

## COMPONENTS:

1. Methane;  $\text{CH}_4$ ; [74-82-8]
2. 2,2-Dimethylpropane (neopentane);  
 $\text{C}_5\text{H}_{12}$ ; [463-82-1]

## EVALUATOR:

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## EVALUATION:

This system has been investigated by Prodany and Williams (1) over the temperature range 344 K to 411 K and by Rogers and Prausnitz (2) at 298 K. Because of the different temperatures studied a detailed comparison between the data is impossible. Both sets of data are classified as tentative.

References

1. Prodany, N. W.; Williams, B. J. *Chem. Engng. Data*, 1971, 16, 1.
2. Rogers, B. L.; Prausnitz, J. M. *J. Chem. Thermodyn.*, 1971, 3, 211.

COMPONENTS:		ORIGINAL MEASUREMENTS:	
1. Methane; CH <sub>4</sub> ; [74-82-8] 2. 2,2-Dimethylpropane, (Neopentane) C <sub>5</sub> H <sub>12</sub> ; [463-82-1]		Rogers, B.L.; Prausnitz, J.M.  <i>J. Chem. Thermodynamics</i> , <u>1971</u> , 3, 211-6.	
VARIABLES:		PREPARED BY:	
Pressure		C.L. Young	
EXPERIMENTAL VALUES:			
T/K	P/MPa	10 <sup>2</sup> Mole fraction of methane in liquid, 10 <sup>2</sup> x <sub>CH<sub>4</sub></sub>	in gas 10 <sup>2</sup> y <sub>CH<sub>4</sub></sub>
298.15	1.213	6.96	89.23
	2.354	13.88	92.54
	3.450	20.55	94.07
	4.371	24.22	95.19
	5.446	30.97	95.54
	6.778	37.31	95.22
	7.832	41.74	95.32
	8.998	46.87	94.81
	9.487	49.78	94.54
	10.417	52.76	94.51
	10.915	55.42	94.55
	11.990	61.28	93.54
	13.039	65.36	91.15
	13.913	69.50	89.93
	14.500	75.45	88.71
15.100	82.87	86.32	
AUXILIARY INFORMATION			
METHOD / APPARATUS / PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
Stainless steel equilibrium cell fitted with pistons which enabled sample of gas and liquid to be taken without a change in pressure. Pressure measured with floating piston gauge and temperature with four thermocouples. Cell charged with components and magnetically stirred. Samples removed and analysed using gas chromatography. Details in ref. (1).		1. Matheson, ultra high purity grade purity 99.97 mole per cent.  2. Phillips Petroleum Co. research grade sample, purity 99.97 mole per cent.	
		ESTIMATED ERROR: $\delta T/K = \pm 0.5$ ; $\delta P/MPa = \pm 0.007$ ; $\delta x_{CH_4}, \delta y_{CH_4} = \pm 1\%$	
		REFERENCES:  1. Rogers, B.L.; Prausnitz, J.M. <i>Ind. Eng. Chem. Fundam.</i> <u>1970</u> , 9, 1974.	

COMPONENTS:		ORIGINAL MEASUREMENTS:	
1. Methane; CH <sub>4</sub> ; [74-82-8]		Prodany, N.W.; Williams, B.	
2. 2,2-Dimethylpropane; (neopentane) C <sub>5</sub> H <sub>12</sub> ; [463-82-1]		<i>J. Chem. Engng. Data.</i> <u>1971</u> , 16, 1-6.	
VARIABLES:		PREPARED BY:	
Temperature, pressure		C.L. Young	
EXPERIMENTAL VALUES:			
T/K	$p/10^5\text{Pa}$	Mole fraction of methane in liquid, $x_{\text{CH}_4}$	Mole fraction of methane in vapor, $y_{\text{CH}_4}$
344.26	21.37	0.085	0.667
	35.23	0.153	0.761
	52.61	0.232	0.797
	69.29	0.312	0.819
	87.77	0.391	0.813
	88.32	0.398	0.813
	104.87	0.482	0.784
	117.83	0.560	0.727
	120.52	0.603	0.685
	377.59	21.23	0.051
34.68		0.117	0.563
51.57		0.197	0.639
69.50		0.282	0.670
86.25		0.377	0.654
98.87		0.471	0.585
410.93	34.89	0.068	0.280
	52.06	0.163	0.407
	69.22	0.281	0.416
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
Stirred equilibrium cell fitted with vapor and liquid sampling valves. Temperature measured with mercury in glass thermometer. Pressure measured with Bourdon gauge. Cell charged with components and contents equilibrated. Vapor and liquid samples withdrawn through pressure lock systems. Analysed using gas chromatography. Details in source.		1. Phillips Petroleum Co. sample 99.3 mole per cent (0.6 mole per cent nitrogen, 0.1 mole per cent ethane).	
		2. Phillips Petroleum Co. sample purity 99.8 mole per cent.	
		ESTIMATED ERROR:	
		$\delta T/K = \pm 0.3$ ; $\delta p/\text{MPa} = \pm 0.02$ ; $\delta x_{\text{CH}_4} = \pm 0.75\%$ .	
		REFERENCES:	

COMPONENTS:			ORIGINAL MEASUREMENTS:	
1. Methane; CH <sub>4</sub> ; [74-82-8]			Prodany, N. W.; Williams, B.	
2. 2-Methylbutane ( <i>isopentane</i> ); C <sub>5</sub> H <sub>12</sub> ; [78-78-4]			<i>J. Chem. Engng. Data</i>	
			1971, 16, 1-6.	
VARIABLES:			PREPARED BY:	
			C. L. Young	
EXPERIMENTAL VALUES:				
T/K (T/°F)	P/MPa	p/psi	Mole fraction of methane in liquid, $x_{\text{CH}_4}$	in vapor, $y_{\text{CH}_4}$
344.26 (160)	3.46	502	0.142	0.841
	5.21	755	0.218	0.872
	6.90	1001	0.283	0.885
	8.64	1253	0.351	0.879
	10.38	1505	0.418	0.869
	12.13	1759	0.489	0.853
	13.73	1992	0.545	0.821
	15.11	2191	0.633	0.741
377.59 (220)	3.44	499	0.118	0.710
	5.23	759	0.192	0.765
	6.90	1001	0.262	0.741
	8.66	1256	0.331	0.788
	10.37	1503	0.396	0.774
	11.87	1721	0.454	0.746
	13.09	1899	0.566	0.686
410.93 (280)	3.52	511	0.092	0.520
	5.23	759	0.161	0.603
	6.90	1001	0.231	0.636
	8.74	1267	0.315	0.651
	8.80	1277	0.330	0.643
	10.46	1517	0.488	0.581
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:			SOURCE AND PURITY OF MATERIALS:	
Stirred equilibrium cell fitted with vapor and liquid sampling valves. Temperature measured with mercury in glass thermometer. Pressure measured with Bourdon gauge. Cell charged with components and contents equilibrated. Vapor and liquid samples withdrawn through pressure lock systems. Analysed using gas chromatography. Details in source.			1. Phillips Petroleum Co. sample, 99.3 mole per cent (0.6 mole per cent nitrogen, 0.1 mole per cent ethane).	
			2. Phillips Petroleum Co. sample, purity 99.9 mole per cent.	
			ESTIMATED ERROR:	
			$\delta T/K = \pm 0.3$ ; $\delta P/\text{MPa} = \pm 0.02$ ;	
			$\delta x_{\text{CH}_4} = \pm 0.75\%$ .	
			REFERENCES:	

<b>COMPONENTS:</b> (1) Methane; CH <sub>4</sub> ; [74-82-8] (2) 2-methylbutane or isopentane; C <sub>5</sub> H <sub>12</sub> ; [78-78-4]				<b>ORIGINAL MEASUREMENTS:</b> Pomeroy, R. D.; Lacey, W. N.; Scudder, N. F.; Stapp, F. P. <i>Ind. Eng. Chem.</i> <u>1933</u> , <i>25</i> , 1014-1019.		
<b>VARIABLES:</b> $T/K = 303.15$ $p_1/\text{MPa} = 0.293 - 1.327$ (2.89 - 13.10 atm)				<b>PREPARED BY:</b> H. L. Clever		
<b>EXPERIMENTAL VALUES:</b>						
Temperature t/°C	T/K	Pressure p <sub>1</sub> /atm	Pressure p <sub>1</sub> /MPa	Methane Dissolved <sup>1,2</sup> V/cm <sup>3</sup>	Solvent Volume Increase ΔV/cm <sup>3</sup>	Solubility Gas in Sat. Solu. <sup>2</sup> C <sub>s</sub> /cm <sup>3</sup> cm <sup>-3</sup>
30	303.15	2.89	0.293	65.6	0.172	2.46
		6.29	0.637	142.8	0.392	5.30
		8.62	0.873	195.6	0.531	7.23
		10.06	1.019	228.0	0.614	8.40
		13.10	1.318	524.0	---	10.95
<sup>1</sup> Isopentane volume 26.53 cm <sup>3</sup> except the last value for which the volume is 47.87 cm <sup>3</sup> . <sup>2</sup> Gas volumes at 303.15 K (30°C) and 101.325 kPa (1 atm). The diffusion coefficient of methane in 2-methylbutane was measured to be 10 <sup>5</sup> D/cm <sup>2</sup> s <sup>-1</sup> = 14.00.						
<b>AUXILIARY INFORMATION</b>						
<b>METHOD/APPARATUS/PROCEDURE:</b> Measurements were carried out in a brass absorption cell designed for diffusion measurements.				<b>SOURCE AND PURITY OF MATERIALS:</b> (1) Methane. Gas obtained from a natural gas sample which was treated with activated charcoal at pressures up to 70 atm. The gas contained up to 2 per cent ethane and a small amount of nitrogen. (2) 2-methylbutane. Obtained by repeated fractionation of casinghead gasoline. B.p. (760 mmHg), t/°C = 27.3 - 28.2.		
				<b>ESTIMATED ERROR:</b> $\delta T/K = \pm 0.05$ $\delta C_s/C_s = \pm 0.05$ (compiler)		

EXPERIMENTAL VALUES:			Mole fraction of methane	
T/ <sup>o</sup> F	T/K	P/Mpa (P/psi)	in liquid	in vapor
160	344	2.76	0.089	0.811
190	361	(400)	0.072	0.726
220	378		0.057	0.618
250	394		0.043	0.494
280	405		0.030	0.354
310	428		0.017	0.017
340	444		0.004	0.034
160	344	3.45	0.141	0.832
190	361	(500)	0.115	0.766
220	378		0.093	0.677
250	394		0.072	0.563
280	405		0.054	0.440
310	428		0.037	0.296
340	444		0.021	0.130
350	450		0.015	0.083
160	344	4.14	0.210	0.842
190	361	(600)	0.180	0.792
220	378		0.155	0.718
250	394		0.134	0.622
280	405		0.117	0.507
310	428		0.102	0.372
340	444		0.088	0.222
350	450		0.084	0.160
160	344	6.89	0.300	0.870
190	361	(1000)	0.296	0.830
220	378		0.292	0.770
250	394		0.288	0.680
280	405		0.285	0.570
310	428		0.282	0.415

COMPONENTS:

1. Methane; CH<sub>4</sub>; [74-82-8]

2. 2-Methylbutane; C<sub>5</sub>H<sub>12</sub>;  
[78-78-4]

ORIGINAL MEASUREMENTS:

Amick, E. H.; Johnson, W. B.;  
Dodge, B. F.  
*Chem. Eng. Progr. Symp. Ser.*,  
1952, 48, 65-71.

VARIABLES:

Temperature, pressure

PREPARED BY:

C. L. Young

## AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Bubble-point dew-point apparatus. Sample confined over mercury, pressure measured with dead-weight piston gauge and temperature measured with mercury-in-glass thermometer.

SOURCE AND PURITY OF MATERIALS:

1. Sample subjected to fractional distillation.
2. Phillips Petroleum sample, stated purity 99.5 mole per cent dried and distilled.

ESTIMATED ERROR:

REFERENCES: