	16027	110.5	0.0	0.3183	0.00570	
212.36	373.35	16085	110.9	0.0	0.3322	0.00595	
212.36	373.35	16085	110.9	0.0	0.3154	0.00565	
212.00	373.15	16128	111.2	0.0	0.3242	0.00581	
212.00	373.15	16128	111.2	0.0	0.3300	0.00591	
213.80	374.15	13169	90.8	0.0	0.2986	0.00535	
213.80	374.15	13169	90.8	0.0	0.2994	0.00536	
212.00	373.15	10240	70.6	0.0	0.2585	0.00463	
212.00	373.15	10240	70.6	0.0	0.2592	0.00465	
212.36	373.35	7107	49.0	0.0	0.2227	0.00400	
212.36	373.35	5004	34.5	0.0	0.1884	0.00338	
212.36	373.35	5004	34.5	0.0	0.1774	0.00319	
212.36	373.35	3524	24.3	0.0	0.1438	0.00258	
212.36	373.35	3524	24.3	0.0	0.1365	0.00245	
(cont.)							
AUXILIARY INFORMATION							
METHOD/APPARATUS/PROCEDURE:				SOURCE AND PURITY OF MATERIALS:			
Teflon-lined stainless steel equilibrium cell. Methane added to saline solution under pressure. Cell equilibrated over a period of up to two days. Samples of solution taken while additional methane was being added to cell to keep the pressure constant. Sample sizes varied from 3 to 10 ml. Weight of sample measured and methane dissolved determined by volumetric method. Details in ref. (1) and (2).				1. Purity 99.99 mole per cent. 2. Reagent grade. 3. Distilled.			
				ESTIMATED ERROR: $\delta T/K = \pm 2$; $\delta P/MPa = \pm 0.3$; $\delta x/x = \pm 0.05$.			
				REFERENCES:			
				1. Price, L. C. Am. Ass. Petr. Geol. 1979, 63, 1527. 2. Blount, C. W.; Price, L. C.; Wenger, L. M.; Tarullo, M. Proc. U.S. Gulf Coast Geo- pressured Geotherm. Energy Conf. 1980, 4, 1225.			

COMPONENTS:

ORIGINAL MEASUREMENTS:

1. Methane; CH₄; [74-82-8] Blount, C. W.; Price, L.C.;
 2. Sodium chloride; NaCl; Wenger, L. M.; Tarullo, M.
 [7647-14-5] DOE Contract report DE-A508-
 3. Water; H₂O; [7732-18-5] 78ET12145.

EXPERIMENTAL VALUES:

T/°F	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹	Mole fraction <i>x</i> _{CH₄}
212.36	373.35	2176	15.0	0.0	0.1081	0.00194
212.36	373.35	2176	15.0	0.0	0.1095	0.00197
213.35	373.90	22539	155.4	3.19	0.3533	0.00632
213.35	373.90	19000	131.0	3.19	0.3489	0.00624
213.35	373.90	19000	131.0	3.19	0.3366	0.00602
212.45	373.40	16056	110.7	3.19	0.3074	0.00550
212.45	373.40	16056	110.7	3.19	0.3133	0.00561
212.45	373.40	13227	91.2	3.19	0.2848	0.00510
212.45	373.40	13227	91.2	3.19	0.2856	0.00511
212.45	373.40	10008	69.0	3.19	0.2462	0.00441
212.45	373.40	10008	69.0	3.19	0.2331	0.00418
213.35	373.90	7063	48.7	3.19	0.2215	0.00397
213.35	373.90	5105	35.2	3.19	0.1719	0.00308
213.35	373.90	5105	35.2	3.19	0.1719	0.00308
212.90	373.65	3640	25.1	3.19	0.1377	0.00247
212.90	373.65	3640	25.1	3.19	0.1464	0.00263
212.90	373.65	2147	14.8	3.19	0.1209	0.00217
212.90	373.65	2147	14.8	3.19	0.0998	0.00179
212.90	373.65	2219	15.3	3.19	0.1034	0.00186
212.90	373.65	2219	15.3	3.19	0.1100	0.00198
212.45	373.40	19421	133.9	51.1	0.2682	0.00473
212.45	373.40	19421	133.9	51.1	0.2491	0.00440
212.00	373.15	19421	133.9	51.1	0.2534	0.00447
212.00	373.15	19421	133.9	51.1	0.2654	0.00468
212.00	373.15	16027	110.5	51.1	0.2357	0.00416
212.00	373.15	13111	90.4	51.1	0.2280	0.00402
212.00	373.15	13111	90.4	51.1	0.2301	0.00406
212.00	373.15	13111	90.4	51.1	0.2322	0.00410
211.55	372.90	10182	70.2	51.1	0.2011	0.00355
211.55	372.90	10182	70.2	51.1	0.1842	0.00325
211.10	372.65	7223	49.8	51.1	0.1687	0.00298
211.10	372.65	7223	49.8	51.1	0.1701	0.00301
212.00	373.15	5033	34.7	51.1	0.1454	0.00257
212.00	373.15	5033	34.7	51.1	0.1461	0.00258
212.00	373.15	3597	24.8	51.1	0.1200	0.00212
212.00	373.15	3597	24.8	51.1	0.1228	0.00217
213.80	374.15	16186	111.6	106.0	0.1960	0.00340
213.80	374.15	13213	91.1	106.0	0.1735	0.00301
213.80	374.15	13213	91.1	106.0	0.1755	0.00305
212.00	373.15	22510	155.2	106.5	0.2349	0.00407
212.00	373.15	22510	155.2	106.5	0.2308	0.00400
212.00	373.15	22510	155.2	106.5	0.2329	0.00404
212.00	373.15	22510	155.2	106.5	0.2308	0.00400
212.00	373.15	22394	154.4	106.5	0.23626	0.00401
212.00	373.15	22394	154.4	106.5	0.23831	0.00413
212.90	373.65	19043	131.3	106.5	0.21919	0.00380
212.90	373.65	19043	131.3	106.5	0.21646	0.00375
212.36	373.35	15360	105.9	106.5	0.20007	0.00347
212.36	373.35	15360	105.9	106.5	0.20485	0.00355
212.90	373.65	15273	105.3	106.5	0.19529	0.00339
212.90	373.65	15273	105.3	106.5	0.20076	0.00348
212.90	373.65	13242	91.3	106.5	0.17617	0.00306
212.90	373.65	13242	91.3	106.5	0.17822	0.00309
212.90	373.65	12908	89.0	106.5	0.17959	0.00312
212.90	373.65	12908	89.0	106.5	0.18505	0.00321
212.00	373.15	10182	70.2	106.5	0.16457	0.00286

(cont.)

COMPONENTS:		ORIGINAL MEASUREMENTS:			
1. Methane; CH ₄ ; [74-82-8]		Blount, C. W.; Price, L. C.;			
2. Sodium chloride; NaCl; [7647-14-5]		Wenger, L. M.; Tarullo, M.			
3. Water; H ₂ O; [7732-18-5]		DOE Contract report DE-A508-78ET12145.			
EXPERIMENTAL VALUES:					
T/°F	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹
					Mole fraction <i>x</i> _{CH₄}
212.00	373.15	10182	70.2	106.5	0.16183
212.00	373.15	10095	69.6	106.5	0.1489
212.00	373.15	10095	69.6	106.5	0.1550
212.90	373.65	7165	49.4	106.5	0.1407
212.90	373.65	7165	49.4	106.5	0.1284
212.90	373.65	7078	48.8	106.5	0.1338
212.90	373.65	7078	48.8	106.5	0.1359
212.36	373.35	5163	35.6	104.0	0.1245
212.36	373.35	5163	35.6	104.0	0.1197
212.36	373.35	5120	35.6	105.0	0.1080
212.36	373.35	5120	35.3	105.0	0.1230
212.90	373.65	3669	35.3	105.0	0.0936
212.00	373.15	3698	25.5	105.0	0.0977
212.36	373.35	3640	25.1	105.0	0.0916
212.36	373.35	3640	25.1	105.0	0.0889
212.00	373.15	2060	14.2	105.0	0.0663
212.00	373.15	2060	14.2	105.0	0.0622
211.55	372.90	21843	150.6	166.3	0.1772
211.55	372.90	21843	150.6	166.3	0.1726
211.10	372.65	22104	152.4	166.3	0.1806
211.10	372.65	19087	131.6	166.3	0.1620
211.10	372.65	19087	131.6	166.3	0.1614
210.65	372.40	16157	111.4	166.3	0.1528
211.55	372.90	13314	91.8	166.3	0.1343
211.55	372.90	13314	91.8	166.3	0.1369
211.55	372.90	13198	91.0	163.5	0.1497
211.55	372.90	13198	91.0	163.5	0.1358
211.55	372.90	13373	92.2	163.5	0.1497
211.55	372.90	13373	92.2	163.5	0.1411
210.65	372.40	9993	68.9	164.6	0.1165
210.65	372.40	9993	68.9	164.6	0.1198
212.00	373.15	9834	67.8	163.5	0.1358
212.00	373.15	9834	67.8	163.5	0.1166
212.45	373.40	9935	68.5	163.5	0.1159
212.45	373.40	9935	68.5	163.5	0.1311
210.92	372.55	7208	49.7	164.6	0.1019
209.75	371.90	7107	49.0	163.5	0.1146
209.75	371.90	7107	49.0	163.5	0.1099
209.75	371.90	7107	49.0	163.5	0.1126
209.75	371.90	7107	49.0	163.5	0.1126
211.55	372.90	7034	48.5	163.5	0.1086
211.55	372.90	7034	48.5	163.5	0.1060
211.55	372.90	5018	34.6	163.5	0.0960
211.55	372.90	5018	34.6	163.5	0.0960
210.92	372.55	3205	22.1	163.5	0.0656
210.92	372.55	3205	22.1	163.5	0.0642
211.10	372.65	1915	13.2	163.5	0.0570
211.10	372.65	1915	13.2	163.5	0.0563
211.10	372.65	1973	13.6	163.5	0.0570
211.10	372.65	1973	13.6	163.5	0.0570
211.55	372.90	22466	154.9	227.6	0.1149
211.55	372.90	22466	154.9	227.6	0.1194
211.55	372.90	22466	154.9	227.6	0.1342
211.55	372.90	22466	154.9	227.6	0.1258
211.55	372.90	22437	154.7	227.6	0.1329
211.55	372.90	22437	154.7	227.6	0.1246
211.55	372.90	17463	120.4	227.6	0.1169

(cont.)

COMPONENTS:

ORIGINAL MEASUREMENTS:

1. Methane; CH₄; [74-82-8] Blount, C. W.; Price, L. C.;
 2. Sodium chloride; NaCl; Wenger, L. M.; Tarullo, M.
 [7647-14-5] DOE Contract report DE-A508-
 3. Water; H₂O; [7732-18-5] 78ET12145.

EXPERIMENTAL VALUES:

T/°F	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹	Mole fraction x_{CH_4}
211.55	372.90	17463	120.4	227.6	0.1162	0.00194
211.55	372.90	15345	105.8	227.6	0.1136	0.00189
210.65	372.40	15519	107.0	227.6	0.1181	0.00197
210.65	372.40	15519	107.0	227.6	0.1226	0.00204
211.10	372.65	16302	112.4	227.6	0.1085	0.00181
210.65	372.40	16360	112.8	227.6	0.10272	0.00171
210.65	372.40	16360	112.8	227.6	0.10786	0.00180
210.65	372.40	13285	91.6	227.6	0.09438	0.00157
210.65	372.40	13518	93.2	227.6	0.09053	0.00151
210.65	372.40	13518	93.2	227.6	0.09951	0.00166
210.20	372.15	9747	67.2	227.6	0.08346	0.00139
210.65	372.40	10182	70.2	227.6	0.07833	0.00131
210.65	372.40	10182	70.2	227.6	0.08796	0.00147
210.20	372.15	7281	50.2	225.1	0.07328	0.00122
210.20	372.15	7281	50.2	225.1	0.07649	0.00128
210.65	372.40	5047	34.8	225.1	0.07713	0.00129
210.20	372.15	5366	37.0	223.7	0.06432	0.00107
210.65	372.40	5395	37.2	223.7	0.05506	0.00092
210.65	372.40	5395	37.2	223.7	0.06110	0.00102
210.65	372.40	3597	24.8	223.7	0.05210	0.00087
210.65	372.40	3597	24.8	223.7	0.05467	0.00091
210.65	372.40	3597	24.8	223.7	0.06753	0.00113
210.65	372.40	3568	24.6	223.7	0.05210	0.00087
210.20	372.15	2118	14.6	223.7	0.04181	0.00070
210.20	372.15	2118	14.6	223.7	0.03988	0.00067
213.44	373.95	22220	153.2	293.5	0.07734	0.00126
212.90	373.65	19000	131.0	293.5	0.08545	0.00139
212.90	373.65	19000	131.0	293.5	0.08920	0.00145
212.90	373.65	19000	131.0	293.5	0.08732	0.00142
212.90	373.65	19000	131.0	293.5	0.08670	0.00141
212.90	373.65	19000	131.0	293.5	0.09169	0.00149
212.90	373.65	15998	110.3	293.5	0.06487	0.00106
212.90	373.65	15998	110.3	293.5	0.08233	0.00134
212.90	373.65	13068	90.1	293.5	0.06924	0.00113
212.90	373.65	13068	90.1	293.5	0.07610	0.00124
214.16	374.35	13169	90.8	294.6	0.06671	0.00109
214.16	374.35	13169	90.8	294.6	0.07107	0.00116
213.44	373.95	13111	90.4	294.6	0.07357	0.00120
213.44	373.95	13111	90.4	294.6	0.07793	0.00127
213.80	374.15	10240	70.6	294.6	0.06983	0.00114
213.80	374.15	10240	70.6	294.6	0.06796	0.00111
213.44	373.95	7194	49.6	294.6	0.05424	0.00088
213.44	373.95	7194	49.6	294.6	0.05673	0.00092
213.80	374.15	5178	35.7	294.6	0.04801	0.00078
213.80	374.15	5178	35.7	294.6	0.04551	0.00074
214.16	374.35	3626	25.0	294.6	0.03678	0.00060
214.16	374.35	3626	25.0	294.6	0.04177	0.00068
213.44	373.95	2045	14.1	294.6	0.03180	0.00052
213.44	373.95	2045	14.1	294.6	0.03055	0.00050
213.44	373.95	2045	14.1	294.6	0.02806	0.00046
213.44	373.95	2045	14.1	294.6	0.03055	0.00050
272.75	406.90	22495	155.1	3.19	0.44146	0.00788
272.75	406.90	22495	155.1	3.19	0.44000	0.00786
272.75	406.90	19203	132.4	3.19	0.43563	0.00778
272.75	406.90	19203	132.4	3.19	0.38828	0.00694
273.20	407.15	19218	132.5	3.19	0.41086	0.00734
273.20	407.15	19218	132.5	3.19	0.41086	0.00734

(cont.)

COMPONENTS:

ORIGINAL MEASUREMENTS:

1. Methane; CH₄; [74-82-8] Blount, C. W.; Price, L. C.
 2. Sodium chloride; NaCl; Wenger, L. M.; Tarullo, M.
 [7647-14-5] DOE Contract report DE-A508-
 3. Water; H₂O; [7732-18-5] 78ET12145.

EXPERIMENTAL VALUES:

T/°F	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹	Mole fraction <i>x</i> _{CH₄}
272.75	406.90	16186	111.6	3.19	0.39047	0.00698
272.75	406.90	16186	111.6	3.19	0.35696	0.00638
273.20	407.15	13169	90.8	3.19	0.34603	0.00619
273.20	407.15	13169	90.8	3.19	0.35914	0.00642
273.20	407.15	10399	71.7	3.19	0.32636	0.00584
273.20	407.15	10399	71.7	3.19	0.29576	0.00529
272.30	406.65	10385	71.6	3.19	0.31470	0.00563
272.30	406.65	10385	71.6	3.19	0.29576	0.00529
273.65	407.40	7223	49.8	3.19	0.24695	0.00442
272.75	406.90	7266	50.1	3.19	0.24040	0.00431
272.75	406.90	7266	50.1	3.19	0.25715	0.00461
273.20	407.15	7629	52.6	3.19	0.26080	0.00467
273.20	407.15	7629	52.6	3.19	0.25351	0.00454
274.10	407.65	5149	35.5	3.19	0.22292	0.00400
273.20	407.15	5163	35.6	3.19	0.20543	0.00368
273.65	407.40	5134	35.4	3.19	0.20835	0.00374
273.65	407.40	5134	35.4	3.19	0.22656	0.00406
273.20	407.15	3626	25.0	3.19	0.17119	0.00307
273.20	407.15	3626	25.0	3.19	0.18358	0.00329
274.10	407.65	2248	15.5	3.19	0.13404	0.00241
274.10	407.65	2248	15.5	3.19	0.15007	0.00269
275.00	408.15	16128	111.2	51.1	0.34511	0.00608
274.55	407.90	16186	111.6	51.1	0.32252	0.00568
274.55	407.90	16186	111.6	51.1	0.34017	0.00599
275.00	408.15	13155	90.7	51.1	0.28441	0.00502
275.00	408.15	13242	91.3	51.1	0.29147	0.00514
275.00	408.15	13242	91.3	51.1	0.27383	0.00483
274.55	407.90	10327	71.2	51.1	0.26042	0.00460
274.55	407.90	10327	71.2	51.1	0.27171	0.00479
272.75	406.90	7034	48.5	51.1	0.20749	0.00366
272.75	406.90	7034	48.5	51.1	0.19831	0.00350
271.99	406.48	7034	48.5	51.1	0.20325	0.00359
271.99	406.48	7034	48.5	51.1	0.21031	0.00371
272.75	406.90	5062	34.9	51.1	0.16797	0.00297
272.75	406.90	5062	34.9	51.1	0.16867	0.00298
272.75	406.90	3568	24.6	51.1	0.14115	0.00250
272.75	406.90	3568	24.6	51.1	0.14185	0.00251
272.30	406.65	2016	13.9	51.1	0.09316	0.00165
272.30	406.65	2016	13.9	51.1	0.08963	0.00159
275.00	408.15	19014	131.1	106.0	0.24931	0.00432
275.00	408.15	19014	131.1	106.0	0.25136	0.00436
275.00	408.15	16273	112.2	106.0	0.22130	0.00384
275.00	408.15	16273	112.2	106.0	0.21789	0.00378
275.00	408.15	16157	111.4	106.0	0.23292	0.00404
275.00	408.15	16157	111.4	106.0	0.25409	0.00440
275.00	408.15	16128	111.2	106.0	0.26229	0.00455
275.00	408.15	16128	111.2	106.0	0.25887	0.00449
275.45	408.40	13169	90.8	106.0	0.21584	0.00374
273.20	407.15	13373	92.2	106.0	0.20218	0.00351
273.20	407.15	13373	92.2	106.0	0.20901	0.00363
274.55	407.90	13097	90.3	106.0	0.20423	0.00354
274.55	407.90	13097	90.3	106.0	0.20286	0.00352
274.55	407.90	13256	91.4	106.0	0.21994	0.00381
276.80	409.15	13082	90.2	106.0	0.21379	0.00371
276.80	409.15	13082	90.2	106.0	0.21789	0.00378
276.80	409.15	10312	71.1	106.0	0.20969	0.00364

(cont.)

COMPONENTS:

ORIGINAL MEASUREMENTS:

1. Methane; CH₄; [74-82-8] Blount, C. W.; Price, L. C.;
 2. Sodium chloride; NaCl; Wenger, L. M.; Tarullo, M.
 [7647-14-5] DOE Contract report DE-A508-
 3. Water; H₂O; [7732-18-5] 78ET12145.

EXPERIMENTAL VALUES:

T/°C	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹	Mole fraction <i>x</i> _{CH₄}
276.80	409.15	10312	71.1	106.0	0.20628	0.00358
274.10	407.65	7223	49.8	106.0	0.17213	0.00299
274.10	407.65	7223	49.8	106.0	0.17076	0.00296
274.55	407.90	7426	51.2	106.0	0.17691	0.00307
274.55	407.90	7426	51.2	106.0	0.18237	0.00316
274.55	407.90	5279	36.4	106.0	0.12978	0.00225
274.10	407.65	3579	24.8	106.0	0.11407	0.00198
274.10	407.65	3597	24.8	106.0	0.10519	0.00183
274.10	407.65	3626	25.0	106.0	0.11680	0.00203
274.10	407.65	3626	25.0	106.0	0.10929	0.00190
275.90	408.65	19043	131.3	105.0	0.25082	0.00435
276.44	408.95	19131	131.9	105.0	0.25423	0.00441
276.44	408.95	19131	131.9	105.0	0.25082	0.00435
276.80	409.15	15940	109.9	105.0	0.23168	0.00402
276.80	409.15	15940	109.9	105.0	0.23988	0.00416
276.98	409.25	13024	89.8	105.0	0.20161	0.00350
276.98	409.25	13024	89.8	105.0	0.20298	0.00352
277.16	409.35	13155	90.7	105.0	0.20708	0.00359
277.16	409.35	13155	90.7	105.0	0.20161	0.00350
276.80	409.15	13126	90.5	105.0	0.20571	0.00357
277.16	409.35	7020	48.4	107.0	0.15496	0.00269
277.16	409.35	7063	48.7	107.0	0.16657	0.00289
277.16	409.35	7063	48.7	107.0	0.15564	0.00270
277.16	409.35	5018	34.6	107.0	0.13243	0.00230
277.16	409.35	5018	34.6	107.0	0.13448	0.00233
276.80	409.15	5149	35.5	107.0	0.14199	0.00247
276.80	409.15	5149	35.5	107.0	0.14131	0.00245
276.80	409.15	5149	35.5	107.0	0.14131	0.00245
276.80	409.15	3684	25.4	107.0	0.10581	0.00184
276.98	409.25	3365	23.2	107.0	0.10786	0.00187
276.98	409.25	3365	23.2	107.0	0.10991	0.00191
276.98	409.25	2016	13.9	106.8	0.07647	0.00133
276.98	409.25	2016	13.9	106.8	0.07647	0.00133
271.04	405.95	2016	13.9	106.8	0.07305	0.00127
271.04	405.95	2016	13.9	106.8	0.06964	0.00121
275.00	408.15	22539	155.4	163.5	0.23644	0.00402
275.00	408.15	22539	155.4	163.5	0.23047	0.00392
275.00	408.15	22278	153.6	161.7	0.22538	0.00383
275.00	408.15	22350	154.1	161.7	0.23864	0.00406
275.00	408.15	22437	154.7	161.7	0.23599	0.00401
275.00	408.15	19029	131.2	161.7	0.22804	0.00388
275.00	408.15	19203	132.4	161.7	0.20682	0.00352
275.00	408.15	19203	132.4	161.7	0.21213	0.00361
275.00	408.15	16157	111.4	160.7	0.20560	0.00350
275.00	408.15	16157	111.4	160.7	0.21688	0.00369
275.90	408.65	13227	91.2	163.5	0.17219	0.00293
275.45	408.40	12850	88.6	160.7	0.18239	0.00311
275.00	408.15	13024	89.8	160.7	0.19300	0.00329
275.00	408.15	13024	89.8	160.7	0.18504	0.00315
275.90	408.65	10211	70.4	163.5	0.16425	0.00280
275.00	408.15	10182	70.2	163.5	0.16160	0.00275
275.00	408.15	10182	70.2	163.5	0.17948	0.00305
275.45	408.40	10153	70.0	160.7	0.18040	0.00307
275.45	408.40	10153	70.0	160.7	0.15918	0.00271
275.00	408.15	7136	49.2	160.7	0.12734	0.00217
275.00	408.15	7136	49.2	160.7	0.12734	0.00217

(cont.)

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1.	Methane; CH ₄ ; [74-82-8]	Blount, C. W.; Price, L. C.; Wenger, L. M.; Tarullo, M.				
2.	Sodium chloride; NaCl; [7647-14-5]	DOE Contract report DE-A508-78ET12145.				
3.	Water; H ₂ O; [7732-18-5]					
EXPERIMENTAL VALUES:						
T/°C	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹	Mole fraction x_{CH_4}
275.45	408.40	5163	35.6	160.3	0.10813	0.00184
275.45	408.40	5091	35.1	160.3	0.10548	0.00180
275.45	408.40	5091	35.1	160.3	0.10481	0.00179
275.00	408.15	3568	24.6	159.7	0.08162	0.00139
274.55	407.90	3626	25.0	163.9	0.08211	0.00140
274.55	407.90	3655	25.2	163.9	0.10330	0.00176
275.00	408.15	2147	14.8	163.9	0.06224	0.00106
275.00	408.15	2147	14.8	163.9	0.05761	0.00098
274.55	407.90	2292	15.8	163.9	0.05694	0.00097
274.55	407.90	2292	15.8	163.9	0.07019	0.00120
275.00	408.15	19087	131.6	224.3	0.15754	0.00263
275.00	408.15	19087	131.6	224.3	0.15818	0.00264
275.00	408.15	19232	132.6	224.3	0.14468	0.00241
274.55	407.90	19174	132.2	224.3	0.15175	0.00253
273.65	407.40	19072	131.5	227.8	0.15086	0.00251
273.65	407.40	19072	131.5	227.8	0.14509	0.00242
273.65	407.40	19072	131.5	227.6	0.14189	0.00236
273.65	407.40	19072	131.5	227.6	0.15794	0.00263
273.65	407.40	16041	110.6	227.1	0.14385	0.00240
273.65	407.40	16070	110.8	225.7	0.15294	0.00255
273.65	407.40	16070	110.8	225.7	0.14908	0.00248
273.65	407.40	13024	89.8	225.4	0.12532	0.00209
273.65	407.40	13024	89.8	225.4	0.13882	0.00231
273.65	407.40	10066	69.4	223.7	0.13764	0.00229
273.65	407.40	10066	69.4	223.7	0.14150	0.00236
273.65	407.40	10080	69.5	222.6	0.13449	0.00224
273.65	407.40	10080	69.5	222.6	0.12162	0.00203
273.65	407.40	10095	69.6	221.3	0.13651	0.00228
273.65	407.40	10109	69.7	219.0	0.12178	0.00203
273.65	407.40	10109	69.7	219.9	0.12178	0.00203
273.65	407.40	7136	49.2	218.6	0.10573	0.00177
272.30	406.65	7194	49.6	224.3	0.10224	0.00171
272.30	406.65	7194	49.6	224.3	0.10674	0.00178
273.65	407.40	4873	33.6	224.3	0.09131	0.00152
272.20	407.15	4931	34.0	224.3	0.07973	0.00133
272.20	407.15	4931	34.0	224.3	0.07780	0.00130
273.65	407.40	3597	24.8	223.7	0.05853	0.00098
273.65	407.40	3597	24.8	223.7	0.06110	0.00102
273.65	407.40	2176	15.0	223.2	0.04568	0.00076
273.65	407.40	2176	15.0	222.6	0.05792	0.00097
273.65	407.40	2176	15.0	222.6	0.05406	0.00090
273.65	407.40	2161	14.9	222.6	0.04633	0.00077
273.65	407.40	2161	14.9	222.6	0.04440	0.00074
275.90	408.65	22640	156.1	295.2	0.13463	0.00219
275.90	408.65	22640	156.1	295.1	0.13464	0.00219
275.90	408.65	19218	132.5	295.1	0.12030	0.00196
275.90	408.65	19218	132.5	295.1	0.11906	0.00194
275.90	408.65	16273	112.2	294.4	0.11784	0.00192
275.90	408.65	16273	112.2	294.4	0.11036	0.00179
277.25	409.40	13068	90.1	293.6	0.09730	0.00158
277.25	409.40	13068	90.1	293.6	0.09480	0.00154
277.70	409.65	10167	70.1	293.0	0.08609	0.00140
277.70	409.65	10167	70.1	293.0	0.08734	0.00142
276.80	409.15	7150	49.3	292.1	0.07240	0.00118
276.80	409.15	7150	49.3	292.1	0.07115	0.00116
276.35	408.90	5163	35.6	291.5	0.05931	0.00097

(cont.)

COMPONENTS:

1. Methane; CH₄; [74-82-8]
 2. Sodium chloride; NaCl;
 [7647-14-5]
 3. Water; H₂O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Blount, C. W.; Price, L. C.;
 Wenger, L. M.; Tarullo, M.
 DOE Contract report DE-A508-
 78ETL2145.

EXPERIMENTAL VALUES:

T/°C	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg	Mole fraction x_{CH_4}
276.35	408.90	5163	35.6	291.5	0.05931	0.00097
276.80	409.15	2263	15.6	286.0	0.04005	0.00065
276.80	409.15	2263	15.6	286.0	0.03629	0.00059
335.12	441.55	22539	155.4	3.0	0.58942	0.01050
335.12	441.55	22539	155.4	3.0	0.66665	0.01186
335.75	441.90	22278	153.6	3.0	0.65500	0.01165
335.75	441.90	22278	153.6	3.0	0.60399	0.01075
335.75	441.90	21843	150.6	3.0	0.65135	0.01159
335.75	441.90	22597	155.8	3.0	0.58724	0.01046
335.75	441.90	22597	155.8	3.0	0.62585	0.01114
336.20	442.15	22800	157.2	3.0	0.60909	0.01084
336.20	442.15	22771	157.0	3.0	0.69142	0.01229
336.20	442.15	22771	157.0	3.0	0.67685	0.01204
336.20	442.15	18332	126.4	3.0	0.58432	0.01041
336.20	442.15	18332	126.4	3.0	0.62512	0.01113
336.20	442.15	17927	123.6	3.0	0.63678	0.01113
335.75	441.90	19218	132.5	3.0	0.61711	0.01099
335.75	441.90	16360	112.8	3.0	0.53187	0.00948
335.75	441.90	16360	112.8	3.0	0.57412	0.01023
336.65	442.40	13169	90.8	3.0	0.53041	0.00946
336.65	442.40	13169	90.8	3.0	0.52021	0.00928
336.65	442.40	10225	70.5	3.0	0.43132	0.00770
335.84	441.95	10269	70.8	3.0	0.42695	0.00763
336.20	442.15	10167	70.1	3.0	0.46119	0.00823
337.55	442.90	5076	35.0	3.0	0.33733	0.00603
337.55	442.90	5076	35.0	3.0	0.32713	0.00585
336.20	442.15	3626	25.0	3.1	0.23167	0.00415
336.20	442.15	3626	25.0	3.1	0.23677	0.00424
336.20	442.15	3640	25.1	3.1	0.25717	0.00461
336.20	442.15	3640	25.1	3.1	0.27247	0.00488
340.25	444.40	18347	126.5	51.1	0.44956	0.00791
340.25	444.40	18347	126.5	51.1	0.45026	0.00792
340.25	444.40	17985	124.0	51.1	0.44744	0.00787
340.25	444.40	17985	124.0	51.1	0.46720	0.00821
339.98	444.25	15650	107.9	51.0	0.42771	0.00753
339.98	444.25	15650	107.9	51.0	0.43759	0.00770
340.70	444.65	12821	88.4	50.7	0.37414	0.00659
340.70	444.65	12821	88.4	50.7	0.39602	0.00697
339.98	444.25	9776	67.4	50.4	0.34949	0.00616
339.98	444.25	9776	67.4	50.4	0.31913	0.00563
339.98	444.25	6773	46.7	50.0	0.26978	0.00476
339.98	444.25	6773	46.7	50.0	0.28320	0.00500
339.08	443.75	4801	33.1	49.7	0.25076	0.00443
339.08	443.75	4801	33.1	49.7	0.23451	0.00414
339.08	443.75	4801	33.1	49.7	0.23592	0.00417
338.90	443.65	3553	24.5	49.5	0.19357	0.00342
338.90	443.65	3553	24.5	49.5	0.19922	0.00352
339.35	443.90	1958	13.5	49.5	0.13281	0.00235
339.35	443.90	1958	13.5	49.5	0.12716	0.00225
339.44	443.95	19043	131.3	104.6	0.32060	0.00555
339.80	444.15	19072	131.5	104.6	0.35204	0.00609
339.80	444.15	19072	131.5	104.6	0.35819	0.00620
339.80	444.15	16157	111.4	104.6	0.31991	0.00554
339.80	444.15	16157	111.4	104.6	0.31171	0.00540
339.80	444.15	16027	110.5	104.6	0.31308	0.00542
339.80	444.15	16027	110.5	104.6	0.30693	0.00532

(cont.)

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8]		Blount, C. W.; Price, L. C.;				
2. Sodium chloride; NaCl; [7647-14-5]		Wenger, L. M.; Tarullo, M.				
3. Water; H ₂ O; [7732-18-5]		DOE Contract report DE-A508-78ET12145.				
EXPERIMENTAL VALUES:						
T/°C	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹	
x _{CH₄}						
339.80	444.15	16027	110.5	104.6	0.32538	0.00564
339.80	444.15	16027	110.5	104.6	0.32538	0.00564
339.80	444.15	13024	89.8	104.6	0.27822	0.00482
339.80	444.15	13024	89.8	104.6	0.28505	0.00494
338.36	443.35	13024	89.8	104.6	0.28505	0.00494
338.36	443.35	13024	89.8	104.6	0.29599	0.00513
339.80	444.15	10008	69.0	106.0	0.25819	0.00447
339.80	444.15	10008	69.0	106.0	0.26638	0.00462
339.80	444.15	10037	69.2	106.0	0.24863	0.00431
339.80	444.15	7049	48.6	106.0	0.20218	0.00351
339.80	444.15	7020	48.4	106.0	0.19603	0.00340
339.80	444.15	7020	48.4	106.0	0.20355	0.00353
339.80	444.15	6991	48.2	106.0	0.19945	0.00346
339.80	444.15	6991	48.2	106.0	0.19808	0.00344
339.80	444.15	5047	34.8	106.0	0.16529	0.00287
339.80	444.15	5047	34.8	106.0	0.17691	0.00307
339.80	444.15	5250	36.2	106.0	0.17486	0.00303
339.80	444.15	5250	36.2	106.0	0.16325	0.00283
339.80	444.15	3553	24.5	106.0	0.14412	0.00250
339.80	444.15	3553	24.5	106.0	0.13388	0.00233
339.80	444.15	3568	24.6	104.0	0.15386	0.00267
339.80	444.15	3568	24.6	104.0	0.13676	0.00238
339.80	444.15	2002	13.8	104.0	0.11762	0.00204
339.80	444.15	2002	13.8	104.0	0.11420	0.00199
339.80	444.15	2002	13.8	104.0	0.09505	0.00165
339.80	444.15	2002	13.8	104.0	0.10667	0.00185
339.80	444.15	22568	155.6	163.9	0.30657	0.00521
338.00	443.15	22568	155.6	163.9	0.30194	0.00513
338.00	443.15	22582	155.7	162.1	0.30487	0.00518
338.00	443.15	22582	155.7	162.1	0.29426	0.00500
338.36	443.35	19072	131.5	163.4	0.27884	0.00474
338.36	443.35	19072	131.5	163.4	0.27155	0.00461
336.20	442.15	16099	111.0	159.8	0.26409	0.00449
336.20	442.15	16099	111.0	159.8	0.27736	0.00472
338.36	443.35	13097	90.3	157.8	0.21853	0.00372
338.36	443.35	13097	90.3	157.8	0.21986	0.00375
336.20	442.15	10298	71.0	159.5	0.19777	0.00337
336.20	442.15	10298	71.0	159.5	0.18250	0.00311
336.20	442.15	7165	49.4	159.5	0.17786	0.00303
336.20	442.15	7165	49.4	159.5	0.17454	0.00297
336.20	442.15	5105	35.2	159.5	0.14401	0.00246
336.20	442.15	5105	35.2	159.5	0.14268	0.00243
336.20	442.15	3553	24.5	159.5	0.11348	0.00194
336.20	442.15	3553	24.5	159.5	0.11680	0.00199
337.10	442.65	2060	14.2	159.5	0.08760	0.00150
337.64	442.95	2016	13.9	159.5	0.08229	0.00140
337.64	442.95	2016	13.9	159.5	0.08229	0.00140
338.36	443.35	22539	155.4	224.3	0.24563	0.00409
338.36	443.35	22539	155.4	224.3	0.24177	0.00402
338.36	443.35	22336	155.4	224.3	0.25077	0.00417
338.36	443.35	22336	155.4	224.3	0.25206	0.00419
338.00	443.15	19087	131.6	223.7	0.22061	0.00367
338.00	443.15	19087	131.6	223.7	0.20518	0.00342
337.64	442.95	16027	110.5	223.5	0.19362	0.00323
338.00	443.15	16070	110.8	223.5	0.18911	0.00315
338.00	443.15	16070	110.8	223.5	0.20262	0.00337

(cont.)

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1.	Methane; CH ₄ ; [74-82-8]	Blount, C. W.; Price, L. C.;				
2.	Sodium chloride; NaCl; [7647-14-5]	Wenger, L. M.; Tarullo, M. DOE Contract report DE-A508-				
3.	Water; H ₂ O; [7732-18-5]	78ET12145.				
EXPERIMENTAL VALUES:						
T/°F	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹	Mole fraction <i>x</i> _{CH₄}
338.00	443.15	13082	90.2	223.7	0.18074	0.00301
338.00	443.15	13097	90.3	223.7	0.18652	0.00311
338.00	443.15	13097	90.3	223.7	0.19553	0.00326
337.64	442.95	10066	69.4	223.5	0.14988	0.00250
338.36	443.35	10051	69.3	223.5	0.14988	0.00250
338.36	443.35	10051	69.3	223.5	0.15052	0.00251
335.84	441.95	7034	48.5	220.4	0.12497	0.00209
338.00	443.15	7092	48.9	220.4	0.13656	0.00228
338.00	443.15	7092	48.9	220.4	0.13334	0.00223
338.00	443.15	5178	35.7	226.5	0.09764	0.00163
338.00	443.15	5033	34.7	226.5	0.09378	0.00156
338.00	443.15	5033	34.7	226.5	0.09700	0.00162
338.00	443.15	3626	25.0	220.4	0.08245	0.00138
338.00	443.15	3626	27.1	220.4	0.07666	0.00128
338.40	443.35	2263	15.6	226.5	0.06167	0.00103
338.40	443.35	2277	15.7	226.5	0.06167	0.00103
338.00	443.15	22480	155.0	289.9	0.18303	0.00298
338.00	443.15	22480	155.0	289.9	0.17803	0.00290
340.00	444.15	21553	148.6	289.9	0.18178	0.00296
338.00	443.15	19232	132.6	287.2	0.16823	0.00274
338.00	443.15	19232	132.6	287.2	0.16948	0.00276
338.00	443.15	16258	112.1	284.5	0.16467	0.00268
338.00	443.15	16258	112.1	284.5	0.15778	0.00257
338.00	443.15	13256	91.4	283.0	0.14472	0.00236
338.00	443.15	13256	91.4	283.1	0.13407	0.00219
338.00	443.15	13256	91.4	283.1	0.13595	0.00222
338.00	443.15	13256	91.4	283.1	0.14096	0.00230
338.90	443.65	10211	70.4	283.1	0.12655	0.00207
338.90	443.65	10211	70.4	283.1	0.12091	0.00197
339.44	443.95	7252	50.0	283.1	0.09397	0.00153
339.44	443.95	7252	50.0	283.1	0.09836	0.00161
339.44	443.95	5163	35.6	282.1	0.08085	0.00132
339.44	443.95	5163	35.6	282.1	0.08524	0.00139
338.90	443.65	3539	24.4	282.1	0.06581	0.00108
338.90	443.65	3539	24.4	282.1	0.06769	0.00111
401.00	478.15	22452	154.8	3.1	0.91139	0.01614
401.45	478.40	22742	156.8	3.5	0.89293	0.01581
401.45	478.40	22742	156.8	3.5	0.91696	0.01623
401.45	478.40	19406	133.8	3.5	0.83321	0.01477
401.45	478.40	19406	133.8	3.5	0.90094	0.01595
400.55	477.90	19319	133.2	3.5	0.86962	0.01541
400.55	477.90	19319	133.2	3.5	0.88856	0.01574
401.90	478.65	16418	113.2	3.5	0.78732	0.01397
401.90	478.65	16360	112.8	3.5	0.83685	0.01484
401.90	478.65	16360	112.8	3.6	0.81281	0.01442
401.90	478.65	13140	90.6	3.5	0.70138	0.01246
401.90	478.65	13140	90.6	3.5	0.71740	0.01275
401.45	478.40	10356	71.4	3.5	0.62637	0.01115
401.18	478.25	10269	70.8	3.5	0.66642	0.01185
400.82	478.05	10327	71.2	3.5	0.63656	0.01133
400.82	478.05	10327	71.2	3.5	0.61908	0.01102
398.75	476.90	7310	50.4	3.5	0.57684	0.01027
398.75	476.90	7310	50.4	3.5	0.58266	0.01038
398.30	476.65	5207	35.9	3.5	0.41369	0.00739
398.30	476.76	5207	35.9	3.5	0.41223	0.00736
398.12	476.55	3655	25.2	3.5	0.31755	0.00568

(cont.)

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1.	Methane; CH ₄ ; [74-82-8]	Blount, C. W.; Price, L. C.;				
2.	Sodium chloride; NaCl; [7647-14-5]	Wenger, L. M.; Tarullo, M. DOE Contract report DE-A508-				
3.	Water; H ₂ O; [7732-18-5]	78ET12145.				
EXPERIMENTAL VALUES:						
T/°F	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg	Mole fraction x_{CH_4}
398.12	476.55	3655	25.2	3.5	0.31901	0.00571
397.22	476.05	2060	14.2	3.5	0.26802	0.00480
397.22	476.05	2060	14.2	3.5	0.24108	0.00432
401.90	478.65	19247	132.7	49.8	0.68301	0.01197
401.90	478.65	19377	133.6	49.4	0.67894	0.01190
401.45	478.40	19522	134.6	49.3	0.65355	0.01146
401.45	478.40	19522	134.6	49.3	0.66062	0.01158
401.45	478.40	16070	110.8	49.2	0.61685	0.01082
401.45	478.40	16244	112.0	49.0	0.67063	0.01176
401.45	478.40	16244	112.0	49.0	0.64307	0.01128
401.45	478.40	13227	91.2	49.0	0.64025	0.01123
401.45	478.40	13227	91.2	49.0	0.59785	0.01049
401.45	478.40	9979	68.8	49.0	0.53283	0.00936
401.45	478.40	9979	68.8	49.0	0.52223	0.00918
401.90	478.65	7194	49.6	48.8	0.37883	0.00668
401.90	478.65	7194	49.6	48.8	0.39296	0.00692
402.35	478.90	7513	51.8	48.8	0.40710	0.00717
401.00	478.15	4873	33.6	46.8	0.33755	0.00596
401.00	478.15	4917	33.9	46.8	0.36091	0.00637
401.00	478.15	4960	34.2	46.8	0.37364	0.00659
401.00	478.15	4960	34.2	46.8	0.37577	0.00663
401.36	478.35	3553	24.5	46.3	0.29023	0.00513
401.36	478.35	3553	24.5	46.3	0.30439	0.00538
401.36	478.35	2161	14.9	46.3	0.19254	0.00341
401.36	478.35	2161	14.9	46.3	0.19679	0.00348
404.60	480.15	22278	153.6	161.7	0.39508	0.00670
404.60	480.15	22278	153.6	161.7	0.40105	0.00680
404.60	480.15	22292	153.7	161.7	0.40304	0.00684
404.60	480.15	22292	153.7	161.7	0.40569	0.00688
404.60	480.15	18855	130.0	161.7	0.38050	0.00646
404.60	480.15	18855	130.0	161.7	0.38647	0.00656
404.60	480.15	15969	110.1	161.7	0.36525	0.00620
404.60	480.15	15969	110.1	161.7	0.35067	0.00595
404.24	479.95	12966	89.4	161.7	0.34537	0.00586
403.70	479.65	12952	89.3	161.7	0.32681	0.00555
404.24	479.95	10124	69.8	161.7	0.30029	0.00510
404.24	479.95	10124	69.8	161.7	0.28968	0.00492
404.24	479.95	7005	48.3	161.7	0.25654	0.00436
404.24	479.95	7005	48.3	161.7	0.24660	0.00419
404.24	479.95	5076	35.0	161.7	0.21146	0.00360
404.24	479.95	5076	35.0	161.7	0.23334	0.00397
404.24	479.95	3568	24.6	161.7	0.16837	0.00287
404.24	479.95	3568	24.6	161.7	0.16572	0.00282
404.24	479.95	2074	14.3	161.7	0.12926	0.00220
404.24	479.95	2074	14.3	161.7	0.11402	0.00194
402.44	478.95	22481	155.0	221.0	0.30525	0.00508
402.44	478.95	22481	155.0	221.0	0.32457	0.00540
401.90	478.65	19218	132.5	221.0	0.30268	0.00504
401.90	478.65	19087	131.6	216.0	0.30274	0.00505
401.90	478.65	19087	131.6	216.0	0.29757	0.00496
402.44	478.95	15635	107.8	212.6	0.27284	0.00456
402.44	478.95	15635	107.8	212.6	0.29676	0.00495
402.44	478.95	13169	90.8	212.3	0.23149	0.00387
402.44	478.95	13169	90.8	212.3	0.23537	0.00393
401.90	478.65	13068	90.1	211.5	0.23546	0.00394
401.90	478.65	13068	90.1	211.5	0.23934	0.00400

(cont.)

COMPONENTS:

1. Methane; CH₄; [74-82-8]
 2. Sodium chloride; NaCl;
 [7647-14-5]
 3. Water; H₂O; [7732-18-5]

ORIGINAL MEASUREMENTS:

Blount, C. W.; Price, L. C.;
 Wenger, L. M.; Tarullo, M.
 DOE Contract report DE-A508-
 78ET12145.

EXPERIMENTAL VALUES:

T/°F	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹	Mole fraction CH ₄
401.90	478.65	10385	71.6	219.7	0.22360	0.00373
402.44	478.93	10428	71.9	218.6	0.23274	0.00388
402.44	478.95	10428	71.9	218.6	0.23210	0.00387
402.44	478.95	7092	48.9	216.0	0.18139	0.00303
402.44	478.95	7092	48.9	216.0	0.16202	0.00271
402.44	478.95	4989	34.4	211.5	0.14878	0.00249
402.44	478.95	4989	34.4	211.5	0.13325	0.00223
401.90	478.65	3510	24.2	207.0	0.11604	0.00195
401.90	478.65	3510	24.2	207.0	0.11279	0.00189
398.75	476.90	22684	156.4	281.7	0.27832	0.00453
398.75	476.90	22568	155.6	281.7	0.25826	0.00421
398.75	476.90	22568	155.6	281.7	0.26077	0.00425
399.20	477.15	22452	154.8	281.7	0.26704	0.00435
398.75	476.90	22220	153.2	281.7	0.28146	0.00458
398.75	476.90	22220	153.2	281.7	0.28835	0.00470
398.75	476.90	22597	155.8	281.7	0.26892	0.00438
398.75	476.90	22597	155.8	281.7	0.28020	0.00456
399.20	477.15	19363	133.5	281.7	0.24071	0.00392
399.20	477.15	19363	133.5	281.7	0.26140	0.00426
399.20	477.15	16273	112.2	281.7	0.24071	0.00392
399.20	477.15	16273	112.2	281.7	0.22379	0.00365
398.75	476.90	13198	91.0	281.7	0.20749	0.00338
398.75	476.90	13198	91.0	281.7	0.20498	0.00334
398.30	476.65	10269	70.8	273.7	0.18618	0.00305
398.30	476.65	10269	70.8	273.7	0.18430	0.00302
398.30	476.65	7107	49.0	273.7	0.15159	0.00248
398.30	476.65	5163	35.6	255.8	0.11664	0.00192
398.30	476.65	5163	35.6	255.8	0.10840	0.00179
398.75	476.90	5453	37.6	249.1	0.12271	0.00203
398.75	476.90	5453	37.6	249.1	0.12207	0.00202
398.30	476.65	3684	25.4	243.6	0.09688	0.00160
398.30	476.65	3684	25.4	243.6	0.09114	0.00151
462.20	512.15	18942	130.6	47.7	0.95621	0.01669
462.20	512.15	19145	132.0	47.6	1.06307	0.01852
462.20	512.15	19145	132.0	47.6	0.99941	0.01743
462.20	512.15	19218	132.5	47.5	0.97401	0.01699
462.20	512.15	15969	110.1	47.4	0.89556	0.01565
462.20	512.15	15969	110.1	47.4	0.86302	0.01509
462.20	512.15	13329	91.9	46.3	0.89972	0.01572
462.20	512.15	13329	91.9	46.3	0.88202	0.01542
462.20	512.15	13576	93.6	46.1	0.75966	0.01331
462.20	512.15	14214	98.0	45.8	0.84194	0.01473
462.20	512.15	14504	100.0	45.8	0.83415	0.01460
462.20	512.15	14504	100.0	45.8	0.84548	0.01479
462.20	512.15	9573	66.0	45.8	0.71873	0.01260
462.20	512.15	9573	66.0	45.8	0.71519	0.01254
462.20	512.15	7397	51.0	45.3	0.65450	0.01149
462.20	512.15	7397	51.0	45.3	0.59996	0.01054
462.20	512.15	5018	34.6	45.1	0.52919	0.00931
462.20	512.15	5221	36.0	44.0	0.47923	0.00844
462.20	512.15	5308	36.6	43.7	0.48074	0.00847
462.20	512.15	5308	36.6	43.7	0.48145	0.00848
460.40	511.15	3568	24.6	43.7	0.44174	0.00779
460.40	511.15	3568	24.6	43.7	0.38289	0.00676
460.40	511.15	2031	14.0	43.2	0.29364	0.00519
460.40	511.15	2031	14.0	43.2	0.26243	0.00464

(cont.)

Aqueous Electrolyte Solutions

COMPONENTS:		ORIGINAL MEASUREMENTS:			
1. Methane; CH ₄ ; [74-82-8]		Blount, C. W.; Price, L. C.;			
2. Sodium chloride; NaCl; [7647-14-5]		Wenger, L. M.; Tarullo, M.			
3. Water; H ₂ O; [7732-18-5]		DOE Contract report DE-A508-78ET12145.			
EXPERIMENTAL VALUES:					
T/°F	T/K	P/psi	P/MPa	Conc. of NaCl /g dm ⁻³	Methane solubility /mol kg ⁻¹ Mole fraction <i>x</i> _{CH₄}
460.40	511.15	2045	14.1	43.2	0.24896 0.00441
461.84	511.95	19203	132.4	158.4	0.52258 0.00886
461.84	511.95	19203	132.4	158.4	0.51926 0.00880
462.20	512.15	16172	111.5	158.4	0.49270 0.00835
462.20	512.15	16172	111.5	158.4	0.49403 0.00838
461.30	511.65	13169	90.8	158.4	0.43759 0.00743
461.30	511.65	13169	90.8	158.4	0.46282 0.00785
461.84	511.95	9964	68.7	161.9	0.38510 0.00653
461.84	511.95	9964	68.7	161.9	0.38245 0.00649
461.84	511.95	7078	48.8	161.9	0.31153 0.00529
461.84	511.95	7078	48.8	161.9	0.29297 0.00498
459.50	510.65	5004	34.5	161.9	0.28369 0.00482
459.50	510.65	5004	34.5	161.9	0.28568 0.00486
461.84	511.95	3510	24.2	161.9	0.21012 0.00358
461.84	511.95	3510	24.2	161.9	0.21542 0.00367
461.84	511.95	3452	23.8	161.9	0.21210 0.00361
461.84	511.95	3452	23.8	161.9	0.21012 0.00358
462.20	512.15	19232	132.6	253.8	0.37688 0.00619
462.20	512.15	19232	132.6	253.8	0.37054 0.00609
464.00	513.15	16331	112.6	253.2	0.33446 0.00550
464.00	513.15	16331	112.6	253.2	0.37889 0.00623
464.00	513.15	15867	109.4	250.4	0.34441 0.00567
464.00	513.15	15867	109.4	250.4	0.33297 0.00548
464.00	513.15	13140	90.6	248.3	0.32947 0.00543
464.00	513.15	13140	90.6	248.3	0.33583 0.00553
464.00	513.15	13256	91.4	243.6	0.32442 0.00535
464.00	513.15	13256	91.4	243.6	0.32506 0.00536
464.00	513.15	10298	71.0	229.4	0.28226 0.00469
464.00	513.15	10298	71.0	229.4	0.27392 0.00455

COMPONENTS:				ORIGINAL MEASUREMENTS:																																																																																																																																
(1) Methane; CH ₄ ; [74-82-8]				Stoessell, R. K.; Byrne, P. A.																																																																																																																																
(2) Sodium chloride; NaCl; [7647-14-5]				<i>Geochim. Cosmochim. Acta</i> <u>1982</u> , 46, 1327-32.																																																																																																																																
(3) Water; H ₂ O; [7732-18-5]																																																																																																																																				
VARIABLES:				PREPARED BY:																																																																																																																																
$T/K = 298.15$ $p_1/kPa = 2410-5170$ $m_2/mol\ kg^{-1} = 0 - 4.0$				H. L. Clever																																																																																																																																
EXPERIMENTAL VALUES:																																																																																																																																				
Temperature $t/^\circ C$	Pressure T/K	Sodium Chloride $m_2/mol\ kg^{-1}$	Methane $m_1/mol\ kg^{-1}$	Salt Effect Parameter $k_{smm}/kg\ mol^{-1}$																																																																																																																																
<table> <tbody> <tr> <td>25</td><td>298.15</td><td>350</td><td>2410</td><td>0</td><td>0.0319</td><td>-</td></tr> <tr> <td></td><td></td><td></td><td></td><td>0.5</td><td>0.0284</td><td>0.101</td></tr> <tr> <td></td><td></td><td></td><td></td><td>1.0</td><td>0.0244</td><td>0.116</td></tr> <tr> <td></td><td></td><td></td><td></td><td>2.0</td><td>0.0180</td><td>0.124</td></tr> <tr> <td></td><td></td><td></td><td></td><td>4.0</td><td>0.0106</td><td>0.120</td></tr> <tr> <td colspan="7">550</td></tr> <tr> <td></td><td></td><td></td><td></td><td>0</td><td>0.0483</td><td>-</td></tr> <tr> <td></td><td></td><td></td><td></td><td>0.5</td><td>0.0412</td><td>0.138</td></tr> <tr> <td></td><td></td><td></td><td></td><td>1.0</td><td>0.0352</td><td>0.137</td></tr> <tr> <td></td><td></td><td></td><td></td><td>2.0</td><td>0.0272</td><td>0.125</td></tr> <tr> <td></td><td></td><td></td><td></td><td>4.0</td><td>0.0157</td><td>0.122</td></tr> <tr> <td colspan="7">750</td></tr> <tr> <td></td><td></td><td></td><td></td><td>0</td><td>0.0617</td><td>-</td></tr> <tr> <td></td><td></td><td></td><td></td><td>0.5</td><td>0.0539</td><td>0.117</td></tr> <tr> <td></td><td></td><td></td><td></td><td>1.0</td><td>0.0464</td><td>0.124</td></tr> <tr> <td></td><td></td><td></td><td></td><td>2.0</td><td>0.0347</td><td>0.124</td></tr> <tr> <td></td><td></td><td></td><td></td><td>4.0</td><td>0.0206</td><td>0.119</td></tr> <tr> <td colspan="7"></td></tr> </tbody> </table>							25	298.15	350	2410	0	0.0319	-					0.5	0.0284	0.101					1.0	0.0244	0.116					2.0	0.0180	0.124					4.0	0.0106	0.120	550											0	0.0483	-					0.5	0.0412	0.138					1.0	0.0352	0.137					2.0	0.0272	0.125					4.0	0.0157	0.122	750											0	0.0617	-					0.5	0.0539	0.117					1.0	0.0464	0.124					2.0	0.0347	0.124					4.0	0.0206	0.119							
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The salt effect parameter is defined as $k_{smm} = \log \gamma_1/I$																																																																																																																																				
where I is the ionic strength (molality) and $\gamma_1 = (m_1^* f_1 / m_1 f_1^*)^{p/T}$ with m_1 and f_1 the solubility and fugacity, respectively, of methane at p and T . The "*" refers to saturation in distilled water.																																																																																																																																				
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METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:																																																																																																																																			
Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for three h to allow equilibration between the methane and solution.	<ul style="list-style-type: none"> (1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to be a minimum of 99.97 mole percent methane. (2) Sodium chloride. The salt solutions were made up gravimetrically using analytical grade chemicals. (3) Water. Distilled. 																																																																																																																																			
The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an expansion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of released gas assuming ideal behavior. A correction was made for the gas not released on flashing.	ESTIMATED ERROR: $\delta p_1/\text{psia} = \pm 1$ $\delta m_1/m_1 = \pm 0.01$																																																																																																																																			
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COMPONENTS:				ORIGINAL MEASUREMENTS:			
(1) Methane; CH ₄ ; [74-82-8]				Cramer, S. D.			
(2) Sodium chloride; NaCl; [7647-14-5]				<i>Ind. Eng. Chem. Process Des. Dev.</i> 1984, 23, 533-8.			
(3) Water; H ₂ O; [7732-18-5]							
Also Salton sea geothermal brine.							
EXPERIMENTAL VALUES:							
Temperature <i>t</i> /°C	Total Pressure <i>p_t</i> /MPa	Henry's Constant <i>k</i> /MPa	Temperature <i>t</i> /°C	Total Pressure <i>p_t</i> /MPa	Henry's Constant <i>k</i> /MPa		
NaCl-1, 0.81 <i>m</i> , 0.79 <i>M</i> , 0.81 <i>I</i> .				NaCl-4, 4.70 <i>m</i> , 4.26 <i>M</i> , 4.70 <i>I</i> .			
3.0	276.2	1.9	3620	3.5	276.7	2.4	17560
13.0	286.2	2.2	4190	13.3	286.5	2.3	14650
20.0	293.2	3.3	5640	31.7	304.9	3.7	23560
41.6	314.8	4.1	7120	61.6	334.8	3.9	23360
73.3	346.5	2.7	8400	89.5	362.7	5.5	28150
100.4	373.6	3.0	9260	112.6	385.8	5.4	21110
124.6	397.8	3.0	7870	115.7	388.9	4.7	27470
146.0	419.2	6.3	8150	146.9	420.1	4.7	20110
174.5	447.7	5.0	6440	159.4	432.6	3.7	18710
191.6	464.8	5.5	5350	204.8	478.0	5.8	15400
240.6	513.8	8.7	3400	241.1	514.3	8.2	10240
264.0	537.2	10.3	2450	287.9	561.1	10.9	6740
NaCl-2, 1.95 <i>m</i> , 1.86 <i>M</i> , 1.95 <i>I</i> .				SSGB, Synthetic Salton sea geothermal brine, 4.05 <i>m</i> , 3.55 <i>M</i> , 6.18 <i>I</i> .			
0.5	273.7	2.3	5530	4.5	277.7	2.6	12490
5.0	278.2	2.7	5870	12.5	285.7	2.7	13160
12.6	285.8	2.3	7080	16.0	289.2	2.7	12920
13.0	286.2	2.6	6060	45.3	318.5	1.1	17990
26.3	299.5	2.3	8230	60.2	333.4	1.1	17630
47.5	320.7	1.9	10530	88.1	361.3	1.1	18000
78.0	351.2	2.3	11770	121.7	394.9	1.1	16790
102.0	375.2	4.6	12260	166.8	440.0	2.7	16450
131.9	405.1	3.5	10450	204.3	477.5	5.3	13180
161.8	435.0	4.4	8620	233.0	506.2	6.4	9200
205.2	478.4	7.1	6770	268.0	541.2	10.5	6320
224.6	497.8	8.9	5330	301.0	574.2	12.7	4830
244.9	518.1	8.1	3820				
271.4	544.6	10.1	3180				
301.1	574.3	11.9	2070				
Composition of the synthetic Salton sea geothermal brine.							
NaCl-3, 3.18 <i>m</i> , 2.97 <i>M</i> , 3.18 <i>I</i> .				Constituent	ppm by wt		
3.5	276.7	3.3	8160				
12.5	285.7	2.4	8860	barium	207		
12.5	285.7	2.5	9090	boron	324		
24.5	297.7	4.1	13390	calcium	23 900		
45.7	318.9	3.1	15590	cesium	17		
60.2	333.4	1.1	17330	chlorine	129 000		
61.8	335.0	3.4	14290	iron	1 660		
61.9	335.1	3.3	15350	lead	66		
75.4	348.6	2.4	17160	lithium	174		
88.8	362.0	4.0	16300	magnesium	8		
111.9	385.1	5.2	15920	manganese	1 140		
134.4	407.6	4.3	14870	potassium	13 700		
162.2	435.4	5.5	12870	rubidium	58		
180.7	453.9	6.8	11200	silica	332		
203.7	476.9	5.7	7430	sodium	44 000		
205.3	478.5	6.8	10870	strontium	365		
225.1	498.3	7.3	7160	sulfur	25		
256.0	529.2	9.4	5670	zinc	415		
269.5	542.7	11.3	5250				
271.5	544.7	10.8	5050				
295.6	568.8	12.4	3410				
				$m = m_2/\text{mol kg}^{-1}$	$M = c_2/\text{mol dm}^{-3}$		
				$I = \sum m_i z_i^2$	ionic strength in molality.		

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Methane; CH ₄ ; [74-82-8] (2) Sodium chloride; NaCl; [7647-14-5] (3) Water; H ₂ O; [7732-18-5] Also Salton sea geothermal brine.	Cramer, S. D. <i>Ind. Eng. Chem. Process Des. Dev.</i> <u>1984</u> , 23, 533-8.
VARIABLES:	PREPARED BY: H. L. Clever
$T/K = 273.7 - 301.1$ $p_t/\text{MPa} = 1.1 - 12.7$ $m_2/\text{mol kg}^{-1} = 0.81 - 4.70$	

ADDITIONAL INFORMATION: Author's smoothed values of Henry's constant and NaCl salt effect parameters.

Temperature $t/^\circ\text{C}$	T/K	Henry's constant, $k/\text{MPa} = (f_1/\text{MPa})/x_1$					Salt Effect Parameter $k_{smx}/\text{kg mol}^{-1}$
		NaCl-1 0.81 m	NaCl-2 1.95 m	NaCl-3 3.18 m	NaCl-4 4.70 m	SSGB 4.05 m	
0	273.2	3400	5320	7550	14970	11680	0.165
20	293.2	5140	7540	10840	19170	14090	0.141
40	313.2	6810	9540	13760	22500	16120	0.127
60	333.2	8120	11020	15830	24620	17610	0.119
80	353.2	8880	11810	16830	25440	18470	0.116
100	373.2	9050	11900	16810	25090	18670	0.116
120	393.2	8700	11380	15970	23810	18260	0.118
140	413.2	7990	10420	14570	21890	17310	0.122
160	433.2	7060	9210	12890	19600	15960	0.126
180	453.2	6040	7910	11120	17190	14340	0.130
200	473.2	5040	6620	9410	14810	12560	0.134
220	493.2	4120	5430	7860	12580	10760	0.136
240	513.2	3310	4370	6500	10570	9010	0.137
260	533.2	2630	3480	5340	8810	7390	0.136
280	553.2	2070	2730	4380	7290	5940	0.133
300	573.2	1620	2130	3590	6000	4690	0.128

The methane fugacity is estimated by subtracting water vapor pressure from total pressure and taking fugacity coefficient reduced properties chart.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Methane solubilities were determined from pVT measurements by the gas extraction technique. The measuring apparatus consisted of : (i) a high pressure, thermostated, stirred reactor for dissolving the gas in the solvent; (ii) a heat exchanger for bringing the gas saturated solvent to room temperature; and (iii) a low pressure, thermostated gas buret for making pVT measurements on collected samples of vapor and liquid. The apparatus and its operation were described earlier (ref 1).	1. Methane. 2. Sodium chloride 3. Water.
Four to eight gas-saturated solution samples were taken and analyzed at 15-30 minute intervals after the time determined necessary for saturation. Henry's constants were computed (ref 1), and smoothed by a specially developed equation (ref 2).	No information.
Henry's constant: $k^0 = f/a = (\phi p_1)/(\gamma x_1)$ see paper. Salt solution, $k = \gamma k^0$	ESTIMATED ERROR: $\delta k/k = \pm 0.058$ is author's estimated experimental error. The relative std error of estimate is 5.1-10.5 %.
REFERENCES:	
1. Cramer, S. D. <i>Ind. Eng. Chem. Process Des. Dev.</i> <u>1980</u> , 19, 300.	
2. Cramer, S. D. <i>ibid</i> <u>1984</u> , 23, 618.	

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Methane; CH_4 ; [74-82-8]		Duffy, J. R.; Smith, N. O.; Nagy, B.	
(2) Calcium chloride; CaCl_2 ; [10043-52-4]		<i>Geochim. Cosmochim. Acta</i> 1961, 24, 23-31.	
(3) Sodium chloride; NaCl ; [7647-14-5]			
(4) Water; H_2O ; [7732-18-5]			
VARIABLES:	$T/K = 303.15$	PREPARED BY:	H. L. Clever
	$p_1/\text{MPa} = 0.32 - 5.19$		
	$c_2/\text{mol l}^{-1} = 0, 3.0$		
	$c_3/\text{mol l}^{-1} = 0, 1.53$		

EXPERIMENTAL VALUES:

$t/^\circ\text{C}$	T/K	Temperature	Calcium Chloride $c_2/\text{mol l}^{-1}$	Sodium Chloride $c_3/\text{mol l}^{-1}$	Pressure	Mol Fraction
					p_1/psia	$10^4 x_1$
30	303.15		0	0	46	0.32
					80	0.55
					115	0.79
					136	0.94
					286	1.97
					297	2.05
					398	2.74
					523	3.61
			3.0	1.53	368	2.54
			3.0	1.53	753	5.19
						1.16
						2.32

The above solution is nearly saturated with NaCl , but not with the $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$.

The authors describe the solution as 1.53 N NaCl and 6.0 N CaCl_2 .

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Rocking equilibrium cell. Pressure measured with a Bourdon gage. The cell is charged with salt solution, the gas is admitted to a known pressure, and the cell contents allowed to equilibrate. The final pressure is measured and used to calculate the amount of gas dissolved.	(1) Methane. Source not given. Stated to be <i>c. p.</i> grade. (2, 3) Electrolytes. Reagent grade of known water content. (4) Water. Distilled, degassed.
ESTIMATED ERROR:	
$\delta T/K = \pm 1$; $\delta p/\text{MPa} = \pm 0.03$;	
$\delta x_1 = \pm 5 \times 10^{-6}$	
REFERENCES:	

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Sodium bromide; NaBr; [7647-15-6] 3. Water; H ₂ O; [7732-18-5]		Michels, A.; Gerver, J.; Bijl, A. <i>Physica</i> <u>1936</u> , 3, 797-808.				
VARIABLES:		PREPARED BY:				
Pressure		C. L. Young				
EXPERIMENTAL VALUES:						
T/K	Conc/mol l ⁻¹	P/10 ⁵ Pa	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}			
298.15	2.7	52.8 102.6 153.6 200.4	0.38 0.67 0.93 1.09			
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Simple rocking equilibrium cell. Amount of gas absorbed calculated from volume and pressure change of charging vessel. Details in source.	No details given.					
ESTIMATED ERROR:						
$\delta T/K = \pm 0.1$; $\delta P/10^5 Pa = \pm 0.05$ to 0.5% ; $\delta x_{CH_4} = \pm 3-5\%$ (estimated by compiler).						
REFERENCES:						

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Methane; CH ₄ ; [74-82-8] 2. Sodium bromide; NaBr; [7647-15-6] 3. Water; H ₂ O; [7732-18-5]		Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974</u> , 78, 170-5.		
VARIABLES:		PREPARED BY:		
Temperature		C. L. Young		
EXPERIMENTAL VALUES:				
T/K	Conc. of sodium bromide /mol l ⁻¹	Ostwald coefficient, [*] L		
283.15	1.0	0.03062		
288.15		0.02823		
293.15		0.02626		
298.15		0.02465		
303.15		0.02332		
<p>* Smoothed values of Ostwald coefficient obtained from</p> $kT \ln L = 8,631.7 - 58.231(T/K) + 0.07352(T/K)^2 \text{ cal mol}^{-1}$ <p>where k is in units of cal mol⁻¹ K⁻¹.</p>				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	1. Matheson sample, purity 99.97 mole per cent. 2. AR grade. 3. Deionised, doubly distilled.			
ESTIMATED ERROR:				
$\delta T/K = \pm 0.01$; $\delta L/L = \pm 0.005$ (estimated by compiler).				
REFERENCES:				
1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u> , 59, 2735. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u> , 74, 170.				

Aqueous Electrolyte Solutions

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. Sodium iodide; NaI; [7681-82-5]		Michels A.; Gerver, J.; Bijl, A. <i>Physica</i> , 1936, 3, 797-808.				
VARIABLES:		PREPARED BY:				
Pressure		C.L. Young				
EXPERIMENTAL VALUES:						
T/K	Conc. of NaI /mol l ⁻¹	p/10 ⁵ Pa	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}			
298.15	2.7	56.2 111.7 152.0 204.9	0.50 0.94 1.22 1.52			
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Simple rocking equilibrium cell. Amount of gas absorbed calculated from volume and pressure change in charging vessel. Details in source.	No details given.					
ESTIMATED ERROR:						
$\delta T/K = \pm 0.1$; $\delta p/10^5 Pa = \pm 0.05$ to 0.5% ; $\delta x_{CH_4} = \pm 3-5\%$. (estimated by compiler).						
REFERENCES:						

COMPONENTS:		ORIGINAL MEASUREMENTS: Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974</u> , 78, 170-5.		
1. Methane; CH ₄ ; [74-82-8] 2. Sodium iodide; NaI; [7681-82-5] 3. Water; H ₂ O; [7732-18-5]				
VARIABLES:		PREPARED BY: C. L. Young		
EXPERIMENTAL VALUES:				
T/K	Conc. of sodium iodide /mol l ⁻¹	Ostwald coefficient, L [*]		
283.15	1.0	0.03102		
288.15		0.02857		
293.15		0.02671		
298.15		0.02533		
303.15		0.02435		
<p>* Smoothed values of Ostwald coefficient obtained from</p> $kT \ln L = 14,243.5 - 97.387 (T/K) + 0.14190 (T/K)2 cal mol-1$ <p>where k is in units of cal mol⁻¹ K⁻¹.</p>				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	<ol style="list-style-type: none"> Matheson sample, purity 99.97 mole per cent. AR grade. Deionised, doubly distilled. 			
ESTIMATED ERROR:				
$\delta T/K = \pm 0.01$; $\delta L/L = \pm 0.005$ (estimated by compiler).				
REFERENCES:				
<ol style="list-style-type: none"> Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u>, 59, 2735. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u>, 74, 170. 				

COMPONENTS:		ORIGINAL MEASUREMENTS:																												
(1) Methane; CH_4 ; [74-82-8]		Mishnina, T. A.; Avdeeva, O. I.; Bozhovskaya, T. K.																												
(2) Sodium sulfate; Na_2SO_4 ; [7757-82-6]		<i>Inf. Sb., Vses. Nauchn.-Issled.</i> <i>Geol. Inst. No. 56, 1962, 137-45.</i>																												
(3) Water; H_2O ; [7732-18-5]		<i>Chem. Abstr. 1964, 60, 8705g</i>																												
VARIABLES:		PREPARED BY:																												
$T/K = 293.15$ $p_1/\text{kPa} = 101.3$ $c_2/\text{mol dm}^{-3} = 0.48, 0.90$		H. L. Clever																												
EXPERIMENTAL VALUES:																														
<table border="1"> <thead> <tr> <th rowspan="2">$t/^\circ\text{C}$</th> <th rowspan="2">T/K</th> <th colspan="2">Sodium Sulfate</th> <th rowspan="2">$\text{cm}^3 (\text{STP}) \text{ dm}^{-3}$</th> <th rowspan="2">Salt Effect Parameter $k_{\text{SCC}}/\text{dm}^3 \text{ mol}^{-1}$</th> </tr> <tr> <th>$c_2/\text{mol dm}^{-3}$</th> <th>$c_2/\text{eq dm}^{-3}$</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>293.15</td> <td>0</td> <td>0</td> <td>33.9^a</td> <td>-</td> </tr> <tr> <td></td> <td></td> <td>0.48</td> <td>0.96</td> <td>22.0</td> <td>0.391</td> </tr> <tr> <td></td> <td></td> <td>0.90</td> <td>1.80</td> <td>15.1</td> <td>0.390</td> </tr> </tbody> </table>					$t/^\circ\text{C}$	T/K	Sodium Sulfate		$\text{cm}^3 (\text{STP}) \text{ dm}^{-3}$	Salt Effect Parameter $k_{\text{SCC}}/\text{dm}^3 \text{ mol}^{-1}$	$c_2/\text{mol dm}^{-3}$	$c_2/\text{eq dm}^{-3}$	20	293.15	0	0	33.9 ^a	-			0.48	0.96	22.0	0.391			0.90	1.80	15.1	0.390
$t/^\circ\text{C}$	T/K	Sodium Sulfate		$\text{cm}^3 (\text{STP}) \text{ dm}^{-3}$			Salt Effect Parameter $k_{\text{SCC}}/\text{dm}^3 \text{ mol}^{-1}$																							
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<p>^a The compiler estimated the solubility of methane in water from a figure in the paper and values of the salt effect parameter.</p> <p>The values of Kelvin temperature, sodium sulfate molar concentration, and salt effect parameter were calculated by the compiler.</p> <p>The solubility is equivalent to the Bunsen coefficient, $10^2 \alpha/\text{cm}^3 (\text{STP}) \text{ cm}^{-3} \text{ atm}^{-1}$.</p>																														
AUXILIARY INFORMATION																														
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:																													
See author's earlier paper (1).	(1) Methane. Source not given. Contained one per cent air. (2) Sodium sulfate. (3) Water.																													
ESTIMATED ERROR:																														
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REFERENCES:																														
1. Mishnina, T. A.; Avdeeva, O. I.; Bozhovskaya, T. K. <i>Materialy Vses. Nauchn.-Issled.</i> <i>Geol. Inst. 1961, 46, 93.</i>																														

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Sodium sulfate; Na ₂ SO ₄ ; [7757-82-6] (3) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> 1982, 46, 1327-32.																																																																							
VARIABLES: T/K = 298.15 p ₁ /kPa = 2410-5170 m ₂ /mol kg ⁻¹ = 0-1.0	PREPARED BY: H. L. Clever																																																																							
EXPERIMENTAL VALUES:																																																																								
<table border="1"> <thead> <tr> <th>Temperature</th> <th>Pressure</th> <th>Sodium Sulfate</th> <th>Methane</th> <th>Salt Effect Parameter</th> </tr> <tr> <th>t/°C</th> <th>T/K</th> <th>p₁/psia</th> <th>p₁/kPa</th> <th>m₂/mol kg⁻¹</th> <th>smm/kg mol⁻¹</th> </tr> </thead> <tbody> <tr> <td colspan="2">25 298.15</td><td colspan="2">350 2410</td><td>0</td><td>0.0319 -</td></tr> <tr> <td colspan="2"></td><td colspan="2"></td><td>0.5</td><td>0.0211 0.120</td></tr> <tr> <td colspan="2"></td><td colspan="2"></td><td>1.0</td><td>0.0135 0.124</td></tr> <tr> <td colspan="2">550 3790</td><td colspan="2"></td><td>0</td><td>0.0483 -</td></tr> <tr> <td colspan="2"></td><td colspan="2"></td><td>0.5</td><td>0.0311 0.127</td></tr> <tr> <td colspan="2"></td><td colspan="2"></td><td>1.0</td><td>0.0208 0.122</td></tr> <tr> <td colspan="2">750 5170</td><td colspan="2"></td><td>0</td><td>0.0617 -</td></tr> <tr> <td colspan="2"></td><td colspan="2"></td><td>0.5</td><td>0.0407 0.120</td></tr> <tr> <td colspan="2"></td><td colspan="2"></td><td>1.0</td><td>0.0277 0.116</td></tr> <tr> <td colspan="2"></td><td colspan="2"></td><td></td><td>0.121 (authors)</td></tr> </tbody> </table>	Temperature	Pressure	Sodium Sulfate	Methane	Salt Effect Parameter	t/°C	T/K	p ₁ /psia	p ₁ /kPa	m ₂ /mol kg ⁻¹	smm/kg mol ⁻¹	25 298.15		350 2410		0	0.0319 -					0.5	0.0211 0.120					1.0	0.0135 0.124	550 3790				0	0.0483 -					0.5	0.0311 0.127					1.0	0.0208 0.122	750 5170				0	0.0617 -					0.5	0.0407 0.120					1.0	0.0277 0.116						0.121 (authors)	
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<p>The salt effect parameter is defined as $k_{\text{smm}} = \log \gamma_1 / I$ where I is the ionic strength (molality) and $\gamma_1 = (m_1^* f_1 / m_1 f_1^*)_{p,T}$ with m_1 and f_1 the solubility and fugacity, respectively, of methane at p and T. The "*" refers to saturation in distilled water.</p>																																																																								
AUXILIARY INFORMATION																																																																								
METHOD/APPARATUS/PROCEDURE: <p>Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for three h to allow equilibration between the methane and solution.</p> <p>The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an anion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of released gas assuming ideal behavior. A correction was made for the gas not released on flashing.</p>	<p>SOURCE AND PURITY OF MATERIALS:</p> <p>(1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to be a minimum of 99.97 mole present methane.</p> <p>(2) Sodium sulfate. The salt solutions were made up gravimetrically using analytical grade chemicals.</p> <p>(3) Water. Distilled.</p> <p>ESTIMATED ERROR:</p> $\delta p_1/\text{psia} = \pm 1$ $\delta m_1/m_1 = \pm 0.01$ <p>REFERENCES:</p>																																																																							

COMPONENTS:				ORIGINAL MEASUREMENTS:													
(1) Methane; CH ₄ ; [74-82-8]				Kobe, K. A.; Kenton, F. H.													
(2) Sulfuric acid; H ₂ SO ₄ ; [7664-93-9]				<i>Ind. Eng. Chem., Anal. Ed.</i> <u>1938</u> , 10, 76 - 77.													
(3) Sodium sulfate; Na ₂ SO ₄ ; [7757-82-6]																	
(4) Water; H ₂ O; [7732-18-5]																	
VARIABLES:				PREPARED BY:													
T/K: 298.15 p ₁ /kPa: 101.325 (1 atm)				P. L. Long H. L. Clever													
EXPERIMENTAL VALUES:																	
<table border="1"> <thead> <tr> <th>Temperature t/°C</th><th>Solvent Volume V/cm³</th><th>Methane Volume Absorbed <i>v</i>₁/cm³</th><th>Bunsen Coefficient α/cm³ (STP) cm⁻³ atm⁻¹</th><th>Ostwald Coefficient L/cm³ cm⁻³</th><th></th></tr> </thead> <tbody> <tr> <td>25</td><td>298.15</td><td>49.54 49.54</td><td>0.47 0.45</td><td>0.0085</td><td>0.0093</td></tr> </tbody> </table>						Temperature t/°C	Solvent Volume V/cm ³	Methane Volume Absorbed <i>v</i> ₁ /cm ³	Bunsen Coefficient α/cm ³ (STP) cm ⁻³ atm ⁻¹	Ostwald Coefficient L/cm ³ cm ⁻³		25	298.15	49.54 49.54	0.47 0.45	0.0085	0.0093
Temperature t/°C	Solvent Volume V/cm ³	Methane Volume Absorbed <i>v</i> ₁ /cm ³	Bunsen Coefficient α/cm ³ (STP) cm ⁻³ atm ⁻¹	Ostwald Coefficient L/cm ³ cm ⁻³													
25	298.15	49.54 49.54	0.47 0.45	0.0085	0.0093												
<p>The solvent is a mixture of 800 g H₂O 200 g Na₂SO₄ (anhydrous) 40 ml H₂SO₄ (Conc., 36 normal)</p>																	
Thus the molality of the solution is																	
$m_2/\text{mol kg}^{-1} = 0.90 \text{ (H}_2\text{SO}_4)$ $m_3/\text{mol kg}^{-1} = 1.76 \text{ (Na}_2\text{SO}_4)$																	
AUXILIARY INFORMATION																	
METHOD/APPARATUS/PROCEDURE:				SOURCE AND PURITY OF MATERIALS:													
The apparatus is described in detail in an earlier paper (1). The apparatus consists of a gas buret, a pressure compensator, and a 200 cm ³ absorption bulb and mercury leveling bulb. The absorption bulb is attached to a shaking mechanism.				(1) Methane. Source not given. Purity stated to be 99+ per cent.													
The solvent and the gas are placed in the absorption bulb. The bulb is shaken until equilibrium is reached. The remaining gas is returned to the buret. The difference in the final and initial volumes is taken as the volume of gas absorbed.				(2, 3) Sulfuric acid and sodium sulfate. Sources not given. Analytical grade.													
				(4) Water. Distilled.													
ESTIMATED ERROR:																	
$\delta\alpha/\text{cm}^3 = \pm 0.001 \text{ (authors)}$																	
REFERENCES:																	
1. Kobe, K. A.; Williams, J. S. <i>Ind. Eng. Chem., Anal. Ed.</i> <u>1935</u> , 7, 37.																	

COMPONENTS:		ORIGINAL MEASUREMENTS:
(1) Methane; CH ₄ ; [74-82-8]		Byrne, P. A.; Stoessell, R. K.
(2) Electrolytes, see below		<i>Geochim. Cosmochim. Acta</i> 1982, 46, 2395-7.
(3)		
(4) Water; H ₂ O; [7732-18-5]		
VARIABLES:		PREPARED BY:
$T/K = 298.15$		H. L. Clever
$p_1/kPa = 3790$		

EXPERIMENTAL VALUES:

Temperature $t/^\circ C$	T/K	Pressure p_1/psia	p_1/kPa	Electrolyte		Methane $m_1/\text{mol kg}^{-1}$	Salt Effect Parameter
					$m_i/\text{mol kg}^{-1}$		
25	298.15	550	3790	-	0	0.0438 ^a	-
				Na ₂ SO ₄	0.5	0.0221	0.097
				MgSO ₄	0.5		
25	298.15	550	3790	-	0	0.0483	-
				K ₂ SO ₄	0.25	0.0345	0.084
				MgSO ₄	0.25		

^a Value of methane solubility in water, m_1° , from (ref 1).

The salt effect parameter, $k_{\text{smim}}/\text{kg mol}^{-1}$ =

$$(\sum (k_{\text{smim}}/\text{kg mol}^{-1}) (I_i/\text{mol kg}^{-1})) / (I/\text{mol kg}^{-1})$$

where I_i and I are ionic strength due to component i and the total ionic strength, respectively, and $k_{\text{smim}}/\text{kg mol}^{-1}$ =

$$\log((m_1^\circ/\text{mol kg}^{-1}) / (m_1/\text{mol kg}^{-1})) / (I_i/\text{mol kg}^{-1})$$

Sodium sulfate; Na₂SO₄; [7757-82-6]

Potassium sulfate; K₂SO₄; [7778-80-5]

Magnesium sulfate; MgSO₄; [7785-87-7]

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketted by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for 3 h to allow equilibration between the methane and the solution.	(1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to have a minimum purity of 99.97 mole percent.
The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an expansion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of gas assuming ideal behavior. A correction was made for the gas not released on flashing.	(2) Electrolytes. The salt solutions (3) were made up gravimetrically using analytical grade chemicals.
Solution densities were measured gravimetrically with pycnometers.	(4) Water. Distilled.
ESTIMATED ERROR:	
$\delta p_1/\text{psia} = \pm 1$ $\delta m_1/\text{mol kg}^{-1} = \pm 0.0003 - 0.0005$ $\delta m_{2,3}/\text{mol kg}^{-1} = \pm 0.0001$	
REFERENCES:	
1. Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> 1982, 46, 1327.	

Aqueous Electrolyte Solutions

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Electrolytes, see below (3) (4) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Byrne, P. A.; Stoessell, R. K. <i>Geochim. Cosmochim. Acta</i> <u>1982</u> , <u>46</u> , 2395-7.																																																	
VARIABLES: $T/K = 298.15$ $p_1/kPa = 3790$	PREPARED BY: H. L. Clever																																																	
EXPERIMENTAL VALUES:																																																		
<table border="1"> <thead> <tr> <th>Temperature $t/^\circ C$</th><th>Pressure T/K</th><th>Electrolyte p_1/psia</th><th>p_1/kpa</th><th>$m_i/\text{mol kg}^{-1}$</th><th>Methane $m_1/\text{mol kg}^{-1}$</th><th>Salt Effect Parameter</th></tr> </thead> <tbody> <tr> <td>25</td><td>298.15</td><td>550</td><td>3790</td><td>-</td><td>0</td><td>0.0483^a</td></tr> <tr> <td></td><td></td><td></td><td></td><td>NaCl</td><td>1.0</td><td></td></tr> <tr> <td></td><td></td><td></td><td></td><td>Na₂SO₄</td><td>1.0</td><td></td></tr> <tr> <td>25</td><td>298.15</td><td>550</td><td>3790</td><td>-</td><td>0</td><td>0.0483^a</td></tr> <tr> <td></td><td></td><td></td><td></td><td>NaCl</td><td>1.0</td><td></td></tr> <tr> <td></td><td></td><td></td><td></td><td>Na₂CO₃</td><td>1.0</td><td>0.113</td></tr> </tbody> </table>	Temperature $t/^\circ C$	Pressure T/K	Electrolyte p_1/psia	p_1/kpa	$m_i/\text{mol kg}^{-1}$	Methane $m_1/\text{mol kg}^{-1}$	Salt Effect Parameter	25	298.15	550	3790	-	0	0.0483 ^a					NaCl	1.0						Na ₂ SO ₄	1.0		25	298.15	550	3790	-	0	0.0483 ^a					NaCl	1.0						Na ₂ CO ₃	1.0	0.113	
Temperature $t/^\circ C$	Pressure T/K	Electrolyte p_1/psia	p_1/kpa	$m_i/\text{mol kg}^{-1}$	Methane $m_1/\text{mol kg}^{-1}$	Salt Effect Parameter																																												
25	298.15	550	3790	-	0	0.0483 ^a																																												
				NaCl	1.0																																													
				Na ₂ SO ₄	1.0																																													
25	298.15	550	3790	-	0	0.0483 ^a																																												
				NaCl	1.0																																													
				Na ₂ CO ₃	1.0	0.113																																												
^a Value of methane solubility in water, m_1 , from (ref 1). The salt effect parameter, $k_{smim}/\text{kg mol}^{-1} =$ $(\sum((k_{smim}/\text{kg mol}^{-1})(I_i/\text{mol kg}^{-1}))/I/\text{mol kg}^{-1})$ where I_i and I are ionic strength due to component i and the total ionic strength, respectively, and $k_{smim}/\text{kg mol}^{-1} =$ $\log((m_1^\circ/\text{mol kg}^{-1})/(m_1/\text{mol kg}^{-1}))/I_i/\text{mol kg}^{-1}$ Sodium chloride; NaCl; [7647-14-5] Sodium sulfate; Na ₂ SO ₄ ; [7757-82-6] Sodium carbonate; Na ₂ CO ₃ ; [497-19-8]																																																		
AUXILIARY INFORMATION																																																		
METHOD/APPARATUS/PROCEDURE: Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketted by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for 3 h to allow equilibration between the methane and the solution. The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an expansion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of gas assuming ideal behavior. A correction was made for the gas not released on flashing. Solution densities were measured gravimetrically with pycnometers.	<p>SOURCE AND PURITY OF MATERIALS:</p> <p>(1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to have a minimum purity of 99.97 mole percent.</p> <p>(2) Electrolytes. The salt solutions (3) were made up gravimetrically using analytical grade chemicals.</p> <p>(4) Water. Distilled.</p> <p>ESTIMATED ERROR:</p> $\delta p_1/\text{psia} = \pm 1$ $\delta m_1/\text{mol kg}^{-1} = \pm 0.0003-0.0005$ $\delta m_{2,3}/\text{mol kg}^{-1} = \pm 0.0001$ <p>REFERENCES:</p> <p>1. Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> <u>1982</u>, <u>46</u>, 1327.</p>																																																	

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Sodium bicarbonate; NaHCO ₃ ; [144-55-8] (3) Water; H ₂ O; [7732-18-5]				ORIGINAL MEASUREMENTS: Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> 1982, 46, 1327-32.				
VARIABLES: T/K = 298.15 $p_1/\text{kPa} = 2410 - 5170$ $m_2/\text{mol kg}^{-1} = 0 - 0.5$				PREPARED BY: H. L. Clever				
EXPERIMENTAL VALUES:								
Temperature t/°C	Pressure T/K	Pressure p_1/psia	Pressure p_1/kPa	Sodium Bicarbonate $m_2/\text{mol kg}^{-1}$	Methane $m_1/\text{mol kg}^{-1}$			
25	298.15	350	2410	0 0.25 0.5	0.0319 0.0296 0.0270			
		550	3790	0 0.25 0.5	0.0483 0.0450 0.0400			
		750	5170	0 0.25 0.5	0.0617 0.0572 0.0532			
					0.146 (authors)			
The salt effect parameter is defined as $k_{\text{smm}} = \log \gamma_1/I$ where I is the ionic strength (molality) and $\gamma_1 = (m_1 f_1 / m_1 f_1^*)_{p,T}$ with m_1 and f_1 the solubility and fugacity, respectively, of methane at p and T . The "*" refers to saturation in distilled water.								
AUXILIARY INFORMATION								
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:					
Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for three h to allow equilibration between the methane and solution.			(1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to be a minimum of 99.97 mole present methane.					
The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an anion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of released gas assuming ideal behavior. A correction was made for the gas not released on flashing.			(2) Sodium bicarbonate. The salt solutions were made up gravimetrically using analytical grade chemicals.					
			(3) Water. Distilled.					
ESTIMATED ERROR:								
$\delta p_1/\text{psia} = \pm 1$ $\delta m_1/m_1 = \pm 0.01$								
REFERENCES:								

COMPONENTS:				ORIGINAL MEASUREMENTS:						
(1) Methane; CH ₄ ; [74-82-8]				Stoessell, R. K.; Byrne, P. A.						
(2) Sodium carbonate; Na ₂ CO ₃ ; [497-19-8]				<i>Geochim. Cosmochim. Acta</i> 1982, 46, 1327-32.						
(3) Water; H ₂ O; [7732-18-5]										
VARIABLES: T/K = 298.15 $p_1/\text{kPa} = 2410 - 5170$ $m_2/\text{mol kg}^{-1} = 0 - 1.5$				PREPARED BY: H. L. Clever						
EXPERIMENTAL VALUES:										
Temperature	Pressure	Sodium Carbonate	Methane	Salt Effect Parameter						
t/°C	T/K	p_1/psia	p_1/kPa	$m_2/\text{mol kg}^{-1}$	$m_1/\text{mol kg}^{-1}$	$k_{\text{smm}}/\text{kg mol}^{-1}$				
25		350		0		0.0319				
				0.5		0.0211				
				1.0		0.0135				
				1.5		0.0091				
550		3790		0		0.0483				
				0.5		0.0311				
				1.0		0.0204				
				1.5		0.0149				
750		5170		0		0.0617				
				0.5		0.0400				
				1.0		0.0260				
				1.5		0.0182				
						0.118 (authors)				
The salt effect parameter is defined as $k_{\text{smm}} = \log \gamma_1/I$ where I is the ionic strength (molality) and $\gamma_1 = (m_1^* f_1 / m_1 f_1^*) p, T$ with m_1 and f_1 the solubility and fugacity, respectively, of methane at p and T . The "*" refers to saturation in distilled water.										
AUXILIARY INFORMATION										
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:									
Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for three h to allow equilibration between the methane and solution.	(1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to be a minimum of 99.97 mole percent methane.									
The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an aneroid loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of released gas assuming ideal behavior. A correction was made for the gas not released on flashing.	(2) Sodium carbonate. The salt solutions were made up gravimetrically using analytical grade chemicals.									
	(3) Water. Distilled.									
	ESTIMATED ERROR: $\delta p_1/\text{psia} = \pm 1$ $\delta m_1/m_1 = \pm 0.01$									
	REFERENCES:									

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Electrolytes, see below (3) (4) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Byrne, P. A.; Stoessell, R. K. <i>Geochim. Cosmochim. Acta</i> <u>1982</u> , 46, 2395-7.
VARIABLES: $T/K = 298.15$ $p_1/kPa = 3790$	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Pressure		Electrolyte		Methane	Salt Effect Parameter
<i>t</i> /°C	<i>T</i> /K	<i>p</i> ₁ /psia	<i>p</i> ₁ /kPa		<i>m</i> _i /mol kg ⁻¹	<i>m</i> ₁ /mol kg ⁻¹	
25	298.15	550	3790	-	0	0.0483 ^a	-
				Na ₂ SO ₄	0.5		
				Na ₂ CO ₃	0.5	0.0211	0.120
25	298.15	550	3790	-	0	0.0483 ^a	-
				Na ₂ SO ₄	0.25		
				K ₂ SO ₄	0.25	0.0322	0.119

^a Value of methane solubility in water, m_{g}° , from (ref 1).

The salt effect parameter, $k_{\text{smm}}/\text{kg mol}^{-1}$ =

$$((k_{smim}/\text{kg mol}^{-1})(I_i/\text{mol kg}^{-1}))/(\text{I/mol kg}^{-1})$$

where I_i and I are ionic strength due to component i and the total ionic strength, respectively, and $k_{smi,m}$ /kg mol $^{-1}$ =

$$\log((m_1^\circ/\text{mol kg}^{-1})/(m_1/\text{mol kg}^{-1}))/(I_i/\text{mol kg}^{-1})$$

Sodium sulfate; Na₂SO₄; [7757-82-6]

Sodium carbonate; Na₂CO₃; [497-19-8]

Potassium sulfate; K_2SO_4 ; [7778-80-5]

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

METHOD/APPARATUS/PROCEDURE.
Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketted by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for 3 h to allow equilibration between the methane and the solution.

The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an expansion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of gas assuming ideal behavior. A correction was made for the gas not released on flashing.

Solution densities were measured gravimetrically with pycnometers.

SOURCE AND PURITY OF MATERIALS:

SOURCE AND PURITY OF MATERIALS:

(1) Methane. Matheson Co., Inc.
Ultra high purity grade, stated
to have a minimum purity of
99.97 mole percent.

(2) Electrolytes. The salt solutions
(3) were made up gravimetrically
using analytical grade chemicals.

(4) Water. Distilled.

ESTIMATED ERROR:

$$\begin{aligned}\delta p_1/\text{psia} &= \pm 1 \\ \delta m_1/\text{mol kg}^{-1} &= \pm 0.0003-0.0005 \\ \delta m_2, z/\text{mol kg}^{-1} &= \pm 0.0001\end{aligned}$$

REFERENCES:

1. Stoessell, R. K.; Byrne, P. A.
Geochim. Cosmochim. Acta 1982, 46,
 1327.

COMPONENTS:			ORIGINAL MEASUREMENTS:		
(1) Methane; CH ₄ ; [74-82-8]			Shoor, S. K.; Walker, R. D., Jr.; Gubbins, K. E.		
EXPERIMENTAL VALUES:					
T/K	Potassium Hydroxide KOH/wt %	KOH/mol dm ⁻³	Gas Mol Fraction $10^5 x_1$	Solubility Ratio $\gamma = x_1^0/x_1$	Salt Effect Parameter $k_{scx}/\text{dm}^3 \text{ mol}^{-1}$
298.15	0.0 5.61 13.90 23.50 31.61 40.70	0.0 1.03 2.77 5.13 7.35 10.12	2.48	1.00 1.66 3.64 10.2 26.7 100	- 0.214 0.203 0.197 0.194 0.198 0.197 (authors)
313.15	0.0 5.61 13.90 23.50 31.61 40.70	0.0 1.03 2.77 5.13 7.35 10.12	1.90	1.00 1.51 3.14 8.08 19.8 63.4	- 0.174 0.179 0.177 0.176 0.178 0.176 (authors)
333.15	0.0 5.61 13.90 23.50 31.61 40.70	0.0 1.03 2.77 5.13 7.35 10.12	1.62	1.00 1.48 2.83 6.90 16.7 49.6	- 0.165 0.163 0.164 0.166 0.168 0.164 (authors)
353.15	0.0 5.61 13.90 23.50 31.61 40.70	0.0 1.03 2.77 5.13 7.35 10.12	1.44	1.00 1.39 2.50 6.22 14.4 38.0	- 0.139 0.144 0.154 0.158 0.156 0.154 (authors)
The KOH concentrations were measured at 298.15 K.					
The compiler calculated the salt effect parameter values at the individual KOH concentrations. The author's values are also given.					
The salt effect parameter, $k_{scx}/\text{dm}^3 \text{ mol}^{-1} = (1/(c_2/\text{mol dm}^{-3})) \log (x_1^0/x_1)$.					

COMPONENTS:		ORIGINAL MEASUREMENTS:
(1) Methane; CH ₄ ; [74-82-8]		Shoor, S. K.; Walker, R. D., Jr.; Gubbins, K. E.
(2) Potassium hydroxide; KOH; [1310-58-3]		J. Phys. Chem. 1969, 73, 312-7.
(3) Water; H ₂ O; [7732-18-5]		
VARIABLES:		PREPARED BY:
$T/K = 298.15 - 353.15$ $p_1/kPa = 101.325$ $c_2/mol dm^{-3} = 0 - 10.12$		H. L. Clever
EXPERIMENTAL VALUES:		See preceeding page.
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:	
A gas chromatographic method was used (ref 1). The gas saturated solutions were prepared by bubbling the g gas through presaturators and then the KOH solution. Samples were drawn over a 48 h period to determine whether or not equilibrium was established. Samples were transferred from the saturator to the gas chromatograph in gas tight syringes. All analyses were made with a thermal conductivity cell, and with nitrogen as the carrier gas.	(1) Methane. Source not given. Minimum purity stated to be 99.0 %.	
The results are reported as activity coefficients, which are the mole fraction solubility ratio x_1^0/x_1 . x_1^0 is the mole fraction solubility in water, and x_1 is the mole fraction solubility in the KOH solution. Both mole fractions were adjusted to a gas partial pressure of one atm assuming Henry's law is obeyed. The γ 's are the average of at least four measurements.	(2) Potassium hydroxide. Baker Analyzed Reagent Grade. Contained a maximum of 1 percent K ₂ CO ₃ . The KOH solutions were protected from atm CO ₂ by Ascarite.	
	(3) Water. Specially distilled and degassed from an all glass-Teflon still.	
	ESTIMATED ERROR:	
	$\delta T/K = \pm 0.05$ $\delta \gamma/\gamma = \pm 0.01$	
	REFERENCES:	
	1. Gubbins, K. E.; Carden, S. N.; Walker, R. D., Jr. J. Gas Chromatog. 1965, 3, 98.	

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. Potassium chloride; KCl; [7447-40-7]		Michels, A.; Gerver, J.; Bijl, A. <i>Physica</i> , 1936, 3, 797-808.				
VARIABLES:		PREPARED BY:				
Pressure		C.L. Young				
EXPERIMENTAL VALUES:						
T/K	Conc. of KCl /mol l ⁻¹	p/10 ⁵ Pa	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}			
298.15	2.7	48.5 98.5 150.7 200.6	0.44 0.80 1.14 1.39			
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Simple rocking equilibrium cell. Amount of gas absorbed calculated from volume and pressure change in charging vessel. Details in source.	No details given.					
ESTIMATED ERROR:						
$\delta T/K = \pm 0.1$; $\delta p/10^5 Pa = \pm 0.05$ to 0.5%; $\delta x_{CH_4} = \pm 3-5\%$. (estimated by compiler)						
REFERENCES:						

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Methane; CH ₄ ; [74-82-8] 2. Potassium chloride; KCl; [7447-40-7] 3. Water; H ₂ O; [7732-18-5]		Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974</u> , 78, 175-8.		
VARIABLES:		PREPARED BY:		
Temperature		C. L. Young		
EXPERIMENTAL VALUES:				
T/K	Conc. of potassium chloride /mol l ⁻¹	Ostwald coefficient, L		
283.15	1.0	0.03129		
288.15		0.02888		
293.15		0.02676		
298.15		0.02488		
303.15		0.02321		
<p>* Smoothed values of Ostwald coefficient obtained from</p> $kT \ln L = 3,595.6 - 23.037 (T/K) + 0.01219 (T/K)^2 \text{ cal mol}^{-1}$ <p>where k is in units of $\text{cal mol}^{-1} \text{ K}^{-1}$.</p>				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	1. Matheson sample, purity 99.97 mole per cent. 2. AR grade. 3. Deionised, doubly distilled.			
ESTIMATED ERROR:				
$\delta T/K = \pm 0.01$; $\delta L/L = \pm 0.005$ (estimated by compiler).				
REFERENCES:				
1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u> , 59, 2735. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u> , 74, 170.				

COMPONENTS:		ORIGINAL MEASUREMENTS:				
(1) Methane; CH ₄ ; [74-82-8]		Yano, T.; Suetaka, T.; Umehara, T.; Horiuchi, A.				
(2) Potassium chloride; KCl; [7447-40-7]		<i>Kagaku Kogaku</i> <u>1974</u> , 38, 320-3.				
(3) Water; H ₂ O; [7732-18-5]						
VARIABLES: $T/K = 298.15$ $p_1/kPa = 101.325$ $c_2/mol dm^{-3} = 0 - 1.500$		PREPARED BY: H. L. Clever C. L. Young				
EXPERIMENTAL VALUES:						
Temperature $t/^\circ C$	Potassium Chloride $c_2/mol dm^{-3}$	Methane Solubility $10^3 c_1/mol dm^{-3}$	Salt Effect Parameter $k_{SCC}/dm^3 mol^{-1}$			
25	298.15	0 0.500 1.000 1.500	1.31 1.13 0.951 0.809 - 0.128 0.139 0.140 0.137 (authors)			
$k_{SCC}/dm^3 mol^{-1} = (1/(c_2/mol dm^{-3})) \log ((c_1^0/mol dm^{-3})/(c_1/mol dm^{-3}))$						
The compiler added the salt effect parameter values at the individual salt concentrations.						
The authors defined the salt effect parameter in terms of the electrolyte ionic strength.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Volumetric apparatus. Salt solution allowed to enter stirred absorption chamber. Pressure within absorption chamber adjusted to be as near atmospheric pressure as possible. Details in source and ref. 1.	1. High purity sample, purity better than 99.5 mole per cent. 2. Special grade. 3. Distilled.					
ESTIMATED ERROR:						
REFERENCES:						
1. Yano, T.; Suetaka, T.; Umehara, T. <i>Nippon Kagaku Kaishi</i> <u>1972</u> , 11, 2194.						

COMPONENTS:				ORIGINAL MEASUREMENTS:																																																													
(1) Methane; CH ₄ ; [74-82-8]				Byrne, P. A.; Stoessell, R. K.																																																													
(2)				<i>Geochim. Cosmochim. Acta</i> <u>1982</u> , 46, 2395-7.																																																													
(3) Electrolytes, see below																																																																	
(4) Water; H ₂ O; [7732-18-5]																																																																	
VARIABLES:				PREPARED BY:																																																													
T/K = 298.15 $p_1/\text{kPa} = 3790$				H. L. Clever																																																													
EXPERIMENTAL VALUES:																																																																	
<table border="1"> <thead> <tr> <th rowspan="2">Temperature t/°C</th> <th rowspan="2">Pressure T/K</th> <th rowspan="2">p_1/psia</th> <th rowspan="2">p_1/kPa</th> <th colspan="2">Electrolyte</th> <th rowspan="2">Methane $m_1/\text{mol kg}^{-1}$</th> <th rowspan="2">Salt Effect Parameter</th> </tr> <tr> <th>$m_i/\text{mol kg}^{-1}$</th> <th>$m_1/\text{mol kg}^{-1}$</th> </tr> </thead> <tbody> <tr> <td>25</td> <td>298.15</td> <td>550</td> <td>3790</td> <td>-</td> <td>0</td> <td>0.0483^a</td> <td>-</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>NaCl</td> <td>1.0</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>KCl</td> <td>1.0</td> <td>0.0286</td> <td>0.114</td> </tr> <tr> <td>25</td> <td>298.15</td> <td>550</td> <td>3790</td> <td>-</td> <td>0</td> <td>0.0483^a</td> <td>-</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>KCl</td> <td>1.0</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>K_2CO_3</td> <td>1.0</td> <td>0.0177</td> <td>0.109</td> </tr> </tbody> </table>								Temperature t/°C	Pressure T/K	p_1/psia	p_1/kPa	Electrolyte		Methane $m_1/\text{mol kg}^{-1}$	Salt Effect Parameter	$m_i/\text{mol kg}^{-1}$	$m_1/\text{mol kg}^{-1}$	25	298.15	550	3790	-	0	0.0483 ^a	-					NaCl	1.0							KCl	1.0	0.0286	0.114	25	298.15	550	3790	-	0	0.0483 ^a	-					KCl	1.0							K_2CO_3	1.0	0.0177	0.109
Temperature t/°C	Pressure T/K	p_1/psia	p_1/kPa	Electrolyte		Methane $m_1/\text{mol kg}^{-1}$	Salt Effect Parameter																																																										
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<p>The salt effect parameter, $k_{\text{sm}}/\text{kg mol}^{-1}$ = $(\Sigma ((k_{\text{sm},i}/\text{kg mol}^{-1})(I_i/\text{mol kg}^{-1}))/(I/\text{mol kg}^{-1})$ where I_i and I are ionic strength due to component i and the total ionic strength, respectively, and $k_{\text{sm},i}/\text{kg mol}^{-1}$ = $\log((m_1^0/\text{mol kg}^{-1})/(m_1/\text{mol kg}^{-1}))/(I_i/\text{mol kg}^{-1})$</p>																																																																	
Sodium chloride; NaCl; [7647-14-5] Potassium chloride; KCl; [7447-40-7] Potassium carbonate; K_2CO_3 ; [584-08-7]				^a Value of methane solubility in water, m_1^0 , from (ref 1)																																																													
AUXILIARY INFORMATION																																																																	
METHOD/APPARATUS/PROCEDURE:				SOURCE AND PURITY OF MATERIALS:																																																													
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The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an expansion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of gas assuming ideal behavior. A correction was made for the gas not released on flashing.				ESTIMATED ERROR: $\delta p_1/\text{psia} = \pm 1$ $\delta m_1/\text{mol kg}^{-1} = \pm 0.0003-0.0005$ $\delta m_{2,3}/\text{mol kg}^{-1} = \pm 0.0001$																																																													
Solution densities were measured gravimetrically with pycnometers.				REFERENCES:																																																													
				1. Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> <u>1982</u> , 46, 1327.																																																													

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Potassium iodide; KI; [7681-11-0] (3) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Morrison, T. J.; Billett, F. <i>J. Chem. Soc.</i> 1952, 3819 - 3822.
VARIABLES: $T/K: 285.75 - 344.85$ $p/kPa: 101.325 \text{ (1 atm)}$	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Temperature			Salt Effect Parameters	
t/°C	T/K	1/(T/K)	(1/m ₂) log(S°/S) ¹	(1/m ₂) log(x°/x)
12.6	285.75	0.0035	0.130	0.145
30.0	303.15	0.0033	0.097	0.112
49.4	322.55	0.0031	0.071	0.086
71.7	344.85	0.0029	0.054	0.069

¹ The authors used $(1/c)\log(S^{\circ}/S)$ with c defined as g eq salt per kg of water. For the 1-1 electrolyte the compiler changed the c to an m for $m_2/\text{mol kg}^{-1}$. The methane solubility S is $\text{cm}^3 \text{ (STP)} \text{ kg}^{-1}$.

The salt effect parameters were calculated from two measurements. The solubility of methane in water, S° , and in the one molal salt solution, S. Only the solubility of the methane in water, and the value of the salt effect parameter are given in the paper. The solubility values in the salt solution are not given.

The compiler calculated the values of the salt effect parameter using the mole fraction gas solubility ratio.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: The degassed solvent flows in a thin film down an absorption helix containing the methane gas plus solvent vapor at a total pressure of one atmosphere. The volume of gas absorbed is measured in an attached buret system (1).	SOURCE AND PURITY OF MATERIALS: (1) Methane. Prepared from Grignard reagent. (2) Potassium iodide. "AnalaR" material. (3) Water. No information given.
	ESTIMATED ERROR: $\delta k/\text{kg}^{-1} \text{ mol} = 0.010$
	REFERENCES: 1. Morrison, T. J.; Billett, F. <i>J. Chem. Soc.</i> 1948, 2033.

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Potassium sulfate; K ₂ SO ₄ ; [7778-80-5] (3) Water; H ₂ O; [7732-18-5]				ORIGINAL MEASUREMENTS: Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> <u>1982</u> , <i>46</i> , 1327-32.		
VARIABLES: T/K = 298.15 $p_1/\text{kPa} = 2410-5170$ $m_2/\text{mol kg}^{-1} = 0-0.5$				PREPARED BY: H. L. Clever		
EXPERIMENTAL VALUES:						
Temperature	Pressure	Potassium Sulfate	Methane	Salt Effect Parameter		
t/°C	T/K	p_1/psia	p_1/kPa	$m_2/\text{mol kg}^{-1}$	$k_{\text{smm}}/\text{kg mol}^{-1}$	
25	298.15	350	2410	0 0.25 0.5	0.0319 0.0261 0.0223	- 0.116 0.104
		550	3790	0 0.25 0.5	0.0483 0.0393 0.0325	- 0.119 0.115
		750	5170	0 0.25 0.5	0.0617 0.0515 0.0431	- 0.105 0.104
					0.108 (authors)	
The salt effect parameter is defined as $k_{\text{smm}} = \log \gamma_1/I$ where I is the ionic strength (molality) and $\gamma_1 = (m_1^* f_1 / m_1 f_1^*) p, T$ with m_1 and f_1 the solubility and fugacity, respectively, of methane at p and T . The "*" refers to saturation in distilled water.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE: Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for three h to allow equilibration between the methane and solution.	SOURCE AND PURITY OF MATERIALS: (1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to be a minimum of 99.97 mole present methane. (2) Potassium sulfate. The salt solutions were made up gravimetrically using analytical grade chemicals. (3) Water. Distilled.					
ESTIMATED ERROR: $\delta p_1/\text{psia} = \pm 1$ $\delta m_1/m_1 = \pm 0.01$						
REFERENCES:						

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Potassium bicarbonate; KHCO ₃ ; [298-14-6] (3) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> <u>1982</u> , <u>46</u> , 1327-32.
VARIABLES: $T/K = 298.15$ $p_1/kPa = 2410-5170$ $m_2/\text{mol kg}^{-1} = 0-0.5$	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Temperature	Pressure	Potassium Bicarbonate	Methane	Salt Effect Parameter	
<i>t/°C</i>	<i>T/K</i>	<i>p₁/psia</i>	<i>p₁/kPa</i>	<i>m₂/mol kg⁻¹</i>	<i>k_{smm}/kg mol⁻¹</i>
25	298.15	350	2410	0	0.0319
				0.25	0.0296
				0.5	0.0268
550		3790		0	0.0483
				0.25	0.0457
				0.5	0.0406
750		5170		0	0.0617
				0.25	0.0574
				0.5	0.0530
					0.145 (authors)

The salt effect parameter is defined as $k_{\text{smm}} = \log \gamma_1/I$

where I is the ionic strength (molality) and $\gamma_1 = (m_1^* f_1 / m_1 f_1^*) p, T$

with m_1 and f_1 the solubility and fugacity, respectively, of methane at p and T . The "*" refers to saturation in distilled water.

AUXILIARY INFORMATION**METHOD/APPARATUS/PROCEDURE:**

Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for three h to allow equilibration between the methane and solution.

The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an anion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of released gas assuming ideal behavior. A correction was made for the gas not released on flashing.

SOURCE AND PURITY OF MATERIALS:

- (1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to be a minimum of 99.97 mole present methane.
- (2) Potassium bicarbonate. The salt solutions were made up gravimetrically using analytical grade chemicals.
- (3) Water. Distilled.

ESTIMATED ERROR:

$$\delta p_1/\text{psia} = \pm 1$$

$$\delta m_1/m_1 = \pm 0.01$$

REFERENCES:

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Potassium carbonate; K ₂ CO ₃ ; [584-08-7] (3) Water; H ₂ O; [7732-18-5]			ORIGINAL MEASUREMENTS: Stoessell, R. K.; Byrne, P. A. <i>Geochim. Cosmochim. Acta</i> 1982, 46, 1327-32.		
VARIABLES: T/K = 298.15 $p_1/\text{kPa} = 2410 - 5170$ $m_2/\text{mol kg}^{-1} = 0 - 2.0$			PREPARED BY: H. L. Clever		
EXPERIMENTAL VALUES:					
Temperature <i>t</i> /°C	Pressure <i>T</i> /K	Pressure <i>p</i> ₁ /psia	Pressure <i>p</i> ₁ /kPa	Potassium Carbonate <i>m</i> ₂ /mol kg ⁻¹	Methane <i>m</i> ₁ /mol kg ⁻¹
25	298.15	350	2410	0 0.5 1.0 2.0	0.0319 0.0219 0.0142 0.0073
				0 0.5 1.0 2.0	0.0483 0.0324 0.0217 0.0103
	550	3790		0 0.5 1.0 2.0	0.0617 0.0427 0.0290 0.0128
			750	0 0.5 1.0 2.0	0.107 0.116 0.117 0.112
					0.111 (authors)
The salt effect parameter is defined as $k_{\text{smm}} = \log \gamma_1 / I$ where I is the ionic strength (molality) and $\gamma_1 = (m_1^* f_1 / m_1 f_1^*)_{p, T}$ with m_1 and f_1 the solubility and fugacity, respectively, of methane at p and T . The "*" refers to saturation in distilled water.					
AUXILIARY INFORMATION					
METHOD/APPARATUS/PROCEDURE: Solubility determinations were made using a titanium-lined chamber within a stainless steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber's headpiece. The vessel was rocked for three h to allow equilibration between the methane and solution.			SOURCE AND PURITY OF MATERIALS: (1) Methane. Matheson Co., Inc. Ultra high purity grade, stated to be a minimum of 99.97 mole present methane. (2) Potassium carbonate. The salt solutions were made up gravimetrically using analytical grade chemicals. (3) Water. Distilled.		
The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an anion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of released gas assuming ideal behavior. A correction was made for the gas not released on flashing.			ESTIMATED ERROR: $\delta p_1/\text{psia} = \pm 1$ $\delta m_1/m_1 = \pm 0.01$		
REFERENCES:					

COMPONENTS:		ORIGINAL MEASUREMENTS:																		
1. Methane; CH ₄ ; [74-82-8] 2. Cesium chloride; CsCl; [7647-17-8] 3. Water; H ₂ O; [7732-18-5]		Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974, 78, 175-8.</u>																		
VARIABLES:		PREPARED BY: C. L. Young																		
EXPERIMENTAL VALUES:																				
<table> <thead> <tr> <th>T/K</th> <th>Conc. of cesium chloride / mol l⁻¹</th> <th>Ostwald coefficient, * L</th> </tr> </thead> <tbody> <tr> <td>283.15</td><td>1.0</td><td>0.03250</td></tr> <tr> <td>288.15</td><td></td><td>0.02936</td></tr> <tr> <td>293.15</td><td></td><td>0.02710</td></tr> <tr> <td>298.15</td><td></td><td>0.02553</td></tr> <tr> <td>303.15</td><td></td><td>0.02453</td></tr> </tbody> </table>			T/K	Conc. of cesium chloride / mol l ⁻¹	Ostwald coefficient, * L	283.15	1.0	0.03250	288.15		0.02936	293.15		0.02710	298.15		0.02553	303.15		0.02453
T/K	Conc. of cesium chloride / mol l ⁻¹	Ostwald coefficient, * L																		
283.15	1.0	0.03250																		
288.15		0.02936																		
293.15		0.02710																		
298.15		0.02553																		
303.15		0.02453																		
<p>* Smoothed values of Ostwald coefficient obtained from</p> $kT \ln L = 20,487.3 - 138.831 (T/K) + 0.21072 (T/K)^2 \text{ cal mol}^{-1}$ <p>where k is in units of cal mol⁻¹ K⁻¹.</p>																				
AUXILIARY INFORMATION																				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:																			
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	<ol style="list-style-type: none"> Matheson sample, purity 99.97 mole per cent. AR grade. Deionised, doubly distilled. 																			
ESTIMATED ERROR:																				
$\delta T/K = \pm 0.01; \delta L/L = \pm 0.005$ (estimated by compiler).																				
REFERENCES:																				
<ol style="list-style-type: none"> Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u>, 59, 2735. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u>, 74, 170. 																				

COMPONENTS:		ORIGINAL MEASUREMENTS: Michels, A.; Gerver, J.; Bijl, A. <i>Physica</i> , 1936, 3, 797-808.				
1. Methane; CH ₄ ; [74-82-8]						
2. Water; H ₂ O; [7732-18-5]						
3. Formaldehyde; CH ₂ O; [50-00-0]						
VARIABLES:		PREPARED BY: C.L. Young				
Pressure						
EXPERIMENTAL VALUES:						
T/K	Conc. of formaldehyde /mol l ⁻¹	p/10 ⁵ Pa	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}			
298.15	1.0	49.6 100.7 151.8 198.7	0.97 1.62 2.02 2.29			
AUXILIARY INFORMATION						
METHOD /APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Simple rocking equilibrium cell. Amount of gas absorbed calculated from volume and pressure change in charging vessel. Details in source.	No details given.					
ESTIMATED ERROR:						
$\delta T/K = \pm 0.1$; $\delta p/10^5 Pa = \pm 0.05$ to 0.5% ; $\delta x_{CH_4} = \pm 3-5\%$ (estimated by compiler)						
REFERENCES:						

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Methanol; CH ₃ OH; [67-56-1] 3. Water; H ₂ O; [7732-18-5]		Tokunaga, J.; Kawai, M. <i>J. Chem. Eng. Japan</i> <u>1975, 8, 326-327.</u>				
VARIABLES:		PREPARED BY:				
		C. L. Young				
EXPERIMENTAL VALUES:		T/K = 293.2				
Mole fraction of methanol	Ostwald coefficient, a <i>L</i>	Henry's law constant a /atm	Mole fraction of methane, a,b <i>x</i> _{CH₄}			
0	0.0353	37800	0.0000265			
0.0650	0.0461	27000	0.0000370			
0.1386	0.0513	22600	0.0000442			
0.2016	0.0555	19800	0.0000505			
0.2983	0.0743	13600	0.0000735			
0.4871	0.131	6590	0.000152			
0.6011	0.187	4200	0.000238			
0.6762	0.237	3140	0.000318			
1.0000	0.525	1130	0.000885			
^a At a partial pressure of methane of 101.3 kPa.						
^b Calculated by compiler.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Volumetric apparatus with multibulb buret and magnetic stirrer. Amount of solution and gas absorbed determined volumetrically. Partial pressure determined from total pressure of solvent solution. Details in ref. (1).	1. Obtained from Seitetsu Kagaku Co., purity better than 99 mole per cent. 2. Guaranteed reagent obtained from Wako Pure Chemical Ind. Fractionated.					
ESTIMATED ERROR:						
$\delta T/K = \pm 0.5$; $\delta L/L = \pm 0.01$.						
REFERENCES:						
1. Tokunaga, J. <i>J. Chem. Eng. Data</i> <u>1975, 20, 41.</u>						

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8]		Tokunaga, J.; Kawai, M.				
2. Ethanol; C ₂ H ₆ O; [64-17-5]		<i>J. Chem. Eng. Japan</i>				
3. Water; H ₂ O; [7732-18-5]		<u>1975</u> , 8, 326-327.				
VARIABLES:		PREPARED BY:				
		C. L. Young				
EXPERIMENTAL VALUES:		T/K = 293.2				
Mole fraction of ethanol	Ostwald coefficient, <i>a</i> <i>L</i>	Henry's law constant ^a /atm	Mole fraction ^{a,b} of methane, <i>x</i> _{CH₄}			
0	0.0353	37800	0.0000265			
0.0260	0.0415	30600	0.0000327			
0.0609	0.0462	25800	0.0000388			
0.1170	0.0501	21700	0.0000461			
0.2432	0.0840	10700	0.0000935			
0.3112	0.106	7680	0.000130			
0.5285	0.216	2820	0.000355			
0.7601	0.367	1370	0.000730			
1.0000	0.540	763	0.00131			
^a At a partial pressure of methane of 101.3 kPa.						
^b Calculated by compiler.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Volumetric apparatus with multibulb buret and magnetic stirrer. Amount of solution and gas absorbed determined volumetrically. Partial pressure determined from total pressure of solvent solution. Details in ref. (1).	1. Obtained from Seitetsu Kagaku Co., purity better than 99 mole per cent. 2. Guaranteed reagent obtained from Wako Pure Chemical Ind. Fractionated.					
ESTIMATED ERROR:						
$\delta T/K = \pm 0.5$; $\delta L/L = \pm 0.01$.						
REFERENCES:						
1. Tokunaga, J. <i>J. Chem. Eng. Data</i> <u>1975</u> , 20, 41.						

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Methane; CH ₄ ; [74-82-8] 2. 1-Propanol; C ₃ H ₈ O; [71-23-8] 3. Water; H ₂ O; [7732-18-5]		Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974</u> , 78, 170-5.		
VARIABLES:		PREPARED BY:		
Temperature		C. L. Young		
EXPERIMENTAL VALUES:				
T/K	Mole [#] fraction of 1-propanol, $x_{C_3H_8O}$	Ostwald coefficient*, L		
283.15	0.03	0.04594		
288.15		0.04248		
293.15		0.03951		
298.15		0.03696		
303.15		0.03475		
<p>* Smoothed values of Ostwald coefficient obtained from</p> $kT \ln L = 5,537.5 - 36.091 (T/K) + 0.03677 (T/K)^2 \text{ cal mol}^{-1}$ <p>where k is in units of $\text{cal mol}^{-1} \text{ K}^{-1}$.</p>				
<p># Mole fraction before saturation with methane which is virtually the same as the mole fraction after saturation.</p>				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	1. Matheson sample, purity 99.97 mole per cent. 2. CP grade. 3. Deionised, doubly distilled.			
ESTIMATED ERROR:				
$\delta T/K = \pm 0.01; \delta L/L = \pm 0.005$ (estimated by compiler).				
REFERENCES:				
1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u> , 59, 2735. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u> , 74, 170.				

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Methane; CH ₄ ; [74-82-8] 2. 1,4-Dioxane; C ₄ H ₈ O ₂ ; [123-91-1] 3. Water; H ₂ O; [7732-18-5]		Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974, 78, 170-5.</u>		
VARIABLES:		PREPARED BY:		
Temperature		C. L. Young		
EXPERIMENTAL VALUES:				
T/K	#Mole fraction of dioxane, $x_{C_4H_8O_2}$	Ostwald coefficient, L^*		
283.15	0.03	0.04516		
288.15		0.04211		
293.15		0.03949		
298.15		0.03724		
303.15		0.03530		
<p>* Smoothed values of Ostwalt coefficient obtained from</p> $kT \ln L = 11,689.2 - 72.532(T/K) + 0.09180(T/K)^2 \text{ cal mol}^{-1}$ <p>where k is in units of $\text{cal mol}^{-1} \text{ K}^{-1}$.</p> <p># Mole fraction before saturation with methane which is virtually the same as the mole fraction after saturation.</p>				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	1. Matheson sample, purity 99.97 mole per cent. 2. AR grade. 3. Deionised, doubly distilled.			
ESTIMATED ERROR:				
$\delta T/K = \pm 0.01; \delta L/L = \pm 0.005$ (estimated by compiler).				
REFERENCES:				
1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u> , 59, 2735. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u> , 74, 170.				

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. Urea; CH ₄ N ₂ O; [57-13-6]		Wetlaufer, D. B.; Malik, S. K.; Stoller, L.; Coffin, R. L. <i>J. Am. Chem. Soc.</i> <u>1964</u> , 86, 508-514.				
VARIABLES:		PREPARED BY:				
Temperature		C. L. Young				
EXPERIMENTAL VALUES:						
T/K	Conc. of urea in soln. / mol dm ⁻³	10 ³ Conc. of methane [†] in soln. / mol dm ⁻³	Mole fraction* of methane x_{CH_4}			
278.2	6.96	0.00131	0.0000291			
298.2	6.96	0.00102	0.0000227			
318.2	6.96	0.00086	0.0000198			
[†] at a partial pressure of 101.3 kPa.						
[*] calculated by compiler.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Modified Van Slyke-Neill apparatus fitted with a magnetic stirrer. Solution was saturated with gas and then sample transferred to the Van Slyke extraction chamber.	1. Matheson c.p. grade, purity 99 mole per cent or better. 2. Distilled. 3. Commercial sample, purified by two recrystallizations from 65% ethanol.					
ESTIMATED ERROR:						
$\delta T/K = \pm 0.05$; $\delta x_{CH_4} = \pm 2\%$.						
REFERENCES:						

COMPONENTS:			ORIGINAL MEASUREMENTS:							
1. Methane; CH ₄ ; [74-82-8] 2. Urea; CH ₄ N ₂ O; [57-13-6] 3. Water; H ₂ O; [7732-18-5]			Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974</u> , 78, 170-5.							
VARIABLES:			PREPARED BY:							
Temperature, concentration			C. L. Young							
EXPERIMENTAL VALUES:										
T/K	Conc. of urea /mol l ⁻¹	Ostwald [*] Coefficient, L	T/K	Conc. of urea /mol l ⁻¹	Ostwald [*] Coefficient, L					
283.15	1.0	0.04117	283.15	4.0	0.03228					
288.15		0.03757	288.15		0.03066					
293.15		0.03471	293.15		0.02894					
298.15		0.03244	298.15		0.02715					
303.15		0.03065	303.15		0.02532					
283.15	2.0	0.03782	283.15	7.0	0.02676					
288.15		0.03480	288.15		0.02579					
293.15		0.03249	293.15		0.02482					
298.15		0.03078	298.15		0.02387					
303.15		0.02955	303.15		0.02294					
<p>* Smoothed values of Ostwald coefficient obtained from</p> $kT \ln L = 11,562.0 - 77.00(T/K) + 0.10534(T/K)^2 \text{ cal mol}^{-1}$ $kT \ln L = 14,255.0 - 96.928(T/K) + 0.14153(T/K)^2 \text{ cal mol}^{-1}$ $kT \ln L = -6,004.4 + 41.018(T/K) + 0.09407(T/K)^2 \text{ cal mol}^{-1}$ $kT \ln L = -855.0 + 2.980(T/K) + 0.02528(T/K)^2 \text{ cal mol}^{-1}$ <p>(where k is in units of $\text{cal mol}^{-1} \text{ K}^{-1}$) for concentrations of 1.0, 2.0, 4.0 and 7.0 mol l⁻¹, respectively.</p>										
AUXILIARY INFORMATION										
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:									
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	1. Matheson sample, purity 99.97 mole per cent. 2. AR grade. 3. Deionised, doubly distilled.									
ESTIMATED ERROR:										
$\delta T/K = \pm 0.01$; $\delta L/L = \pm 0.005$ (estimated by compiler).										
REFERENCES:										
1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u> , 59, 2735. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u> , 74, 170.										

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. 1,3,5,7-Tetraazatricyclo[3.3.1,1,1 ^{3,7}] decane; C ₆ H ₁₂ N ₄ ; [100-97-0] 3. Water; H ₂ O; [7732-18-5]		Barone, G.; Castronuovo, G.; Volpe, D.; Elia, V.; Grassi, L. <i>J. Phys. Chem.</i> <u>1979, 83, 2703-2714.</u>				
VARIABLES:		PREPARED BY:				
		C. L. Young				
EXPERIMENTAL VALUES:						
t/°C	T/K	Conc. of component 2 ^a /mol dm ⁻³	Ostwald coefficient, L			
15	288.15	0.0	0.03918			
		0.5	0.03936			
		1.0	0.03932			
		1.5	0.03905			
		2.0	0.03856			
		2.5	0.03785			
		3.0	0.03692			
25	298.15	0.0	0.03371			
		0.5	0.03434			
		1.0	0.03445			
		1.5	0.03405			
		2.0	0.03314			
		2.5	0.03172			
		3.0	0.02979			
35	308.15	0.0	0.02986			
		0.5	0.03010			
		1.0	0.03026			
		1.5	0.03034			
		2.0	0.03034			
		2.5	0.03026			
		3.0	0.03010			
^a Units not explicitly given in original.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
The apparatus was similar to that described by Ben-Naim and Baer (1). Teflon needle valves were used in place of stopcocks. The apparatus consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer. Dissolution of the gas results in the change in the height of a column of mercury which is measured with a cathetometer.	1. Matheson sample, purity 99.97 mole per cent. 2. Fluka sample, recrystallized from ethanol. 3. Doubly distilled.					
ESTIMATED ERROR: $\delta T/K = \pm 0.03$; $\delta L/L = \pm 0.005$ (estimated by compiler).						
REFERENCES:						
1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963, 59, 2735.</u>						

COMPONENTS:		ORIGINAL MEASUREMENTS:																		
1. Methane; CH ₄ ; [74-82-8] 2. β-D-Fructofuranosyl-α-D-gluco-pyranoside, (Sucrose); C ₁₂ H ₂₂ O ₁₁ ; [57-50-1] 3. Water; H ₂ O; [7732-18-5]		Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974</u> , 78, 170-5.																		
VARIABLES: Temperature		PREPARED BY: C. L. Young																		
EXPERIMENTAL VALUES:																				
<table border="1"> <thead> <tr> <th>T/K</th> <th>Conc. of sucrose /mol l⁻¹</th> <th>Ostwald coefficient, L</th> </tr> </thead> <tbody> <tr> <td>283.15</td><td>0.5</td><td>0.03592</td></tr> <tr> <td>288.15</td><td></td><td>0.03276</td></tr> <tr> <td>293.15</td><td></td><td>0.03020</td></tr> <tr> <td>298.15</td><td></td><td>0.02813</td></tr> <tr> <td>303.15</td><td></td><td>0.02646</td></tr> </tbody> </table>			T/K	Conc. of sucrose /mol l ⁻¹	Ostwald coefficient, L	283.15	0.5	0.03592	288.15		0.03276	293.15		0.03020	298.15		0.02813	303.15		0.02646
T/K	Conc. of sucrose /mol l ⁻¹	Ostwald coefficient, L																		
283.15	0.5	0.03592																		
288.15		0.03276																		
293.15		0.03020																		
298.15		0.02813																		
303.15		0.02646																		
<p>* Smoothed values of Ostwald coefficient obtained from</p> $kT \ln L = 10,386.5 - 68.957 (T/K) + 0.09063 (T/K)2 \text{ cal mol}^{-1}$ <p>where k is in units of $\text{cal mol}^{-1} \text{ K}^{-1}$.</p>																				
AUXILIARY INFORMATION																				
METHOD/APPARATUS/PROCEDURE:	<p>SOURCE AND PURITY OF MATERIALS:</p> <p>The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.</p> <p>1. Matheson sample, purity 99.97 mole per cent.</p> <p>2. AR grade.</p> <p>3. Deionised, doubly distilled.</p>																			
	<p>ESTIMATED ERROR:</p> $\delta T/K = \pm 0.01; \delta L/L = \pm 0.005$ <p>(estimated by compiler).</p>																			
	<p>REFERENCES:</p> <ol style="list-style-type: none"> 1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u>, 59, 2735. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u>, 74, 170. 																			

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. α-D-Glucopyranoside, β-D-fructofuranosyl (Sucrose); C ₁₂ H ₂₂ O ₁₁ ; [57-50-1]		Michels, A.; Gerver, J.; Bijl, A. <i>Physica</i> , 1936, 3, 797-808.				
VARIABLES:		PREPARED BY:				
Pressure, concentration		C.L. Young				
EXPERIMENTAL VALUES:						
T/K	p/10 ⁵ Pa	Conc. of sucrose /mol l ⁻¹	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}			
298.15	60.2 109.4 157.5 191.5 60.3 146.4 265.8 448	1.0 2.0	0.88 1.35 1.70 1.94 0.83 1.53 1.96 2.23			
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Simple rocking equilibrium cell. Amount of gas absorbed calculated from volume and pressure change in charging vessel. Details in source.	No details given.					
ESTIMATED ERROR: ΔT/K = ±0.1; Δp/10 ⁵ Pa = ±0.05 to 0.5%; Δx _{CH₄} = ±3-5% (estimated by compiler).						
REFERENCES:						

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. Methane; CH ₄ ; [74-82-8] 2. Sulfinylbismethane; (Dimethyl-sulfoxide, DMSO); C ₂ H ₆ OS; [67-68-5] 3. Water; H ₂ O; [7732-18-5]		Ben-Naim, A.; Yaacobi, M. <i>J. Phys. Chem.</i> <u>1974, 78, 170-5.</u>		
VARIABLES:		PREPARED BY:		
Temperature		C. L. Young		
EXPERIMENTAL VALUES:				
T/K	#Mole fraction of DMSO, x_{DMSO}	Ostwald coefficient, L^*		
283.15	0.03	0.04329		
288.15		0.03977		
293.15		0.03684		
298.15		0.03440		
303.15		0.03236		
<p>* Smoothed values of Ostwald coefficient obtained from</p> $kT \ln L = 7,904.5 - 52.042(T/K) + 0.06316(T/K)^2 \text{ cal mol}^{-1}$ <p>where k is in units of $\text{cal mol}^{-1} \text{ K}^{-1}$.</p>				
<p># Mole fraction before saturation with methane which is virtually the same as the mole fraction after saturation.</p>				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:			
The apparatus was similar to that described by Ben-Naim and Baer (1) and Wen and Hung (2). It consists of three main parts, a dissolution cell of 300 to 600 cm ³ capacity, a gas volume measuring column, and a manometer. The solvent is degassed in the dissolution cell, the gas is introduced and dissolved while the liquid is kept stirred by a magnetic stirrer immersed in the water bath. Dissolution of the gas results in the change in the height of a column of mercury which is measured by a cathetometer.	1. Matheson sample, purity 99.97 mole per cent. 2. CP grade. 3. Deionised, doubly distilled.			
ESTIMATED ERROR:				
$\delta T/K = \pm 0.01$; $\delta L/L = \pm 0.005$ (estimated by compiler).				
REFERENCES:				
1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> <u>1963</u> , 59, 2735. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> <u>1970</u> , 74, 170.				

COMPONENTS:		ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. Glucose; C ₆ H ₁₂ O ₆ ; [50-99-7]		Michels, A.; Gerver, J.; Bijl, A. <i>Physica</i> , 1936, 3, 797-808.				
VARIABLES:		PREPARED BY:				
Pressure, concentration		C.L. Young				
EXPERIMENTAL VALUES:						
T/K	p/10 ⁵ Pa	Conc. of glucose /mol l ⁻¹	10 ³ Mole fraction of methane in liquid, 10 ³ x _{CH₄}			
298.15	53.0 108.1 149.8 192.8 54.4 102.1 154.5 204.4 414.4	1.0 2.0	0.76 1.32 1.59 1.77 0.67 1.15 1.55 1.74 2.66			
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:					
Simple rocking equilibrium cell. Amount of gas absorbed calculated from volume and pressure change in charging vessel. Details in source.	No details given.					
ESTIMATED ERROR:						
$\delta T/K = \pm 0.1$; $\delta p/10^5 Pa = \pm 0.05$ to 0.5%; $\delta x_{CH_4} = \pm 3-5\%$. (estimated by compiler).						
REFERENCES:						

COMPONENTS:			ORIGINAL MEASUREMENTS:					
1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. 2-Aminoethanol, (Monoethanol-amine); C ₂ H ₇ NO; [141-43-5]			Lawson, J.D.; Garst, A.W. <i>J. Chem. Engng. Data.</i> <u>1976</u> , 21, 30-2					
VARIABLES:			PREPARED BY:					
Temperature, pressure, composition			C.L. Young					
EXPERIMENTAL VALUES:								
T/K	P/MPa	Conc. Wt. % amine	Mole fraction of methane in liquid, x_{CH_4}	$10^5 \times \text{Solubility}$ / mol g ⁻¹ (soln)				
310.93	6.578 3.447 6.578	15 40	0.00132 0.000835 0.00157	6.55 3.48 6.26				
338.71	3.433 6.846 3.433 6.578	15 40	0.000618 0.00152 0.000835 0.00155	3.07 5.80 3.33 6.20				
366.48	3.378 6.715	40	0.00230 0.00416	9.16 16.60				
394.26	3.503 6.550	40	0.00105 0.00197	4.19 7.85				
AUXILIARY INFORMATION								
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:							
Rocking equilibrium cell fitted with liquid sampling valve. Pressure measured with Bourdon gauge. Cell charged with amine and then methane added. Liquid phase samples analysed volumetrically.	1. Purity 99 mole per cent minimum. 2. Distilled. 3. Commercial sample, purity better than 99 mole per cent as determined by acid titration.							
ESTIMATED ERROR: $\delta T/K = \pm 0.15$; $\delta P/MPa = \pm 0.5\%$ $\delta x_{\text{CH}_4} = \pm 3\%$.								
REFERENCES:								

COMPONENTS: 1. Methane; CH ₄ ; [74-82-8] 2. Water; H ₂ O; [7732-18-5] 3. 2,2'-Iminobisethanol, (Diethanol-amine); C ₄ H ₁₁ NO; [111-42-2]			ORIGINAL MEASUREMENTS: Lawson, J.D.; Garst, A.W. <i>J. Chem. Engng. Data.</i> <u>1976</u> , 21, 30-2					
VARIABLES: Temperature, pressure, composition			PREPARED BY: C.L. Young					
EXPERIMENTAL VALUES:			Mole fraction of methane in liquid, x_{CH_4}	$10^5 \times \text{Solubility}$ / mol g ⁻¹ (soln)				
T/K	P/MPa	Conc. Wt. %						
310.93	3.530	5	0.000653	3.48				
	6.640		0.00121	6.46				
	3.515	25	0.000727	3.20				
	6.674		0.00136	5.00				
	3.627	40	0.000872	3.24				
	6.433		0.00149	5.52				
338.71	3.558	5	0.000520	2.77				
	6.743		0.000976	5.20				
	3.523	25	0.000656	2.89				
	6.771		0.00123	5.40				
	3.571	40	0.000824	3.06				
	6.460		0.00145	5.38				
366.48	3.558	25	0.000586	2.58				
	6.343		0.00114	5.02				
	3.654	40	0.000819	3.04				
	6.640		0.000155	5.74				
	3.454	25	0.000674	2.97				
	6.343		0.001321	5.82				
394.26	3.434	40	0.000959	3.56				
	6.260		0.00170	6.30				
AUXILIARY INFORMATION								
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:							
Rocking equilibrium cell fitted with liquid sampling valve. Pressure measured with Bourdon gauge. Cell charged with amine then methane added. Liquid phase samples analysed volumetrically.	1. Purity 99 mole per cent minimum. 2. Distilled. 3. Commercial sample, purity better than 99 mole per cent as determined by acid titration							
ESTIMATED ERROR: $\delta T/K = \pm 0.15$; $\delta P/MPa = \pm 0.5\%$ $\delta x_{\text{CH}_4} = \pm 3\%$.								
REFERENCES:								

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Methane; CH ₄ ; [74-82-8]		Muccitelli, J. A.; Wen, W.-Y.	
(2) Triethylenediamine or 1,4-Diaza-bicyclo[2.2.2]octane; C ₆ H ₁₂ N ₂ ; [280-57-9]		J. Solution Chem. 1980, 9, 141 - 161.	
(3) Sodium hydroxide; NaOH; [7646-69-7]			
(4) Water; H ₂ O; [7732-18-5]			
VARIABLES:	T/K: 278.15 - 298.15 p/kPa: 101.325 (1 atm) $c_2/\text{mol dm}^{-3}$: 0 - 1.157	PREPARED BY: H. L. Clever	

EXPERIMENTAL VALUES:

T/K	C ₆ H ₁₂ N ₂		pH	Ostwald Coefficient $10^3 \text{L}/\text{cm}^3 \text{cm}^{-3}$
	$c_2/\text{mol dm}^{-3}$	$c_3/\text{mol dm}^{-3}$		
278.15	0.0	0.01	12.02	49.82 ± 0.29
	0.291	0.01	12.03	52.83
	0.3785	0.01	12.06	52.31
	0.8554	0.01	12.06	51.80
	1.010	0.01	11.90	52.01
283.15	0.0	0.01	12.08	44.42 ± 0.25
	0.1782	0.01	12.01	45.41
	0.2778	0.01	12.02	45.42
	0.5629	0.01	12.07	46.48
	0.8753	0.01	12.02	46.44
	1.039	0.01	12.08	47.15
288.15	0.0	0.01	12.02	39.46 ± 0.25
	0.1110	0.01	12.10	40.07
	0.1722	0.01	12.00	40.02
	0.2182	0.01	12.22	40.49
	0.3835	0.01	12.01	41.98
	0.4763	0.01	12.09	48.81 [sic]
	0.6238	0.01	12.23	42.33
	0.8941	0.01	12.03	41.74

Table continued on next page.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solubility apparatus and procedure employed were similar to that described by Ben-Naim and Baer (1) with modifications suggested by Wen and Hung (2). The apparatus consists mainly of a mercury manometer, a gas-volume measuring buret, a dissolution cell of about 450 cm ³ capacity, and a mercury reservoir. The degassing apparatus and procedure used were similar to that described by Battino <i>et al.</i> (3). From published ionization constants the authors estimated that nearly 100 per cent of the triethylenediamine is unprotonated when the solution pH is 12 or above, and about 99.7 per cent is in the monoprotonated form when the solution pH is 5.7 to 5.9.	(1) Methane. Matheson Co., Inc. Specified to have a purity of 99.95 per cent. (2) Triethylenediamine. Aldrich Chemical Co. Recrystallized twice from diethylether, triturated and dried <i>in vacuo</i> over P ₂ O ₅ for eight days at 50 °C. (3) Sodium hydroxide. Carbonate free. (4) Water. Carbon dioxide free.
ESTIMATED ERROR:	$\delta T/K = \pm 0.005$ $\delta P/\text{mmHg} = \pm 3$ $\delta L/L = \pm 0.005$
REFERENCES:	1. Ben-Naim, A.; Baer, S. <i>Trans. Faraday Soc.</i> 1964, 60, 1736. 2. Wen, W.-Y.; Hung, J. H. <i>J. Phys. Chem.</i> 1970, 74, 170. 3. Battino, R.; Banzhof, M.; Bogan, M.; Wilhelm, E. <i>Anal. Chem.</i> 1971, 43, 806.

COMPONENTS:		ORIGINAL MEASUREMENTS:		
(1) Methane; CH_4 ; [74-82-8]		Muccitelli, J. A.; Wen, W.-Y.		
(2) Triethylenediamine or 1,4-Diazabicyclo[2.2.2]octane; $\text{C}_6\text{H}_{12}\text{N}_2$; [280-57-9]		<i>J. Solution Chem.</i> 1980, 9, 141 - 161.		
(3) Sodium hydroxide; NaOH; [7646-69-7]				
(4) Water; H_2O ; [7732-18-5]				
VARIABLES:		PREPARED BY:		
T/K : 278.15 - 298.15 P/kPa : 101.325 (1 atm) $c_2/\text{mol dm}^{-3}$: 0 - 1.157		H. L. Clever		
EXPERIMENTAL VALUES:				
T/K	$\text{C}_6\text{H}_{12}\text{N}_2$ $c_2/\text{mol dm}^{-3}$	NaOH $c_3/\text{mol dm}^{-3}$	pH	Ostwald Coefficient $10^3 \text{L}/\text{cm}^3 \text{cm}^{-3}$
293.15	0.0 0.1395 0.2440 0.6772 1.157	0.01 0.01 0.01 0.01 0.01	12.02 12.02 12.02 12.08 12.01	36.63 ± 0.37 36.75 37.32 38.29 38.71
298.15	0.0 0.1807 0.4836 0.7682 0.9947	0.01 0.01 0.01 0.01 0.01	11.88 11.74 11.94 11.93 12.03	33.48 ± 0.16 34.10 35.55 35.71 36.38
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE: See preceding page.	SOURCE AND PURITY OF MATERIALS: See preceding page.			
		ESTIMATED ERROR: See preceding page.		
		REFERENCES: See preceding page.		

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Methane; CH ₄ ; [74-82-8]		Bolden, P. L.; Hoskins, J. C.; King, A. D. Jr.	
(2) Sulfuric acid monohexyl ester, sodium salt or sodium hexyl-sulfate; C ₆ H ₁₄ O ₄ S.Na; [2207-98-9]		J. Colloid Interface Sci. 1983, 91, 454-463.	
(3) Water; H ₂ O; [7732-18-5]			
VARIABLES: T/K = 298.15 $p_1/\text{kPa} = m_2/\text{mol kg}^{-1} = 0 - 1.10$		PREPARED BY: H. L. Clever	
EXPERIMENTAL VALUES:			
	Temperature <i>t</i> /°C	Sodium Hexyl-sulfate <i>m</i> ₂ /mol kg ⁻¹	Henry's Constant Methane K/mol kg ⁻¹ atm ⁻¹
	25	298.15	0 1.55 ^a 0.10 1.62 0.30 1.61 0.50 1.51 0.60 1.43 0.70 1.60 0.80 1.71 0.90 1.78 1.00 1.84 1.10 1.90
^a Solubility value in water from reference 1.			
Henry's constant, K/mol kg ⁻¹ atm ⁻¹ = (<i>m</i> ₁ /mol kg ⁻¹) / (<i>p</i> ₁ /atm).			
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
The solution of surface active material is contained in a glass-lined brass equilibrium cell resting on a magnetic stirrer. The solution is degassed by evacuation and stirring. Gas is introduced at pressures above atmospheric and equilibration is continued for at least five hours. Subsequently as the pressure is released to a lower pressure, the gas evolved from the supersaturated solution is collected at atmospheric pressure and ambient temperature in a Warburg manometer and its volume measured.		(1) Methane. Source not given. Stated to be c. p. grade, 99 % or better. (2) Sodium hexylsulfate. Eastman Kodak Co. Recrystallized from 2-propanol and dried <i>in vacuo</i> . (3) Water. Double distilled.	
Corrections are made for the gas lost during the venting procedure, the differences in temperature and pressure, and the water vapor pressure in the calculation of Henry's constant.		ESTIMATED ERROR: $\delta K/\text{mol kg}^{-1} \text{ atm}^{-1} = \pm 0.04$	
Details are in an earlier paper (ref 1).		REFERENCES: 1. Matheson, I. B. C.; King, A. D. J. Coll. Interface Sci. 1978, 66, 464	

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Sulfuric acid monododecyl ester sodium salt (sodium dodecyl sulfate or SDS); C ₁₂ H ₂₆ O ₄ S.Na; [151-21-3] (3) Water; H ₂ O; [7732-18-5]			ORIGINAL MEASUREMENTS: Matheson, I. B. C.; King, A. D. <i>J. Coll. Interface Sci.</i> 1978, 66, 464 - 469.		
VARIABLES: T/K: 298.15 p/kPa: 255.1-820.5(37.0-119.0 psig) SDS/mol kg ⁻¹ H ₂ O: 0 - 0.300			PREPARED BY: H. L. Clever		
EXPERIMENTAL VALUES:					
T/K	Sulfuric acid monododecyl ester sodium salt m ₂ /mol kg ⁻¹	Pressure pounds per square inch, gauge p/psig	Volume gas evolved V ₁ /cm ³	Ambient Pressure p/mmHg	Ambient Temperature t/°C Henry's constant 10 ³ K/mol kg ⁻¹ atm ⁻¹
298.15	0	42.7 68.2 119.0	11.6 18.8 31.1	744.6 749.9 744.7	24.5 23.0 23.9
	0.150	37.0 70.5 94.5	12.1 22.7 29.6	755.4 758.6 756.7	21.9 21.2 22.0
	0.300	53.2 75.4 112.0	19.6 26.7 39.2	749.6 752.8 752.0	21.9 21.2 22.0
					1.55±0.03 1.88±0.03 2.09±0.03
AUXILIARY INFORMATION					
METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS: (1) Methane. Source not given. Chemically pure or equivalent of 99.0 mole percent purity. (2) Sulfuric acid monododecyl ester sodium salt. Aldrich Chemical Co., Inc. Recrystallized from ethanol and dried <i>in vacuo</i> . (3) Water. Laboratory distilled.				
The apparatus consists of a jacketed thermostated thick-walled cylindrical brass bomb which rests on a variable speed magnetic stirrer. An inlet line to the bomb is connected to a gas manifold, and an exit line is connected to a Warburg manometer. Bourden gauges are used to record the pressure.	ESTIMATED ERROR: $\delta K/K = 0.02$				
The solution, consisting of 100 g of water and the colloidal electrolyte, is contained in a glass liner inside of the bomb. The solution is degassed by evacuation to just above water vapor pressure and then stirring for several hours. The gas is introduced over the solution at the desired pressure and the solution is stirred for a minimum of five hours.					
The gas is vented to atmospheric pressure. The gas from the supersaturated solution is collected in the Warburg manometer and its volume measured at atmospheric pressure and ambient temperature. Corrections for gas lost during venting and thermal equilibration and for water vapor pressure are made.					
The solubility is reported as Henry's constant, K/mol gas kg ⁻¹ atm ⁻¹ = gas molality/pressure = (m ₁ /mol kg ⁻¹)/(p/atm).					

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Methane; CH ₄ ; [74-82-8]	Ben-Naim, A.; Battino, R.
(2) Sodium dodecylsulfate or SDS; C ₁₂ H ₂₅ SO ₄ Na; [151-21-8]	J. Solution Chem. 1985, 14, 245-53.
(3) Water; H ₂ O; [7732-18-5]	

EXPERIMENTAL VALUES:

Temperature <i>t</i> /°C	Sodium Dodecyl sulfate <i>c</i> ₂ /mol dm ⁻³	Ostwald Coefficient 10 ³ L/cm cm ⁻³
15 288.15	0.0	40.94
	0.002	40.60
	0.005	.42.0
	0.01	42.2
	0.03	41.6
	0.05	42.2
	0.08	42.2
		44.1
18 291.15	0.0	39.1
	0.008	38.6
	0.05	39.2
	0.08	40.5
		41.8
21 294.15	0.0	37.0
	0.005	36.7
	0.008	36.4
	0.01	37.64
	0.03	37.0
	0.05	38.3
	0.08	38.0
24 297.15	0.0	39.6
	0.005	37.0
	0.008	36.7
	0.05	36.4
	0.08	34.85
27 300.15	0.0	35.5
	0.005	36.0
	0.008	34.9
	0.05	36.2
	0.08	37.8
	0.002	33.1
	0.004	33.5
	0.005	33.5
	0.008	33.8
	0.01	33.0

The values of $\Delta\mu_s^0$ calculated from the experimental Ostwald absorption coefficients were fit to the following equation by the authors.

$$\begin{aligned}\Delta\mu_s^0 &= - RT \ln L \\ &= - 2986.19 + 16.7082 (T/K) - 523.534 (c_2/\text{mol dm}^{-3}) \\ &\text{with } R \text{ in cal K}^{-1} \text{ mol}^{-1}.\end{aligned}$$

COMPONENTS:				ORIGINAL MEASUREMENTS:	
(1) Methane; CH ₄ ; [74-82-8]				Stoessell, R. K.; Byrne, P.A.	
(2) Clay and sediment slurries				<i>Clays Clay Miner.</i> 1982, 30, 67-72.	
(3) Water; H ₂ O; [7732-18-5]					
Sea water					
EXPERIMENTAL VALUES:					
Temperature		Pressure		Clay or Sediment /wt%	Methane
t/°C	T/K	p ₁ /psia	p ₁ /kPa		m ₁ /mol kg ⁻¹
Na saturated SAz-1 dispersed into distilled water					
25	298.15	350	2410	0	0.0318
				1.09	0.0300
				1.99	0.0298
				5.52	0.0299
				10.32	0.0296
		550	3790	0	0.0473
				1.09	0.0457
				1.99	0.0457
				5.52	0.0466
				10.32	0.0472
		750	5170	0	0.0623
				1.09	0.0596
				1.99	0.0610
				5.52	0.0620
				10.32	0.0608
Na saturated SWy-1 dispersed in distilled water					
25	298.15	350	2410	0	0.0318
				1.01	0.0306
				2.01	^a
		550	3790	0	0.0473
				1.01	0.0467
				2.01	0.0465
		750	5170	0	0.0623
				1.01	0.0621
				2.01	0.0613
Sediment dispersed in distilled water					
25	298.15	350	2410	0	0.0318
				7.1	0.0312
		550	3790	0	0.0473
				7.1	0.0468
		750	5170	0	0.0623
				7.1	0.0616
Sediment dispersed in sea water of 34.84% salinity					
25	298.15	350	2410	0	0.0263
				9.7	0.0250
		550	3790	0	0.0400
				9.7	0.0396
		750	5170	0	0.0514
				9.7	0.0517

^aHigh viscosity gel that would not release gas at these conditions.

COMPONENTS: (1) Methane; CH ₄ ; [74-82-8] (2) Clay and sediment slurries (3) Water; H ₂ O; [7732-18-5] Sea water	ORIGINAL MEASUREMENTS: Stoessell, R. K.; Byrne, P.A. <i>Clays Clay Miner</i> 1982, 30, 67-72.
VARIABLES: $T/K = 298.15$ $p_1/kPa = 2410 - 5170$ slurries/wt % = 0 - 10.32	PREPARED BY: H. L. Clever
SOURCE AND PURITY OF MATERIALS:	
(1) Methane. Matheson ultra high purity. Minimum purity 99.97 percent.	
(2) SAZ-1. Cheto montmorillonite from Arizona.	
SWy-1. Bentonite montmorillonite from Wyoming.	
Both were obtained from The Clay Minerals Society. Data on these clays are reported by Van Olphen, H.; Fripant, J. J., Editors, <i>Data Handbook for Clay Minerals and Other Non-Metallic Minerals</i> , Pergamon Press, Ltd., Oxford and New York, 1979, 346pp.	
Samples of each clay were treated with H ₂ O ₂ to remove organic material. Following settling to remove non-clay minerals, the samples were centrifuged and washed to remove soluble salts. X-ray powder photographs showed no crystalline impurities in SAZ-1, but showed the presence of minor quartz in SWy-1. The exchange sites were saturated with Na by mixing 10 g of clay with one liter of 1 mol dm ⁻³ NaCl solution. The slurries were allowed to set for one week with occasional shaking. They were then washed and centrifuged until chloride ion could not be detected by silver nitrate. The washed clay was then dispersed into distilled water to make the slurries.	
Marine sediment. Obtained from a core off the present Mississippi delta in 60 m of water and 10 m below the bottom. The argillaceous sediment was stored for 2 months in a brine containing 150,000 ppm NaCl. It was then centrifuged and washed until chloride ion could not be detected. The organic carbon content was 1.2 ± 0.2 wt %. X-ray diffraction patterns of the sediment showed the following major	
(continued below)	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: Solubility determinations were made using a titanium-lined chamber within a stainless-steel reaction vessel jacketed by a water bath for temperature control. The system pressure was set by controlling the input and output of methane within the chamber headpiece. The vessel was rocked for 3 h to allow equilibration between the methane and slurry.	SOURCE AND PURITY OF MATERIALS:(continued) components: quartz, feldspar, dioctahedral smectite, and well-crystallized mica and kaolinite. (3) Water. Distilled. Sea water. 34.85% salinity.
The amount of gas in the saturated solution was measured by transfer of a sample volume to a loop at the system pressure, followed by flashing the sample in an expansion loop and measuring the gas pressure in a known volume. The total gas volume and pressure change were used to compute the moles of methane assuming ideal behavior. A correction was made for the gas not released on flashing.	ESTIMATED ERROR: $\delta T/K = \pm 0.1$ $\delta p_1/\text{psia} = \pm 1$ $\delta m_1/\text{mol kg}^{-1} = \pm 0.0003 \text{ Av.}$ $\pm 0.0005 \text{ Max.}$
REFERENCES:	

COMPONENTS:				ORIGINAL MEASUREMENTS:				
1. Methane; CH ₄ ; [74-82-8] 2. Ethane; C ₂ H ₆ ; [74-84-0] 3. Propane; C ₃ H ₈ ; [74-98-6] 4. Water; H ₂ O; [7732-18-5]				Amirijafari, B.; Campbell, J. M. <i>Soc. Pet. Engrs. J.</i> <u>1972, 12, 21-27.</u>				
VARIABLES:				PREPARED BY:				
				C. L. Young				
EXPERIMENTAL VALUES:								
T/K (T/°F)	P/psi	P/MPa	10 ³ × Mole fraction in liquid			Mole fraction in vapor ^a		
			10 ³ x _{CH₄}	10 ³ x _{C₂H₆}	10 ³ x _{C₃H₈}	y' _{CH₄}	y' _{C₂H₆}	y' _{C₃H₈}
377.59 (220)	665	4.59	1.178	0.398	0.019	0.5023	0.2527	0.2450
	2065	14.24	2.068	0.700	0.032	0.5023	0.2527	0.2450
	3015	20.79	2.370	0.803	0.041	0.5023	0.2527	0.2450
	4015	27.68	2.676	0.906	0.042	0.5023	0.2527	0.2450
	5015	34.58	2.942	0.998	0.039	0.5023	0.2527	0.2450
	665	4.59	1.276	0.271	0.048	0.6110	0.1780	0.2110
	2065	14.24	2.244	0.476	0.086	0.6110	0.1780	0.2110
	3015	20.79	2.570	0.546	0.102	0.6110	0.1780	0.2110
	4015	27.68	2.882	0.613	0.111	0.6110	0.1780	0.2110
	5015	34.58	3.162	0.672	0.123	0.6110	0.1780	0.2110
344.26 (160)	5000	34.47	2.780	0.323	0.198	0.7015	0.1065	0.1920
360.93 (190)	5000	34.47	2.830	0.329	0.206	0.7015	0.1065	0.1920
377.59 (220)	5000	34.47	3.158	0.367	0.225	0.7015	0.1065	0.1920
	665	4.59	1.175	0.137	0.083	0.7015	0.1065	0.1920
	2065	14.24	2.234	0.260	0.161	0.7015	0.1065	0.1920
	3015	20.79	2.614	0.304	0.161	0.7015	0.1065	0.1920
	4015	27.68	2.882	0.328	0.205	0.7015	0.1065	0.1920
	665	4.59	1.230	0.119	0.040	0.8218	0.0945	0.0837
(cont.)								
^a Mole fraction of hydrocarbon in water-free gas phase.								
AUXILIARY INFORMATION								
METHOD/APPARATUS/PROCEDURE:				SOURCE AND PURITY OF MATERIALS:				
Static stainless steel equilibrium vessel of approximately 75 mL capacity. Pressure measured with Bourdon gauge and temperature measured with thermocouple. Samples of liquid and vapor analysed using a gas chromatograph equipped with a flame ionisation detector. Poropak R column used.				1, 2 and 3. Pure grade samples, purity 99.9 mole per cent.				
				4. No details given.				
				ESTIMATED ERROR:				
				$\delta T/K = \pm 0.03$; $\delta P/MPa = \pm 1\%$; $\delta x, \delta y = \pm 2\%$.				
				REFERENCES:				

COMPONENTS:

ORIGINAL MEASUREMENTS:

1. Methane; CH₄; [74-82-8] Amirijafari, B.; Campbell, J. M.
 2. Ethane; C₂H₆; [74-84-0] Soc. Pet. Engrs. J.
 3. Propane; C₃H₈; [74-98-6] 1972, 12, 21-27.
 4. Water; H₂O; [7732-18-5]

EXPERIMENTAL VALUES:

T/K (T/°F)	P/psi	P/MPa	10 ³ × Mole fraction in liquid			Mole fraction in vapor ^a		
			10 ³ x _{CH₄}	10 ³ x _{C₂H₆}	10 ³ x _{C₃H₈}	y' CH ₄	y' C ₂ H ₆	y' C ₃ H ₈
377.59 (220)	2065	14.24	2.000	0.194	0.056	0.8218	0.0945	0.0837
	3015	20.79	2.668	0.258	0.079	0.8218	0.0945	0.0837
	4015	27.68	2.842	0.275	0.087	0.8218	0.0945	0.0837
	5015	34.58	3.276	0.317	0.099	0.8218	0.0945	0.0837
	665	4.59	0.768	0.596	0.216	0.2594	0.3558	0.3848
	2065	14.24	1.305	1.002	0.348	0.2594	0.3558	0.3848
	3015	20.79	1.508	1.170	0.427	0.2594	0.3558	0.3848
	4015	27.68	1.635	1.269	0.461	0.2594	0.3558	0.3848
	5015	34.58	1.800	1.396	0.607	0.2594	0.3558	0.3848

^a Mole fraction of hydrocarbon in water-free gas phase.