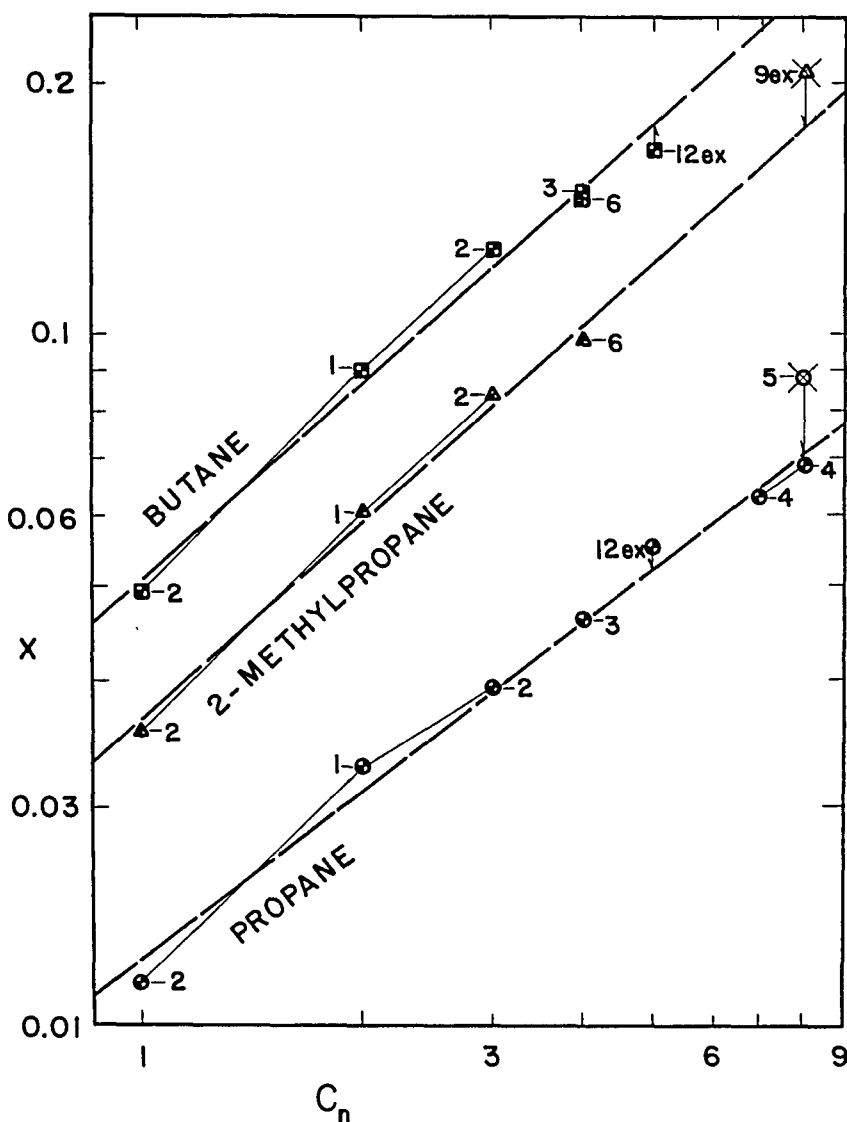| COMPONENTS:	EVALUATOR:

(1) Propane: C_3H_8;   [74-98-6]
 	
     Butane; C_4H_{10};   [106-97-8]
 	
     2-Methylpropane; C_4H_{10};[75-28-5]
 	
(2) Alcohols
	Walter Hayduk
	Department of Chemical Engineering
	University of Ottawa
	Ottawa, Canada K1N 9B4
	
	January, 1984

CRITICAL EVALUATION:

   Nine groups of workers have reported solubilities of *propane*,
butane and *2-methylpropane* in normal alcohols from methanol to octanol.
In spite of the scarcity, there is a relatively high consistency for
the data for all three gases. The sources of the data are listed
separately for each gas; for *propane*: methanol (2), ethanol (1,10),
butanol (3), heptanol (4) and octanol (4,5). The solubilities of
propane in 2-propanol (2) and in 3-methyl-1-butanol (12) are compared
with those in the normal alcohols. For *butane*: methanol (2,11),
ethanol (1,13), butanol (3,6), and octanol (5). The solubilities of
butane in 2-propanol (2) and 3-methyl-1-butanol (12) are also compared
with those in the normal alcohols. Finally, for *2-methylpropane*:
methanol (2,11), ethanol (1), butanol (6), and octanol (9). These
latter solubilities are compared with those in 2-propanol (2).

Solubilities in normal alcohols at 298.15 K

COMPONENTS:	EVALUATOR:

(1) Propane; C_3H_8; [74-98-6]
 	
    Butane; C_4H_{10}; [106-97-8]
 	
    2-Methylpropane; C_4H_{10} [75-28-5]
 	
(2) Alcohols
	Walter Hayduk
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	University of Ottawa
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	January, 1984

CRITICAL EVALUATION: continued

        Solubilities for the three gases are shown for a temperature of
298.15 K and a gas partial pressure of 101.325 kPa in the diagram above
in which the mole fraction solubility, x, and the number of carbon atoms
in the solvent, C_n, are shown on logarithmic scales. This method of
obtaining a linear relation for solubilities in alcohols was previously
used by Boyer and Bircher (14). It may be observed that the solubilities
of all three gases in the tertiary alcohol 2-propanol (2), are completely
consistent with the solubilities in the normal alcohols. Surprisingly,
the early data of Friedel and Gorgeu (12) for *propane* and *butane* solubi-
lities in 3-methyl-1-butanol correspond reasonably well to the expected
solubilities in an alcohol of C_n = 5, and are classified as tentative.
On the other hand, the early data of Frankland (13) and Lebeau (10,11),
although of historic interest, are all very much too low and are rejected.
The solubilities of Gerrard (5,9) for *propane* and *butane* in octanol are
both estimated to be at least 20% too high and are also rejected. The
remaining data are classified as tentative (1,2,3,4,6). These latter
data were used to determine regression lines (on logarithmic scales) for
the three gases. Included were the solubilities in 2-propanol of
Kretschmer and Wiebe (2).

For *propane*:

$$x_{C_3} = 0.01230 \; C_n^{0.7774} \qquad \text{Correlation coefficient} = 0.997$$

For *butane*:

$$x_{C_4} = 0.04131 \; C_n^{0.9053} \qquad \text{Correlation coefficient} = 0.996$$

For *2-methylpropane*:

$$x_{iC_4} = 0.02625 \; C_n^{0.9128} \qquad \text{Correlation coefficient} = 0.997$$

The above equations are represented as dashed lines in the diagram.

        Three groups of workers have reported solubilities of *propane,*
butane and *2-methylpropane* in other alcohol solvents. The sources are
listed separately for each gas; for *propane*: in 1,2-ethanediol (ethylene
glycol)(7), 2-ethoxyethanol (ethylcellosolve)(8), oxybispropanol
(dispropylene glycol)(7), phenol (7) and benzenemethanol (benzyl alcohol)
(5,7), for *butane*: in 1,2-ethanediol (5), oxybispropanol (7), phenol (7),
benzenemethanol (7) and 1,2,3-propanetriol (glycerol)(5), and for
2-methylpropane: in 1,2-ethanediol (7), 2-ethoxyethanol (8), phenol (7),
benzenemethanol (9) and oxybispropanol (7). Unfortunately none of the
above data is considered reliable enough to warrant classification as
tentative; instead, they are all classified as doubtful for reasons that
are discussed below. These data appear generally too high by an amount
ranging from 5% to several factors and are considered of qualitative
value only.

        An explanation for the above classification follows. In the
Critical Evaluation of the solubilities of *Ethane* in polar solvents (15)
it was possible to directly compare some of the Lenoir et al. data (7)
with those of four other workers. It was found that the Lenoir et al.
data were from 6% to 46% higher than those of the other workers. The
data in question here are from the same paper. In addition it was
possible to compare hydrogen-bonding factors in 1-2-ethanediol for all

COMPONENTS:	EVALUATOR:
(1) Propane; C_3H_8; [74-98-6] Butane; C_4H_{10}; [106-97-8] 2-methylpropane; C_4H_{10};[75-28-5] (2) Alcohols	Walter Hayduk Department of Chemical Engineering University of Ottawa Ottawa, Canada K1N 9B4 January, 1984

CRITICAL EVALUATION: continued

three gases (5,7) with those of several other gases which formed a
consistent relation on a hydrogen-bonding factor diagram (16). For
all three gases, the indicated solubilities yielded hydrogen-bonding
factors much higher (> 20%) than expected. Although by no means
conclusive by itself, this test is often effective in discerning
inaccurate data. Hence, although copious, the data of Lenoir et al.
(7) are classified as doubtful. In the first part of this Critical
Evaluation, the data of Gerrard for the solubility of *propane* and
butane in octanol (5) were considered to be too high by at least 20%.
It is expected that while this order of error may be present for the
solubility of *propane* in benzenemethanol, that it is probably much
higher in the reported solubility of *butane* in 1,2-ethanediol. Most
hydrocarbon gases have a very low solubility in the highly polar
1,2-ethanediol so that the relatively high solubility indicated by
Gerrard (5) appears several factors too high. Again sufficient doubt
is associated with these data to warrant classification as doubtful.
Finally, some doubt is also cast on the solubilities of Ezheleva and
Zorin (8,in Russian) on examination of an example given in their
paper explaining the method of data treatment. The example shows a
linear plot of mole fraction solubility versus different values of
gas partial pressure. When the resulting lines are extrapolated to
zero partial pressure, they do not pass through the origin even
approximately, but were nonetheless, apparently (incorrectly) used
to evaluate Henry's law constants. If a similar method was followed
in the calculation for other gas solubilities, large errors would
have resulted. Hence, there appears to be reason to doubt the accuracy
of the data for *propane* and *2-methylpropane* in 2-ethoxyethanol (8).

References

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9. Gerrard, W. *Solubility of Gases and Liquids, Plenum Press, New York*, 1976, Chapter 1.

10. Lebeau, P. *Comt. Rend.* 1905, *140*, 1454-1456 and 1572; *Bull. Soc. Chim.* [3] 1905, *33*, 1137-1139.

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COMPONENTS:	EVALUATOR:
(1) Propane; C_3H_8; [74-98-6] Butane; C_4H_{10}; [106-97-8] 2-methylpropane; C_4H_{10}; [75-28-5] (2) Alcohols	Walter Hayduk Department of Chemical Engineering University of Ottawa Ottawa, Canada K1N 9B4 January, 1984

CRITICAL EVALUATION: continued

12. Friedel, C.; Gorgeu, A. *Compt. rendu* 1908, *127*, 590-594.

13. Frankland, E. *J. Chem. Soc.* 1849, *2*, 263-296; *Leibig's Ann.* 1849, *71*, 171-213.

14. Boyer, F.L.; Bircher, L.J. *J. Phys. Chem.* 1960, *64*, 1330-1331.

15. Hayduk, W. Ed. *IUPAC Solubility Data Series, Ethane, Pergamon Press, Oxford, England* 1982, *9*, 195-199.

16. Short, I.; Sahgal, A.; Hayduk, W. *J. Chem. Eng. Data* 1983, *28*, 63-66.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) Methanol; CH_4O; [67-56-1]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* 1952, *74*, 1276-7.

VARIABLES:	PREPARED BY:
T/K = 273.15-323.15 P/kPa = 11.86-101.27	H.L. Clever W. Hayduk

EXPERIMENTAL VALUES:

T/K	Pressure p/mm Hg Total[1]	Partial[2]	Mole fraction[1,2] /x_1	Ostwald Coefficient[2] L/cm^{3}cm^{-3}	Bunsen Coefficient[2] α/cm^3(STP)cm^{-3}atm^{-1}
273.15	756.4	727.9	0.02039		
		760.0	0.0213	12.1	12.1
298.15	464.0	339.3	0.004988		
	598.1	473.6	0.007040		
	759.6	635.4	0.009569		
		760.0	0.0115	6.88	6.37
323.15	758.4	346.2	0.003232		
		760.0	0.00709	4.46	3.73

[1]Original data.

[2]Calculations for 101.325 kPa (760 mm) were by compilers assuming Henry's law, and Raoult's law for solvent partial pressure.

Mole fractions at 101.325 kPa were used to determine the following equation for ln x_1 and table of smoothed values:

$$\ln x_1 = 1942.9/T - 10.9689 \quad \text{Correlation coefficient} = 0.9998$$

T/K	x_1	T/K	x_1
273.15	0.0212	303.15	0.0105
283.15	0.0165	313.15	0.00853
293.15	0.0130	323.15	0.00704

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was an all glass system which consisted of a monometer, a gas handling system, gas buret and solubility bulb equipped with a magnetic stirrer. The solubility bulb was evacuated and weighed. About 15 cm^3 of solvent was distilled into the bulb, the solvent degassed and the bulb reweighed. A sample of hydrocarbon was condensed into a calibrated tube; it was vaporized into a known volume and the pressure measured. Equilibrium was established between' the gas and the solvent. Pressure was again measured. A detailed description of the apparatus and values of the gas molal volume and 2nd virial coefficient are in (1).	(1) Phillips Petroleum Co., Research Grade. Specified 99.9 mole percent pure. Treated to remove dissolved gases and moisture. (2) Source not given. Treated to remove acetone and aldehydes. Fractionated through a 50-plate column, dried with Mg, stored in a sealed container. Density at 25°C 0.78653 g cm^{-3}.
	ESTIMATED ERROR: δT/K $\quad$ = 0.005 δp/mm Hg = 0.05 $\delta x_1/x_1$ $\quad$ = 0.005 $\quad$ (compilers)
	REFERENCES: 1. Kretschmer, C.B.; Wiebe, R. $\quad$ *J. Am. Chem. Soc.* 1951, *73*, 3778.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) Ethanol; C_2H_6O; [64-17-5]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* <u>1951</u>, *73*, 3778-81.
VARIABLES: T/K = 273.15-323.15 P/kPa = 33.10-101.91	PREPARED BY: H.L. Clever W. Hayduk

EXPERIMENTAL VALUES:

T/K	Pressure P/mm Hg Total[1]	Partial[2]	Mole fraction[1,2] /x_1	Ostwald Coefficient[2] L/cm³cm⁻³	Bunsen Coefficient[2] α/cm³(STP)cm⁻³atm⁻¹
273.15	309.8	297.8	0.01497		
	532.0	520.1	0.02706		
	762.2	750.5	0.04054		
		760.0	0.0411	16.5	16.5
298.15	248.3	188.8	0.005089		
	427.5	368.3	0.01003		
	579.8	520.9	0.01434		
	755.3	696.7	0.01941		
		760.0	0.0228	9.55	8.71
323.15	412.0	191.1	0.003201		
	596.4	376.2	0.006349		
	764.4	544.9	0.009245		
		760.0	0.0129	5.67	4.75

continued

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was an all-glass system which consisted of a manometer, gas handling system, gas buret and solubility bulb equipped with a magnetic stirrer. The solubility bulb was evacuated and weighed. About 15 cm³ of solvent was distilled into the bulb, the solvent degassed and the bulb reweighed. A sample of hydrocarbon was condensed into a calibrated tube; it was vaporized into a known volume and the pressure measured. Equilibrium was established between the gas and the solvent. Pressure was again measured.	(1) Phillips Petroleum Co. Research grade, 99.99 mole per cent. Removed dissolved air and moisture. (2) Commercial absolute alcohol sample fractionated, treated with Mg ethylate, stored in sealed container until used. Density, at 25°C 0.78505 g cm⁻³.
	ESTIMATED ERROR: δT/K = ± 0.005 δp/mmHg = ± 0.05 $\delta x_1/x_1$ = ± 0.005 (compilers)
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) Ethanol; C_2H_6O; [64-17-5]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* 1951, *73*, 3778-81.

VARIABLES: $T/K = 273.15-323.15$ $P/kPa = 33.10-101.91$	PREPARED BY: H.L. Clever W. Hayduk

EXPERIMENTAL VALUES: - concluded

[1]Original data

[2]Calculations for 101.325 kPa (760 mm) were by compilers by extrapolation of data from lower pressures, and by assuming Raoult's law for solvent partial pressure.

Mole fractions at 101.325 kPa were used to determine the following equation for ln x_1 and table of smoothed values:

  $\ln x_1 = 35.471 - 6.891 \ln T_1$ Correlation coefficient = 0.9998

T/K	x_1	T/K	x_1
273.15	0.0413	303.15	0.0201
283.15	0.0322	313.15	0.0161
293.15	0.0254	323.15	0.0130
298.15	0.0226		

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) Water, Benzene, Ethanol, Diethylether, Chloroform, Turpentine	Lebeau, P. *Compt. Rend.* <u>1905</u>, *140*, 1454-6 and 1572. *Bull. Soc. Chim.* [3] <u>1905</u>, *33*, 1137-9.

VARIABLES:	PREPARED BY:
T/K = 290.8 - 294.8 p/kPa = 100.4 - 100.9	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Pressure[a]	Solubility Volume propane/100 Volumes Solvent
t/°C	T/K	p/mmHg	
Water; H_2O; [7732-18-5]			
17.8	291.0	753	6.5
Benzene; C_6H_6O; [71-43-2]			
21.5	294.7	757	1452
Ethanol; C_2H_6O; [64-17-5]			
16.6	290.8	754	790
1,1'-Oxybisethane or diethylether; $C_4H_{10}O$; [60-29-7]			
16.6	290.8	757	926
Chloroform or trichloromethane; $CHCl_3$; [67-66-3]			
21.6	294.8	757	1299
Oil of turpentine			
17.7	290.9	757	1587

[a]   Not clear whether this is total pressure or propane partial pressure. It is probably total pressure.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Details not given. The data are reported in both papers.	(1) Propane. Prepared by author from carefully purified propyl iodide by reaction with sodium in liquid ammonia. Melting point/°C = -195 Boiling point/°C = -44.5 Critical temperature/°C = 102. (2) Solvents. No information.
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) 1,2-Ethanediol (Ethylene glycol); [107-21-1]	Lenoir, J-Y.; Renault, P.; Renon, H. *J. Chem. Eng. Data*, <u>1971</u>, *16*, 340-2.

| VARIABLES:
　　　T/K:　298
　　　P/kPa:　101.3 | PREPARED BY:

　　　C. L. Young |

EXPERIMENTAL VALUES:

T/K	Henry's constant $H_{C_3H_8}$/atm	Mole fraction at 1 atm* $x_{C_3H_8}$
298	409	0.00244

* Calculated by compiler assuming a linear function of $p_{C_3H_8}$ vs $x_{C_3H_8}$,
  i.e., $x_{C_3H_8}$ (1 atm) = $1/H_{C_3H_8}$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: A conventional gas-liquid chromatographic unit fitted with a thermal conductivity detector was used. The carrier gas was helium. The value of Henry's law constant was calculated from the retention time. The value applies to very low partial pressures of gas and there may be a substantial difference from that measured at 1 atm. pressure. There is also considerable uncertainty in the value of Henry's constant since surface adsorption was not allowed for although its possible existence was noted.	SOURCE AND PURITY OF MATERIALS: (1) L'Air Liquide sample; minimum purity 99.9 mole per cent. (2) Touzart and Matignon or Serlabo sample; purity 99 mole per cent.
	ESTIMATED ERROR: δT/K = $\pm$0.1;　δH/atm = $\pm$6% 　(estimated by compiler).
	REFERENCES:

PB-L*

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) 2-Propanol; C_3H_8O; [67-63-0]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* <u>1952</u>, *74*, 1276-7.

VARIABLES:	PREPARED BY:
T/K = 273.15-323.15 P/kPa = 67.71-101.39	H.L. Clever W. Hayduk

EXPERIMENTAL VALUES:

T/K	Pressure p/mm Hg Total[1]	Partial[2]	Mole Fraction[1,2] /x_1	Ostwald Coefficient[2] L/cm^{3}cm^{-3}	Bunsen Coefficient[2] α/cm^3(STP)cm^{-3}atm^{-1}
273.15	754.9	747.1	0.05804		
		760.0	0.0590	18.4	18.4
298.15	507.9	463.5	0.01830		
	626.7	582.6	0.02317		
	760.5	716.6	0.02783		
		760.0	0.0295	9.52	8.68
323.15	754.7	577.8	0.01423		
		760.0	0.0187	6.31	5.29

[1]Original data.

[2]Calculations for 101.325 kPa (760 mm) were by compilers assuming Henry's law, and Raoult's law for solvent partial pressure.

Mole fractions at 101.325 kPa were used to determine the following equation for ln x_1 and table of smoothed values:

$$\ln x_1 = 20.274 \ln T + 8044.04/T - 146.016 \quad \text{Correlation coeff.} = 0.9999.$$

T/K	x_1	T/K	x_1
273.15	0.0591	303.15	0.0265
283.15	0.0433	313.15	0.0219
193.15	0.0332	323.15	0.0187

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was an all glass system which consisted of a monometer, gas handling system, gas buret and solubility bulb equipped with a magnetic stirrer. The solubility bulb was evacuated and weighed. About 15 cm^3 of solvent was distilled into the bulb, the solvent degassed and the bulb reweighed. A sample of hydrocarbon was condensed into a calibrated tube; it was vaporized into a known volume and the pressure measured. Equilibrium was established between the gas and the solvent. Pressure was again measured. A detailed description of the apparatus and values of the gas molal volume and 2nd virial coefficient are in (1).	(1) Philipps Petroleum Co., Research Grade. Specified 99.99 mole percent pure. Treated to remove dissolved gases and moisture (2) Source not given. Fractionated through a 50-plate column, dried with Mg, stored in a sealed container. Density at 25°C 0.78081 g cm^{-3}.

ESTIMATED ERROR:
$\delta T/K$ = 0.005 δp/mm Hg = 0.05 $\delta x_1/x_1$ = 0.005 (compilers)

REFERENCES:
1. Kretschmer, C.B.; Wiebe, R.   *J. Am. Chem. Soc.* <u>1951</u>, *73*, 3778.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) 2-Ethoxyethanol (Ethylcellosolve); $C_4H_{10}O_2$; [110-80-5]	Ezheleva, A.E.; Zorin, A.D. *Tr. Khim. Khim. Tech. (Gorkii)* <u>1961</u>, *1*, 37-40.

VARIABLES:	PREPARED BY:
T/K: 303.15-343.15 P/kPa: 101.325 and above	W. Hayduk

EXPERIMENTAL VALUES:

T/K	Ostwald Coefficient[2] $L/cm^3 cm^{-3}$	Bunsen Coefficient[2] $\alpha/cm^3(STP)cm^{-3}atm^{-1}$	Mole Fraction[1] x_1
303.15	10.80	9.67	0.042 (0.0419)[3]
313.15	8.98	7.78	0.035 (0.0342)
323.15	6.98	5.85	0.0274(0.0267)
333.15	4.94	4.01	0.0196(0.0200)
343.15	3.60	2.83	0.0145(0.0145)

[1]Original data given as the inverse of Henry's constant which is equivalent to mole fraction at a gas partial pressure of 101.325 kPa.

[2]Ostwald and Bunsen coefficients calculated by compiler using authors' assumption that solvent is non-volatile.

[3]From equation of smoothed data:

$$\ln x_1 = 391.17 - 59.530 \ln T - 16423/T$$

Correlation coefficient = 0.9988

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus consisted of a two-chamber, rocking device with separate gas and liquid chambers joined by two tubes and microvalves. The gas chamber was equipped with a pressure gauge. After evacuation, gas and deaerated solvent were separately charged, and then contacted by opening the microvalves and by rocking. The solubility was calculated from a knowledge of the volume of the solvent charged, and the initial and final gas pressures. The solvent was considered non-volatile and the gas pressure was considered to be the total pressure.	1. Source and purity not given. Gas purified by low temperature fractionation and analyzed by gas chromatography. 2. Source and purity not given. Refractive index measured: n_D^{20} = 1.4078
	ESTIMATED ERROR: $\delta T/K$ = 0.05 $\delta x_1/x_1$ = 0.05 (estimated by compiler)
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) 1-Butanol; $C_4H_{10}O$; [71-36-3]	Hayduk, W.; Castañeda, R. *Can. J. Chem. Eng.* <u>1973</u>, *51*, 353-358.

VARIABLES:	PREPARED BY:
T/K: 273.15-323.15 P/kPa: 101.325	W. Hayduk

EXPERIMENTAL VALUES:

T/K	Ostwald Coefficient[1] L/cm³ cm⁻³	Bunsen Coefficient[2] α/cm (STP)cm⁻³atm⁻¹	Mole Fraction[1] x_1
273.15	18.60	18.60	0.0706 (0.0706)[3]
298.15	10.07	9.23	0.0367 (0.0367)
323.15	6.43	5.44	0.0226 (0.0226)

[1] Original data.

[2] Calculated by compiler.

[3] The mole fraction solubility of the original data was used to determine the following equations for $\Delta G°$ and $\ln x_1$ and table of smoothed values:

$$\Delta G°/\text{J mol}^{-1} = -RT \ln x_1 = 669.59\ T - 87.560\ T \ln T - 42705$$

$$\ln x_1 = 5136.5/T + 10.5316 \ln T - 80.538$$

Std. deviation for $\Delta G° = 0.6$ J mol⁻¹

T/K	$\Delta G°$/J mol⁻¹	x_1	T/K	$\Delta G°$/J mol⁻¹	x_1
273.15	6019	0.0706	303.15	8604	0.0329
283.15	6911	0.0531	313.15	9406	0.0270
293.15	7772	0.0412	323.15	10181	0.0226
298.15	8192	0.0367			

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A volumetric method using a glass apparatus was employed. Degassed solvent contacted the gas while flowing as a thin film, at a constant rate, through an absorption spiral into a solution buret. A constant solvent flow was obtained by means of a calibrated syringe pump. The solution at the end of the spiral was considered saturated. Dry gas was maintained at atmospheric pressure in a gas buret by mechanically raising the mercury level in the buret at an adjustable rate. The solubility was calculated from the constant slope of volume of gas dissolved and volume of solvent injected. Degassing was accomplished using a two stage vacuum process described by Clever et al. (1).	1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent. 2. Fisher Scientific. Specified minimum purity 99.0 per cent.

ESTIMATED ERROR:

δT/K = 0.1

$\delta x_1/x_1$ = 0.01

REFERENCES:

1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M.
    J. Phys. Chem. <u>1971</u>, *61*, 1078.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) 3-Methyl-1-butanol; $C_5H_{12}O$; [123-51-3]	Friedel, C.; Gorgeu, A. *Compt. rendu* 1908, *127*, 590-4.
VARIABLES: T/K = 289, 296 p/kPa = 100.0, 101.3	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Pressure	Solubility Volume Propane/
$t/^0C$	T/K	p/m Hg	Volume Alcohol
16	289	0.750	12
23	296	0.760	11

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
In the original paper the alcohol was named simply amyl alcohol. However, the boiling point corresponds to the alcohol later named primary isoamyl alcohol or 3-methyl-1-butanol.	(1) Propane. Prepared by authors from isopropyl iodide and zinc plus a small amount of hydrochloric acid. (2) 3-Methyl-1-butanol. Prepared by the authors. Boiling point 130-132 ^0C.
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) 1-Heptanol; $C_7H_{16}O$; [111-70-6]	Dim, A.; Gardner, G.R.; Ponter, A.B.; Wood, T. *J. Chem. Eng. Japan* <u>1971</u>, *4*, 92-95

| VARIABLES:
 T/K: 298.15
 P/kPa: 101.325 | PREPARED BY:

 W. Hayduk |

EXPERIMENTAL VALUES:

T/K	Solubility[1] $c_1/10^5 (mol\ cm^{-3})$	Ostwald Coefficient[2] $L/cm^3 cm^{-3}$	Bunsen Coefficient[2] $\alpha/cm^3 (STP)$ $cm^{-3} atm^{-1}$	Mole Fraction[2] x_1
298.15	40.8	9.82	8.95	0.0546

[1]Original data.

[2]Calculated by compiler using the real gas molar volume.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Not available.	Not available.
	ESTIMATED ERROR: $\delta c_1/c_1 = 0.03$ (compiler)
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) Benzenemethanol, (Benzyl alcohol); C_7H_8O; [100-51-6]	Lenoir, J-Y.; Renault, P.; Renon, H. *J. Chem. Eng. Data*, <u>1971</u>, *16*, 340-2

VARIABLES:	PREPARED BY:
T/K: 298 P/kPa: 101.3	C. L. Young

EXPERIMENTAL VALUES:

T/K	Henry's constant $H_{C_3H_8}$/atm	Mole fraction at 1 atm* $x_{C_3H_8}$
298	50.8	0.0197

* Calculated by compiler assuming a linear function of $p_{C_3H_8}$ vs $x_{C_3H_8}$,
   i.e., $x_{C_3H_8}$ (1 atm) $= 1/H_{C_3H_8}$

<div align="center">AUXILIARY INFORMATION</div>

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A conventional gas-liquid chromato-graphic unit fitted with a thermal conductivity detector was used. The carrier gas was helium. The value of Henry's law constant was calculated from the retention time. The value applies to very low partial pressures of gas and there may be a substantial difference from that measured at 1 atm. pressure. There is also considerable uncertainty in the value of Henry's constant since surface adsorption was not allowed for although its possible existence was noted.	(1) L'Air Liquide sample; minimum purity 99.9 mole per cent. (2) Touzart and Matignon or Serlabo sample; purity 99 mole per cent.
	ESTIMATED ERROR: δT/K = $\pm$0.1; δH/atm = $\pm$6% (estimated by compiler).
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) Phenol; C_6H_6O; [108-95-2]	Lenoir, J-Y.; Renault, P.; Renon, H. *J. Chem. Eng. Data*, 1971, *16*, 340-3

VARIABLES:
  T/K: 323.2
  P/kPa: 101.3
	PREPARED BY:
	
	C. L. Young

EXPERIMENTAL VALUES:

T/K	Henry's constant $H_{C_3H_8}$/atm	Mole fraction at 1 atm* $x_{C_3H_8}$
323.2	101	0.00990

* Calculated by compiler assuming a linear function of $p_{C_3H_8}$ vs $x_{C_3H_8}$, i.e., $x_{C_3H_8}$ (1 atm) = $1/H_{C_3H_8}$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A conventional gas-liquid chromatographic unit fitted with a thermal conductivity detector was used. The carrier gas was helium. The value of Henry's law constant was calculated from the retention time. The value applies to very low partial pressures of gas and there may be a substantial difference from that measured at 1 atm. pressure. There is also considerable uncertainty in the value of Henry's constant since surface adsorption was not allowed for although its possible existence was noted.	(1) L'Air Liquide sample; minimum purity 99.9 mole per cent. (2) Touzart and Matignon or Serlabo sample; purity 99 mole per cent.

	ESTIMATED ERROR:
	  δT/K = $\pm$0.1; δH/atm = $\pm$6%
	  (estimated by compiler).

	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) Benzenemethanol (Benzyl alcohol); C_7H_8O; [100-51-6]	Gerrard, W. *J. Appl. Chem. Biotechnol.* 1973, *23*, 1-17.

VARIABLES:	PREPARED BY:
T/K: 273.2-298.2 P/kPa: 101.3	C. L. Young

EXPERIMENTAL VALUES:

Total pressure = 101.3 kPa

T/K	Mole ratio	Mole fraction of propane[#]
273.2	0.039	0.038
278.2	0.0339	0.0328
283.2	0.0296	0.0287
293.2	0.0243	0.0237
298.2	0.0224	0.0219

[#] Calculated by compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Gas was passed into a known weight of pure liquid in a bubbler tube at a total pressure measured using a manometer assembly. The amount of absorbed gas was estimated by weighing. The temperature was controlled to within 0.2 K. The apparatus and procedure are described by Gerrard, ref. (1).	No details given except that "all compounds were purified by conventional procedures".

ESTIMATED ERROR:
  $\delta T/K = \pm 0.1$; $\delta x/x = \pm 3\%$
  (estimated by compiler).

REFERENCES:
  1. Gerrard, W.
     J. Appl. Chem. Biotechnol.
     1972, *22*, 623.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) 1-Octanol; $C_8H_{18}O$; [111-87-5]	Dim, A.; Gardner, G.R.; Ponter, A.B.; Wood, T. *J. Chem. Eng. Japan* <u>1971</u>, *4*, 92-95.

VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.325	W. Hayduk

EXPERIMENTAL VALUES:

T/K	Solubility[1] $c_1/10^5$ (mol cm^{-3})	Ostwald Coefficient[2] $L/cm^3 cm^{-3}$	Bunsen Coefficient[2] α/cm^3 (STP) cm^{-3}atm^{-1}	Mole Fraction[2] x_1
298.15	40.3	9.70	8.85	0.0602

[1]Original data.

[2]Calculated by compiler using the real gas molar volume.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Not available.	Not available.
	ESTIMATED ERROR: $\delta c_1/c_1$ = 0.03 (compiler)
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Propane; C_3H_8; [74-98-6] (2) 1-Octanol; $C_8H_{18}O$; [111-87-5]	Gerrard, W. *J. Appl. Chem. Biotechnol.* <u>1973</u>, *23*, 1-17.
VARIABLES: T/K: 268.2-298.2 P/kPa: 101.3	PREPARED BY: C. L. Young

EXPERIMENTAL VALUES:

Total pressure = 101.3 kPa

T/K	Mole ratio	Mole fraction of propane[#]
268.2	0.190	0.160
273.2	0.162	0.139
278.2	0.137	0.120
283.2	0.120	0.107
293.2	0.093	0.0851
298.2	0.086	0.0792

[#] Calculated by compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Gas was passed into a known weight of pure liquid in a bubbler tube at a total pressure measured using a manometer assembly. The amount of absorbed gas was estimated by weighing. The temperature was controlled to within 0.2 K. The apparatus and procedure are described by Gerrard, ref. (1).	No details given except that "all compounds were purified by conventional procedures".
	ESTIMATED ERROR: δT/K = ±0.1; $\delta x/x$ = ±3% (estimated by compiler).
	REFERENCES: 1. Gerrard, W. *J. Appl. Chem. Biotechnol.* <u>1972</u>, *22*, 623.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) Methanol; CH_4O; [67-56-1]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* <u>1952</u>, *74*, 1276-7.
VARIABLES: T/K = 298.15-323.15 P/kPa = 65.94-101.59	PREPARED BY: H.L. Clever W. Hayduk

EXPERIMENTAL VALUES:

T/K	Pressure p/mm Hg Total[1]	Pressure p/mm Hg Partial[2]	Mole Fraction[1,2] $/x_1$	Ostwald Coefficient[2] L/cm^{3}cm^{-3}	Bunsen Coefficient[2] α/cm^3(STP)cm^{-3}atm^{-1}
298.15	494.6	371.3	0.01651		
	635.6	513.2	0.02410		
	762.0	640.6	0.03171		
		760.0	0.0398	24.1	21.8
308.15	750.6	547.3	0.01920		
		760.0	0.0267	16.4	14.3
323.15	756.8	346.6	0.008075		
		760.0	0.0177	11.1	9.23

[1]Original data.

[2]Calculations for 101.325 kPa (760 mm) were by compilers assuming Henry's law, and Raoult's law for solvent partial pressure.

Mole fractions at 101.325 kPa were used to determine the following equation for $\ln x_1$ and table of smoothed values:

$$\ln x_1 = 75.474 \ln T + 26544/T - 522.274 \quad \text{Correlation coeff.} = 0.9999$$

T/K	x_1	T/K	x_1
298.15	0.0398	313.15	0.0227
303.15	0.0321	323.15	0.0177

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was an all glass system which consisted of a monometer, gas handling system, gas buret and solubility bulb equipped with a magnetic stirrer. The solubility bulb was evacuated and weighed. About 15 cm^3 of solvent was distilled into the bulb, the solvent degassed and the bulb reweighed. A sample of hydrocarbon was condensed into a calibrated tube; it was vaporized into a known volume and the pressure measured. Equilibrium was established between the gas and the solvent. Pressure was again measured. A detailed description of the apparatus and values of the gas molal volume and 2nd virial coefficient are in (1).	(1) Phillips Petroleum Co., Research Grade. Specified 99.78 mole percent pure. Treated to remove dissolved gases and moisture. (2) Source not given. Treated to remove acetone and aldehydes. Fractionated through a 50-plate column, dried with Mg, stored in a sealed container. Density at 25°C 0.78653 g cm^{-3}.
	ESTIMATED ERROR: $\delta T/K$ = 0.005 δp/mm Hg = 0.05 $\delta x_1/x_1$ = 0.005
	REFERENCES: 1. Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* <u>1951</u>, *73*, 3778.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) Ethanol; C_2H_6O; [64-17-5]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* <u>1951</u>, *73*, 3778-81.

VARIABLES: T/K = 298.15-323.15 P/kPa = 23.88-98.59	PREPARED BY: H.L. Clever W. Hayduk

EXPERIMENTAL VALUES:

T/K	Pressure p/mm Hg Total[1]	Partial[2]	Mole fraction[1,2] $/x_1$	Ostwald Coefficient[2] L/cm^{3}cm^{-3}	Bunsen Coefficient[2] α/cm^3(STP)cm^{-3}atm^{-1}
298.15	238.0	179.1	0.01517		
	325.8	267.4	0.02334		
	393.3	335.3	0.02999		
	436.8	379.1	0.03440		
	589.9	533.2	0.05144		
	739.5	683.9	0.07092		
	760.0		0.0815	35.9	32.5
308.15	233.0	130.0	0.008298		
	330.1	227.7	0.01484		
	430.5	328.9	0.02198		
	713.3	620.0	0.04476		
	760.0		0.0560	24.6	21.5
323.15	337.8	117.4	0.005210		
	487.5	268.6	0.01218		
	590.6	372.8	0.01716		
	733.5	517.3	0.02442		
	760.0		0.0368	16.4	13.6

[1]Original data.

[2]Calculations for 101.325 kPa (760 mm) were by compilers by extrapolation of data for lower pressures, and by assuming Raoult's law for solvent partial pressure.

<div align="center">continued..</div>

<div align="center">AUXILIARY INFORMATION</div>

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was an all-glass system which consisted of a manometer, gas handling system, gas buret and solubility bulb equipped with a magnetic stirrer. The solubility bulb was evacuated and weighed. About 15 cm^3 of solvent was distilled into the bulb, the solvent degassed and the bulb reweighed. A sample of hydrocarbon was condensed into a calibrated tube; it was vaporized into a known volume and the pressure measured. Equilibrium was established between the gas and the solvent. Pressure was again measured.	(1) Phillips Petroleum Co. Research grade, 99.78 mole per cent. Removed dissolved air and moisture. (2) Commercial absolute alcohol sample fractionated, treated with Mg ethylate, stored in sealed container until used. Density, at 25°C 0.78505 g cm^{-3}

ESTIMATED ERROR: $\delta T/K$ = 0.005 δp/mm Hg = 0.05 $\delta x_1/x_1$ = 0.005 (compilers)
REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) Ethanol; C_2H_6O; [64-17-5]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* <u>1951</u>, *73*, 3778-81.

VARIABLES: $T/K = 298.15-323.15$ $P/kPa = 23.88-98.59$	PREPARED BY: H.L. Clever W. Hayduk

EXPERIMENTAL VALUES: concluded

Mole fraction solubilities at 101.325 kPa were used to determine the following equation for ln x_1 and table of smoothed values:

$$\ln x_1 = 53.1055 \ln T + 19544.3/T - 370.633$$

Correlation coefficient = 0.9999

T/K	x_1	T/K	x_1
298.15	0.0815	313.15	0.0478
303.15	0.0668	323.15	0.0368
308.15	0.0560		

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:

(1) Butane; C_4H_{10}; [106-97-8]
 	
(2) Water; H_2O; [7732-18-5]
    Ethanol; C_2H_6O; [64-17-5]
    Diethylether; $C_4H_{10}O$; [60-29-7]
    Chloroform; $CHCl_3$; [67-66-3]
	Lebeau, P.
	
	Bull. Acad. Roy. Belg. <u>1908</u>, 300-4.

VARIABLES: T/K = 290, 291 p/kPa = 102.9 - 104.8	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Pressure[a]	Solubility Volume Butane/Volume Solvent
$t/°C$	T/K	$p/mmHg$	
Water			
17	290	772	0.15
Ethanol			
17	290	775	18.83
Diethylether or 1'1'-oxybisethane			
18	291	773	29.8
Chloroform or trichloromethane			
17	290	786	32.5

[a] Not clear whether this is total pressure or butane partial pressure. It is probably the total pressure.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE: Details not given.	SOURCE AND PURITY OF MATERIALS: (1) Butane. Prepared by author by the reaction of sodium in liquid ammonia on butyl iodide. The normal boiling point is 0.5 °C, and the critical temperature is 151-2 °C. (2) Solvents. No information.
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) 1,2-Ethanediol (*ethylene glycol*); $C_2H_6O_2$; [107-21-1] or 1,2,3-Propanetriol (*glycerol*); $C_3H_8O_3$; [56-81-5]	Gerrard, W. *J. Appl. Chem. Biotechnol.* <u>1973</u>, *23*, 1-17.

VARIABLES:	PREPARED BY:
T/K: 275.2 P/kPa: 101.3	C. L. Young

EXPERIMENTAL VALUES:

Total pressure = 101.3 kPa

T/K	p/mmHg	Mole ratio	Mole fraction of butane[#]
		1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]	
275.2	742	0.0598	0.0564
		1,2,3-Propanetriol; $C_3H_8O_3$; [56-81-5]	
275.2	742	0.010	0.0099

[#] Calculated by compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Gas was passed into a known weight of pure liquid in a bubbler tube at a total pressure measured using a manometer assembly. The amount of absorbed gas was estimated by weighing. The temperature was controlled to within 0.2 K. The apparatus and procedure are described by Gerrard, ref. (1).	No details given except that "all compounds were purified by conventional procedures".
	ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta x/x = \pm 3\%$ (estimated by compiler).
	REFERENCES: 1. Gerrard, W. *J. Appl. Chem. Biotechnol.* <u>1972</u>, *22*, 623.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) Ethanol; C_2H_6O; [64-17-5]	Frankland, E. *J. Chem. Soc.* <u>1849</u>, *2*, 263-96. *Liebig's Ann.* <u>1849</u>, *71*, 171-213.
VARIABLES: $T/K = 287.4$ $p_1/kPa = 99.3$	PREPARED BY: H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Pressure	Solubility, Volume gas/
$t/^0C$	T/K	$p_1/mmHg$	volume alcohol
14.2	287.4	744.8	18.13

The author states that most of the gas is
evolved from the alcohol on the addition
of a small amount of water.

The author also describes an experiment in
which 1 volume of ethanol takes up 1.22
volumes of ethane at 8.8 ^{0}C (282.0 K) at a
pressure of 665.5 mmHg (88.7 kPa).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Eudiometer. The dry gas was treated with sulfuric acid before the solubility experiment.	(1) Butane. Prepared by the reaction of ethyl iodide with zinc at 150 ^{0}C. (2) Ethanol. Described as freshly boiled absolute ethanol.
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8]	Kretschmer, C.B.; Wiebe, R.
(2) 2-Propanol; C_3H_8O; [67-63-0]	*J. Am. Chem. Soc.* 1952, *74*, 1276-7.

VARIABLES:	PREPARED BY:
T/K = 298.15-323.15 P/kPa = 57.36-101.36	H.L. Clever W. Hayduk

EXPERIMENTAL VALUES:

T/K	Pressure p/mm Hg		Mole Fraction[1,2] $/x_1$	Ostwald Coefficient[2] $L/cm^3 cm^{-3}$	Bunsen Coefficient[2] $\alpha/cm^3(STP)cm^{-3}atm^{-1}$
	Total[1]	Partial[2]			
298.15	430.2	387.4	0.05285		
	479.5	537.8	0.07755		
	752.7	712.5	0.11056		
		760.0	0.1179	41.2	38.2
308.15	760.3	685.4	0.07531		
		760.0	0.0835	28.8	25.2
323.15	752.1	580.1	0.04149		
		760.0	0.0544	18.8	15.6

[1]Original data.

[2]Calculations for 101.325 kPa (760 mm) were by compilers assuming Henry's law, and Raoult's law for solvent partial pressure.

Mole fractions at 101.325 kPa were used to determine the following equation for ln x_1 and table of smoothed values:

$$\ln x_1 = 26.142 \ln T + 11093.4/T - 188.292 \quad \text{Correlation coeff.} = 0.9999.$$

T/K	x_1	T/K	x_1
298.15	0.1179	313.15	0.0716
303.15	0.0986	323.15	0.0544

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The apparatus was an all glass system which consisted of a monometer, gas handling system, gas buret and solubility bulb equipped with a magnetic stirrer.

The solubility bulb was evacuated and weighed. About 15 cm³ of solvent was distilled into the bulb, the solvent degassed and the bulb reweighed.

A sample of hydrocarbon was condensed into a calibrated tube; it was vaporized into a known volume and the pressure measured. Equilibrium was established between the gas and the solvent. Pressure was again measured.

A detailed description of the apparatus and values of the gas molal volume and 2nd virial coefficient are in (1).

SOURCE AND PURITY OF MATERIALS:

(1) Phillips Petroleum Co., Research Grade. Specified 99.78 mole percent pure. Treated to remove dissolved gases and moisture.

(2) Source not given. Fractionated through a 50-plate column, dried with Mg, stored in a sealed container. Density at 25°C 0.78081 g cm⁻³.

ESTIMATED ERROR:
$\delta T/K$ = 0.005
δp/mm Hg = 0.05
$\delta x_1/x_1$ = 0.005 (compilers)

REFERENCES:

1. Kretschmer, C.B.; Wiebe, R.
   J. Am. Chem. Soc. 1951, *73*, 3778.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) 1-Butanol; $C_4H_{10}O$; [71-36-3]	Hayduk, W.; Castañeda, R. *Can. J. Chem. Eng.* 1973, *51*, 353-358.
VARIABLES: T/K: 278.15-323.15 P/kPa: 101.325	PREPARED BY: W. Hayduk

EXPERIMENTAL VALUES:

T/K	Ostwald Coefficient[1] $L/cm^3\ cm^{-3}$	Bunsen Coefficient[2] $\alpha/cm^3\ (STP)cm^{-3}atm^{-1}$	Mole Fraction[1] x_1	
278.15	157.4	154.6	0.393	(0.393)[3]
298.15	42.4	38.8	0.141	(0.141)
323.15	20.3	17.2	0.0686	(0.0687)

[1] Original data.

[2] Calculated by compiler.

[3] The mole fraction solubility of the original data was used to determine the following equations for $\Delta G°$ and $\ln x_1$ and table of smoothed values:

$$\Delta G°/J\ mol^{-1} = -RT\ \ln x_1 = 3788.47\ T - 548.330\ T\ \ln T - 193210$$

$$\ln x_1 = 23238.9/T + 65.9526\ \ln T - 455.674$$

Std. deviation for $\Delta G° = 2.4\ J\ mol^{-1}$

T/K	$\Delta G°/J\ mol^{-1}$	x_1	T/K	$\Delta G°/J\ mol^{-1}$	x_1
278.15	2159.5	0.3929	303.15	5412.4	0.1167
283.15	2905.3	0.2910	313.15	6391.2	0.0858
293.15	4252.1	0.1746	323.15	7195.5	0.0687
298.15	4855.3	0.1410			

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A volumetric method using a glass apparatus was employed. Degassed solvent contacted the gas while flowing as a thin film, at a constant rate, through an absorption spiral into a solution buret. A constant solvent flow was obtained by means of a calibrated syringe pump. The solution at the end of the spiral was considered saturated. Dry gas was maintained at atmospheric pressure in a gas buret by mechanically raising the mercury level in the buret at an adjustable rate. The solubility was calculated from the constant slope of volume of gas dissolved and volume of solvent injected. Degassing was accomplished using a two stage vacuum process described by Clever et al. (1).	1. Matheson Co. Specified as instrument grade of purity 99.5 per cent. 2. Fisher Scientific. Specified minimum purity 99.0 per cent.
	ESTIMATED ERROR: $\delta T/K = 0.1$ $\delta x_1/x_1 = 0.01$
	REFERENCES: 1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M. *J. Phys. Chem.* 1971, *61*, 1078.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) 1-Butanol; $C_4H_{10}O$; [71-36-3]	Blais, C.; Hayduk, W. *J. Chem. Eng. Data* 1983, *28*, 181-184.

VARIABLES:	PREPARED BY:
T/K: 298.15, 323.15 P/kPa: 101.325	W. Hayduk

EXPERIMENTAL VALUES:

T/K	Ostwald Coefficient[1] L/cm^3 cm^{-3}	Bunsen Coefficient[2] α/cm^3 (STP)cm^{-3}atm^{-1}	Mole Fraction[1] x_1
298.15	41.6	38.11	0.139 (0.1390)[3]
323.15	21.5	18.17	0.0725(0.0725)

[1]Original data.

[2]Calculated by compiler.

[3]The mole fraction solubility of the original data was used to determine the following equations for $\Delta G°$ and $\ln x_1$ and table of smoothed values:

$$\Delta G°/\text{J mol}^{-1} = -RT \ln x_1 = 663.30\ T \ln T - 3617.3\ T$$

$$\ln x_1 = 44.0836 - 8.08356 \ln T$$

T/K	$10^{-4}\Delta G°$/J mol^{-1}	x_1
298.15	4.828	0.1390
303.15	5.243	0.1215
313.15	6.090	0.0935
323.15	6.958	0.0725

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A volumetric method using a glass apparatus was employed. Degassed solvent contacted the gas while flowing as a thin film, at a constant rate, through an absorption spiral into a solution buret. A constant solvent flow was obtained by means of a calibrated syringe pump. The solution at the end of the spiral was considered saturated. Dry gas was maintained at atmospheric pressure in a gas buret by mechanically raising the mercury level in the buret at an adjustable rate. The solubility was calculated from the constant slope of volume of gas dissolved and volume of solvent injected. Degassing was accomplished using a two stage vacuum process described by Clever et al. (1).	1. Liquid Carbonic. Pure grade of minimum purity 99.0 per cent. 2. Canlab (J.T. Baker Company). Spectrophotometric grade of minimum specified purity 99.5 per cent.

ESTIMATED ERROR:
δT/K $= 0.1$ $\delta x_1/x_1 = 0.01$

REFERENCES:
1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M.   *J. Phys. Chem.* 1957, *61*, 1078.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) 3-Methyl-1-butanol; $C_5H_{12}O$; [123-51-3]	Friedel, C.; Gorgeu, A. *Compt. rendu* <u>1908</u>, *127*, 590-4.

VARIABLES:	PREPARED BY:
$T/K = 286, 295$ $p/kPa = 98.7, 101.3$	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Pressure	Solubility Volume Butane/
$t/^0C$	T/K	p/mHg	Volume Alcohol
13	286	0.740	72
22	295	0.760	44

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
In the original paper the alcohol was named simply amyl alcohol. However the boiling point corresponds to the alcohol later named primary iso amyl alcohol or 3-methyl-1-butanol.	(1) Butane. Prepared by authors from *sec*-butyl iodide, zinc and hydrochloric acid. (2) 3-Methyl-1-butanol. Prepared by the authors. Boiling point 130-132 ^0C.

	ESTIMATED ERROR:

	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) Phenol; C_6H_6O; [108-95-2]	Lenoir, J-Y.; Renault, P.; Renon, H. *J. Chem. Eng. Data*, <u>1971</u>, *16*, 340-2.

| VARIABLES:
 T/K: 323.2
 P/kPa: 101.3 | PREPARED BY:

 C. L. Young |

EXPERIMENTAL VALUES:

T/K	Henry's constant $H_{C_4H_{10}}$/atm	Mole fraction at 1 atm* $x_{C_4H_{10}}$
323.2	37.5	0.0267

*   Calculated by compiler assuming a linear function of $p_{C_4H_{10}}$ vs $x_{C_4H_{10}}$, i.e., $x_{C_4H_{10}}$ (1 atm) $= 1/H_{C_4H_{10}}$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A conventional gas-liquid chromatographic unit fitted with a thermal conductivity detector was used. The carrier gas was helium. The value of Henry's law constant was calculated from the retention time. The value applies to very low partial pressures of gas and there may be a substantial difference from that measured at 1 atm. pressure. There is also considerable uncertainty in the value of Henry's constant since surface adsorption was not allowed for although its possible existence was noted.	(1) L'Air Liquide sample; minimum purity 99.9 mole per cent. (2) Touzart and Matignon or Serlabo sample; purity 99 mole per cent.
	ESTIMATED ERROR: $\delta T/K = \pm 0.1$; δH/atm $= \pm 6\%$ (estimated by compiler).
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) Benzenemethanol, (Benzyl alcohol); C_7H_8O; [100-51-6]	Lenoir, J-Y.; Renault, P. Renon, H. *J. Chem. Eng. Data* <u>1971</u>, *16*, 340-2

VARIABLES:	PREPARED BY:
T/K: 298.15 P/kPa: 101.3	C.L. Young

EXPERIMENTAL VALUES:

T/K	Henry's Constant $H_{C_4H_{10}}$/atm	Mole fraction at 1 atm* $x_{C_4H_{10}}$
298.15	15.7	0.0637

* Calculated by compiler assuming a linear function of $p_{C_4H_{10}}$ vs $x_{C_4H_{10}}$, ie., $x_{C_4H_{10}}$ (1 atm) = $1/H_{C_4H_{10}}$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A conventional gas-liquid chromato-graphic unit fitted with a thermal conductivity detector was used. The carrier gas was helium. The value of Henry's law constant was calculated from the retention time. The value applies to very low partial pressures of gas and there may be a substantial difference from that measured at 1 atm. pressure. There is also considerable uncertainty in the value of Henry's constant since surface adsorption was not allowed for although its possible existence was noted.	(1) L'Air Liquide sample; minimum purity 99.9 mole per cent. (2) Touzart and Matignon or Serlabo sample; purity 99 mole per cent.
	ESTIMATED ERROR: $\delta T/K = \pm 0.1$; δH/atm = $\pm 6\%$ (estimated by compiler).
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Butane; C_4H_{10}; [106-97-8] (2) 1-Octanol; $C_8H_{18}O$; [111-87-5]	Gerrard, W. *J. Appl. Chem. Biotechnol.* <u>1973</u>, *23*, 1-17.

VARIABLES:
    T/K: 278.2-293.2
    P/kPa: 101.3
	PREPARED BY:
	
	    C. L. Young

EXPERIMENTAL VALUES:

Total pressure = 101.3 kPa

T/K	Mole ratio	Mole fraction of butane[#]
278.2	1.78	0.640
283.2	0.702	0.412
293.2	0.400	0.286

[#] Calculated by compiler.

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Gas was passed into a known weight of pure liquid in a bubbler tube at a total pressure measured using a manometer assembly. The amount of absorbed gas was estimated by weighing. The temperature was controlled to within 0.2 K. The apparatus and procedure are described by Gerrard, ref. (1).	No details given except that "all compounds were purified by conventional procedures".

	ESTIMATED ERROR:
	    $\delta T/K = \pm 0.1$; $\delta x/x = \pm 3\%$
	    (estimated by compiler).

	REFERENCES:
	    1. Gerrard, W.
	        J. Appl. Chem. Biotechnol.
	        <u>1972</u>, *22*, 623.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane (isobutane); C_4H_{10}; [75-28-5] (2) Methanol; CH_4O; [67-56-1]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* 1952, *74*, 1276-7.
VARIABLES: T/K = 298.15-323.15 P/kPa = 48.53-101.9	PREPARED BY: H.L. Clever W. Hayduk

EXPERIMENTAL VALUES:

T/K	Pressure p/mm Hg		Mole Fraction[1,2] $/x_1$	Ostwald Coefficient[2] L/cm^{3}cm^{-3}	Bunsen Coefficient[2] α/cm^3(STP)cm^{-3}atm^{-1}
	Total[1]	Partial[2]			
298.15	364.0	293.5	0.00710		
	548.2	424.5	0.01316		
	764.3	641.5	0.02103		
		760.0	0.0256	15.3	13.9
308.15	757.7	553.2	0.01370		
		760.0	0.0188	11.4	10.0
323.15	758.1	347.1	0.00600		
		760.0	0.01314	8.22	6.82

[1]Original data.

[2]Calculations for 101.325 kPa (760 mm) were by compilers assuming Henry's law, and Raoult's law for solvent partial pressure.

Mole fractions at 101.325 kPa were used to determine the following equation for ln x_1 and table of smoothed values:

$$\ln x_1 = 36.912 \ln T + 14,025/T - 261.016 \quad \text{Correlation coeff.} = 0.9999.$$

T/K	x_1	T/K	x_1
298.15	0.0256	313.15	0.0165
303.15	0.0218	323.15	0.0131

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was an all glass system which consisted of a monometer, gas handling system, gas buret and solubility bulb equipped with a magnetic stirrer. The solubility bulb was evacuated and weighed. About 15 cm^3 of solvent was distilled into the bulb, the solvent degassed and the bulb reweighed. A sample of hydrocarbon was condensed into a calibrated tube; it was vaporized into a known volume and the pressure measured. Equilibrium was established between the gas and the solvent. Pressure was again measured. A detailed description of the apparatus and values of the gas molal volume and 2nd virial coefficient are in (1).	(1) Phillips Petroleum Co., Research Grade. Specified 99.88 mole percent pure. Treated to remove dissolved gases and moisture. (2) Source not given. Treated to remove acetone and aldehydes. Fractionated through a 50-plate column, dried with Mg, stored in a sealed container. Density at 25°C 0.78653 g cm^{-3}.

ESTIMATED ERROR:

$\delta T/K$ = 0.005
δp/mm Hg = 0.05
$\delta x_1/x_1$ = 0.005   (compilers)

REFERENCES:

1. Kretschmer, C.B.; Wiebe, R.
    J. Am. Chem. Soc. 1951, *73*, 3778.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane (isobutane); C_4H_{10}; [75-28-5] (2) Ethanol; C_2H_6O; [64-17-5]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* 1951, *73*, 3778-81.

VARIABLES:	PREPARED BY:
T/K = 283.15-323.15 P/kPa = 30.25-101.38	H.L. Clever W. Hayduk

EXPERIMENTAL VALUES: concluded

Mole fraction solubilities at 101.325 kPa (760 mm) were used to determine the following equation for ln x_1 and table of smoothed values:

ln x_1 = 18.020 ln$T$ + 8122.2/T - 132.89   Correlation coeff. = 0.9999.

T/K	x_1	T/K	x_1
283.15	0.0851	303.15	0.0439
293.15	0.0598	313.15	0.0335
298.15	0.0509	323.15	0.0264

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane (isobutane); C_4H_{10}; [75-28-5] (2) Ethanol; C_2H_6O; [64-17-5]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* <u>1951</u>, *73*, 3778-81.

VARIABLES:	PREPARED BY:
T/K = 283.15-323.15 P/kPa = 30.25-101.38	H.L. Clever W. Hayduk

EXPERIMENTAL VALUES:

T/K	Pressure p/mm Hg Total[1]	Partial[2]	Mole Fraction[1,2] /x_1	Ostwald Coefficient[2] L/cm^{3}cm^{-3}	Bunsen Coefficient[2] α/cm^3(STP)cm^{-3}atm^{-1}
283.15	389.7	366.6	0.03528		
	549.6	526.9	0.05443		
	760.0		0.0852	36.2	34.7
298.15	226.9	167.7	0.009739		
	305.8	246.9	0.01454		
	439.5	381.1	0.02316		
	725.4	668.2	0.04368		
	760.0		0.0512	21.8	19.8
308.15	313.1	210.2	0.00955		
	455.2	353.0	0.01643		
	602.4	501.0	0.02391		
	760.4	659.9	0.03241		
	760.0		0.0381	16.4	14.4
323.15	317.3	96.4	0.003121		
	542.3	323.1	0.01064		
	758.7	541.2	0.01828		
	760.0		0.0265	11.7	9.71

[1]Original data.

[2]Calculations for 101.325 kPa (760 mm) were by compilers by extrapolation of data from lower pressures, and by assuming Raoult's law for solvent partial pressure.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The apparatus was an all glass system which consisted of a manometer, gas handling system, gas buret and solubility bulb equipped with a magnetic stirrer.

The solubility bulb was evacuated and weighed. About 15 cm^3 of solvent was distilled into the bulb, the solvent degassed and the bulb reweighed.

A sample of hydrocarbon was condensed into a calibrated tube; it was vaporized into a known volume and the pressure measured. Equilibrium was established between the gas and the solvent. Pressure was again measured.

SOURCE AND PURITY OF MATERIALS:

(1) Phillips Petroleum Co. Research grade, 99.88 mole per cent. Removed dissolved air and moisture.

(2) Commercial absolute alcohol sample fractionated, treated with Mg ethylate, stored in sealed container until used. Dentity, at 25°C 0.78505 g cm^{-3}.

ESTIMATED ERROR:
δT/K = ± 0.005
δp/mm Hg = ± 0.05
$\delta x_1/x_1$ = ± 0.005 (compilers)

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane or isobutane; C_4H_{10}; [75-28-5] (2) Water; H_2O; [7732-18-5] Ethanol; C_2H_6O; [64-17-5] Diethylether; $C_4H_{10}O$; [60-29-7] Chloroform; $CHCl_3$; [67-66-3]	Lebeau, P. *Bull. Acad. Roy. Belg.* 1908, 300-4.

VARIABLES:	PREPARED BY:
T/K = 290, 291 p/kPa = 102.9 - 104.8	H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Pressure[a]	Solubility Volume Isobutane/Volume Solvent
$t/°C$	T/K	$p/mmHg$	
Water			
17	290	772	0.13
Ethanol			
17	290	775	13.2
Diethylether or 1'1'-oxybisethane			
18	291	773	27.9
Chloroform or trichloromethane			
17	290	786	39.5

[a] Not clear whether this is total pressure or isobutane
partial pressure. It is probably the total pressure.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Details not given.	(1) Isobutane. Prepared by the author by the reaction of sodium or calcium in liquid ammonia on isobutyl chloride. The normal boiling point is -10.5 °C and the critical temperature is 134-5 °C. (2) Solvents. No information.
	ESTIMATED ERROR:
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane; (isobutane); C_4H_{10}; [75-28-5] (2) 1,2-Ethanediol, (Ethylene glycol); $C_2H_6O_2$; [107-21-1]	Lenoir J-Y.; Renault, P.; Renon, H. *J. Chem. Eng. Data*, <u>1971</u>, *16*, 340-2

VARIABLES:
    T/K: 298.2
    P/kPa: 101.3
	PREPARED BY:
	
	        C. L. Young

EXPERIMENTAL VALUES:

T/K	Henry's constant $H_{C_4H_{10}}$/atm	Mole fraction at 1 atm* $x_{C_4H_{10}}$
298.2	320	0.00313

*   Calculated by compiler assuming a linear function of $p_{C_4H_{10}}$ vs $x_{C_4H_{10}}$, i.e., $x_{C_4H_{10}}$ (1 atm) $= 1/H_{C_4H_{10}}$

<div align="center">AUXILIARY INFORMATION</div>

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A conventional gas-liquid chromato-graphic unit fitted with a thermal conductivity detector was used. The carrier gas was helium. The value of Henry's law constant was calculated from the retention time. The value applies to very low partial pressures of gas and there may be a substantial difference from that measured at 1 atm. pressure. There is also considerable uncertainty in the value of Henry's constant since surface adsorption was not allowed for although its possible existence was noted.	(1) L'Air Liquide sample; minimum purity 99.9 mole per cent. (2) Touzart and Matignon or Serlabo sample; purity 99 mole per cent.
	ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler).
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane (isobutane); C_4H_{10}; [75-28-5] (2) 2-Propanol; C_3H_8O; [67-63-0]	Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* <u>1952</u>, *74*, 1276-7.

VARIABLES:	PREPARED BY:
$T/K = 298.15-323.15$ $P/kPa = 41.46-101.6$	H.L. Clever W. Hayduk

EXPERIMENTAL VALUES:

T/K	Pressure p/mm Hg		Mole Fraction[1,2] $/x_1$	Ostwald Coefficient[2] $L/cm^3 cm^{-3}$	Bunsen Coefficient[2] $\alpha/cm^3 (STP) cm^{-3} atm^{-1}$
	Total[1]	Partial[2]			
298.15	355.0	311.0	0.02758		
	525.6	482.4	0.04441		
	753.1	711.0	0.06930		
		760.0	0.0741	24.7	22.8
308.15	761.0	684.0	0.04984		
		760.0	0.0554	18.6	16.6
323.15	762.0	587.8	0.02977	13.1	11.1
		760.0	0.0385		

[1]Original data.

[2]Calculations for 101.325 kPa (760 mm) were by compilers assuming Henry's law, and Raoult's law for solvent partial pressure.

Mole fractions at 101.325 kPa were used to determine the following equation for ln x_1 and table of smoothed values:

$$\ln x_1 = 2516.7/T - 11.050 \quad \text{Correlation coefficient} = 0.9996$$

T/K	x_1	T/K	x_1
298.15	0.0736	313.15	0.0491
303.15	0.0640	323.15	0.0383

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus was an all glass system which consisted of a monometer, gas handling system, gas buret and solubility bulb equipped with a magnetic stirrer. The solubility bulb was evacuated and weighed. About 15 cm³ of solvent was distilled into the bulb, the solvent degassed and the bulb reweighed. A sample of hydrocarbon was condensed into a calibrated tube; it was vaporized into a known volume and the pressure measured. Equilibrium was established between the gas and the solvent. Pressure was again measured. A detailed description of the apparatus and values fo the gas molal volume and 2nd virial coefficient are in (1).	(1) Phillips Petroleum Co., Research Grade. Specified 99.88 mole percent pure. Treated to remove dissolved gases and moisture. (2) Source not given. Fractionated through a 50-plate column, dried with Mg, stored in a sealed container. Density at 25°C 0.78081 g cm⁻³
	ESTIMATED ERROR: $\delta T/K = 0.005$ δp/mm Hg = 0.05 $\delta x_1/x_1 = 0.005$ (compilers)
	REFERENCES: 1. Kretschmer, C.B.; Wiebe, R. *J. Am. Chem. Soc.* <u>1951</u>, *73*, 3778.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane (isobutane); C_4H_{10}; [75-28-5] (2) 1-Butanol; $C_4H_{10}O$; [71-36-3]	Blais, C.; Hayduk, W. *J. Chem. Eng. Data* <u>1983</u>, *28*, 181-184.

VARIABLES:	PREPARED BY:
T/K: 298.15,323.15 P/kPa: 101.325	W. Hayduk

EXPERIMENTAL VALUES:

T/K	Ostwald Coefficient[1] L/cm^3 cm^{-3}	Bunsen Coefficient[2] α/cm^3 (STP)cm^{-3}atm^{-1}	Mole Fraction[1] x_1
298.15	25.3	23.18	0.0889 (0.08890)[3]
323.15	14.1	11.92	0.0486 (0.04860)

[1]Original data.

[2]Calculated by compiler.

[3]The mole fraction solubility of the original data was used to determine the following equations for $\Delta G°$ and ln x_1 and table of smoothed values:

$$\Delta G°/J\ mol^{-1} = -RT\ ln\ x_1 = 615.41\ T\ ln\ T - 3307.76\ T$$
$$ln\ x_1 = 40.311 - 7.49987\ ln\ T$$

T/K	$10^{-4}\Delta G°/J\ mol^{-1}$	x_1
298.15	5.921	0.08890
303.15	6.331	0.07848
313.15	7.165	0.06152
323.15	8.019	0.04860

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A volumetric method using a glass apparatus was employed. Degassed solvent contacted the gas while flowing as a thin film, at a constant rate, through an absorption spiral into a solution buret. A constant solvent flow was obtained by means of a calibrated syringe pump. The solution at the end of the spiral was considered saturated. Dry gas was maintained at atmospheric pressure in a gas buret by mechanically raising the mercury level in the buret at an adjustable rate. The solubility was calculated from the constant slope of volume of gas dissolved and volume of solvent injected. Degassing was accomplished using a two stage vacuum process described by Clever et al. (1).	1. Liquid Carbonic. Pure grade of minimum purity 99.0 per cent. 2. Canlab (J.T. Baker Company). Spectrophotometric grade of minimum specified purity 99.5 per cent.

	ESTIMATED ERROR:
	δT/K = 0.1 $\delta x_1/x_1$ = 0.01

	REFERENCES:
	1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M. *J. Phys. Chem.* <u>1957</u>, *61*, 1078.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane (iso-butane); C_4H_{10}; [75-28-5] (2) 2-Ethoxyethanol(ethylcellosolve); $C_4H_{10}O_2$; [110-80-5]	Ezheleva, A.E.; Zorin, A.D. *Tr. Khim. Khim. Tech. (Gorkii)* <u>1961</u>, *1*, 37-40.

VARIABLES:	PREPARED BY:
T/K: 303.15-343.15 P/kPa: 101.325 and above	W. Hayduk

EXPERIMENTAL VALUES:

T/K	Ostwald Coefficient[2] L/cm^{3}cm^{-3}	Bunsen Coefficient[2] α/cm^3(STP)cm^{-3}atm^{-1}	Mole Fraction[1] x_1
303.15	20.6	18.3	0.0780(0.0777)[3]
313.15	16.3	14.0	0.0625(0.0628)
323.15	13.7	11.3	0.0527(0.0514)
333.15	10.3	8.28	0.0404(0.0426)
343.15	9.27	7.21	0.0368(0.0357)

[1]Original data given as the inverse of Henry's constant which is equivalent to mole fraction at a gas partial pressure of 101.325 kPa.

[2]Ostwald and Bunsen coefficients calculated by compiler using authors' assumption that solvent is non-volatile.

[3]From equation of smoothed data:

$$\ln x_1 = 2020.3/T - 9.2195$$

Correlation coefficient = 0.9942

AUXILIARY INFORMATION	

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The apparatus consisted of a two-chamber, rocking device with separate gas and liquid chambers joined by two tubes and microvalves. The gas chamber was equipped with a pressure gauge. After evacuation, gas and deaerated solvent were separately charged, and then contacted by opening the microvalves and by rocking. The solubility was calculated from a knowledge of the volume of the solvent charged, and the initial and final gas pressures. The solvent was considered non-volatile and the gas pressure was considered to be the total pressure.	1. Source and purity not given. Gas purified by low temperature fractionation and analyzed by gas chromatography. 2. Source and purity not given. Refractive index measured: $n_D^{20} = 1.4078$

ESTIMATED ERROR:
δT/K   = 0.05
$\delta x_1/x_1$ = 0.05
(estimated by compiler)

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane; (isobutane) C_4H_{10}; [75-28-5] (2) Phenol; C_6H_6O; [108-95-2]	Lenoir, J-Y.; Renault, P.; Renon, H. *J. Chem. Eng. Data*, 1971, *16*, 340-2

| VARIABLES: T/K: 323.2 P/kPa: 101.3 | PREPARED BY: C. L. Young |

EXPERIMENTAL VALUES:

T/K	Henry's constant $H_{C_4H_{10}}$/atm	Mole fraction at 1 atm* $x_{C_4H_{10}}$
323.2	67.0	0.0149

* Calculated by compiler assuming a linear function of $p_{C_4H_{10}}$ vs $x_{C_4H_{10}}$, i.e., $x_{C_4H_{10}}$ (1 atm) = $1/H_{C_4H_{10}}$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A conventional gas-liquid chromatographic unit fitted with a thermal conductivity detector was used. The carrier gas was helium. The value of Henry's law constant was calculated from the retention time. The value applies to very low partial pressures of gas and there may be a substantial difference from that measured at 1 atm. pressure. There is also considerable uncertainty in the value of Henry's constant since surface adsorption was not allowed for although its possible existence was noted.	(1) L'Air Liquide sample; minimum purity 99.9 mole per cent. (2) Touzart and Matignon or Serlabo sample; purity 99 mole per cent.
	ESTIMATED ERROR: δT/K = ±0.1; δH/atm = ±6% (estimated by compiler).
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. Propane, 2-methyl-, (isobutane) C_4H_{10}; [75-28-5] 2. Propanol, oxybis-, (Dipropylene glycol); $C_6H_{14}O_3$; [25265-71-8]	Lenoir, J-Y.; Renault, P.; Renon, H. *J. Chem. Eng. Data* <u>1971</u>, *16*, 340-2
VARIABLES: T/K: 298.2-343.2 P/kPa: 101.3	PREPARED BY: C. L. Young

EXPERIMENTAL VALUES:

T/K	Henry's constant $H_{C_4H_{10}}$/atm	Mole fraction at 1 atm* $x_{C_4H_{10}}$
298.2	42.4	0.0236
323.2	53.7	0.0186
343.2	74.3	0.0135

* Calculated by compiler assuming a linear function of $p_{C_4H_{10}}$ vs $x_{C_4H_{10}}$, i.e., $x_{C_4H_{10}}$ (1 atm) = $1/H_{C_4H_{10}}$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A conventional gas-liquid chromatographic unit fitted with a thermal conductivity detector was used. The carrier gas was helium. The value of Henry's law constant was calculated from the retention time. The value applies to very low partial pressures of gas and there may be a substantial difference from that measured at 1 atm. pressure. There is also considerable uncertainty in the value of Henry's constant since surface adsorption was not allowed for although its possible existence was noted.	(1) L'Air Liquide sample, minimum purity 99.9 mole per cent. (2) Touzart and Matignon or Serlabo sample, purity 99 mole per cent.
	ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler).
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane, (isobutane); C_4H_{10}; [75-28-5] (2) Benzyl alcohol, (Benzenemethanol) C_7H_8O; [100-51-6]	Gerrard, W. *Solubility of Gases and Liquids,* *Plenum, New York,* <u>1976</u>, Chapter 12.

VARIABLES:	PREPARED BY:
T/K: 273.15 P/kPa: 13.3-101.3	C.L. Young

EXPERIMENTAL VALUES:

T/K	P/mmHg	P/kPa	Mole fraction of 2-methyl propane in liquid, $x_{C_4H_{10}}$
273.15	100	13.3	0.012
	200	26.7	0.020
	300	40.0	0.028
	400	53.3	0.037
	500	66.7	0.049
	600	80.0	0.064
	700	93.3	0.086
	760	101.3	0.107

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Gas was passed into a known weight of pure liquid in a bubbler tube at a total pressure measured by a manometer assembly. The amount of absorbed gas was estimated by weighing. The temperature was manually controlled to within 0.2K. The apparatus and procedure are described by Gerrard (1,2).	No details given.

ESTIMATED ERROR:

$\delta T/K = \pm 0.1$; $\delta x/x = \pm 3\%$

(estimated by compiler).

REFERENCES:
1. Gerrard, W.
   J. Appl. Chem. Biotechnol. <u>1972</u>
   22, 623-650.
2. Gerrard, W.
   Solubility of Gases and Liquids,
   Plenum Press. New York, <u>1976</u>
   Chapter 1.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) 2-Methylpropane, (isobutane); C_4H_{10}; [75-28-5] (2) 1-Octanol; $C_8H_{18}O$; [111-87-5]	Gerrard, W. *Solubility of Gases and Liquids,* *Plenum, New York,* <u>1976</u>, Chapter 12.

| VARIABLES:
    T/K: 273.15
   P/kPa: 13.3-101.3 | PREPARED BY:

   C.L. Young |

EXPERIMENTAL VALUES:

T/K	P/mmHg	P/kPa	Mole fraction of 2-methyl propane in liquid, $x_{C_4H_{10}}$
273.15	100	13.3	0.045
	200	26.7	0.088
	300	40.0	0.132
	400	53.3	0.178
	500	66.7	0.224
	600	80.0	0.282
	700	93.3	0.344
	760	101.3	0.386

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Gas was passed into a known weight of pure liquid in a bubbler tube at a total pressure measured by a manometer assembly. The amount of absorbed gas was estimated by weighing. The temperature was manually controlled to within 0.2K. The apparatus and procedure are described by Gerrard (1,2).	No details given.

ESTIMATED ERROR:
  $\delta T/K = \pm 0.1$; $\delta x/x = \pm 3\%$
  (estimated by compiler)

REFERENCES:
1. Gerrard, W.
    J. Appl. Chem. Biotechnol. <u>1972</u>
    22, 623-650.
2. Gerrard, W.
    Solubility of Gases and Liquids,
    Plenum Press, New York, 1976,
    Chapter 1.