

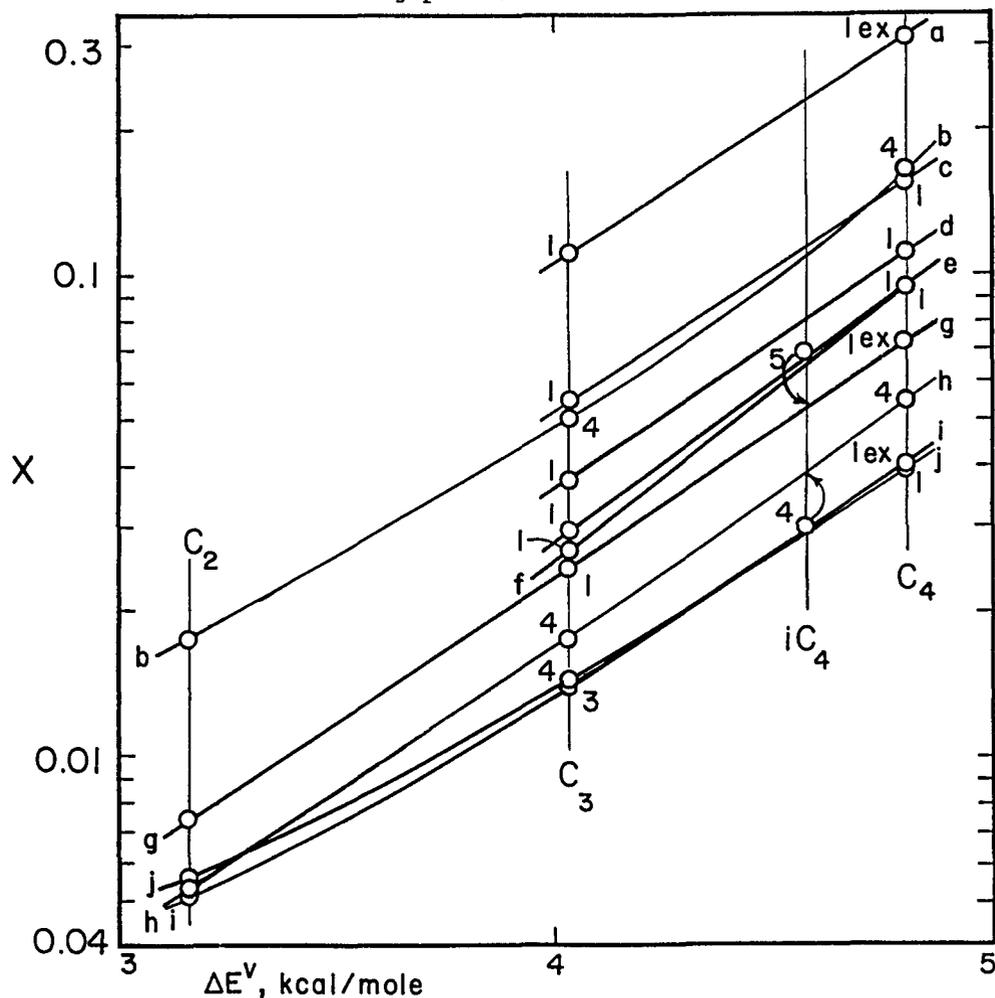
COMPONENTS: (1) Propane; C_3H_8 ; [74-98-6] Butane; C_4H_{10} ; [106-97-8] 2-Methylpropane; C_4H_{10} ; [75-28-5] (2) Nitrogen-containing solvents	EVALUATOR: Walter Hayduk Department of Chemical Engineering University of Ottawa Ottawa, Canada K1N 9B4 March, 1984
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CRITICAL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

Most of the solubility data for *propane*, *2-methylpropane* and *butane* in nitrogen-containing solvents are those of Gerrard (1,7) and Lenoir (4). Certain data from these sources have been previously considered unreliable, generally yielding results that were too high when compared with those of other workers (see Critical Evaluations Alkanes, Alcohols, Non-polar solvents excluding alkanes and organohalides, in this volume, and also ref. 8). Consistency checks were applied to the data whenever possible in an attempt to discover grossly anomalous behavior. However, because it was impossible to independently ascertain their accuracy, most of the data are classified as tentative, or simply meaning, the best available.

A consistency check was developed by Linford and Hildebrand (9) for the solubilities of chemically similar gases, such as the alkane gases, in solvents which formed regular solutions. A linear relation was expected when the log of the solubility for a constant temperature was plotted as a function of the energy of vaporization at the normal boiling points. Because a consistent, although non-linear, relation was observed for polar or associating solvents (10), the test was considered to be

Figure 1. Solubilities at 298.15 K versus heat of vaporization of gas at the normal boiling point.



COMPONENTS:	EVALUATOR:
(1) Propane; C ₃ H ₈ ; [74-98-6] Butane; C ₄ H ₁₀ ; [106-97-8] 2-Methylpropane; C ₄ H ₁₀ ; [75-28-5]	Walter Hayduk Department of Chemical Engineering University of Ottawa Ottawa, Canada K1N 9B4
(2) Nitrogen-containing solvents	March, 1984

CRITICAL EVALUATION:

useful for the nitrogen-containing solvents. Some solubility data for *ethane* are also available in the same solvents for comparison with those for *propane*, *2-methylpropane* and *butane* (8).

Solubilities are available at least at one temperature for *propane* and *butane* in (a) octanamide (1), (b) hexamethylphosphoric triamide (4), (c) *N,N*-dimethylbenzenamine (dimethylaniline) (1), (d) benzonitrile (1), (e) benzenemethanamine (benzylamine) (1), (f) *N*-methylbenzenamine (methylaniline) (1), (g) nitrobenzene (1), (h) 1-methyl-2-pyrrolidinone (4), (i) *N,N*-dimethylformic acid (dimethyl formamide) (3,1, respectively) and in (j) benzenamine (aniline) (4). The above data, listed in Table 1 and shown in Figure 1 for a temperature of 298.15 K, are all classified as tentative. Also classified as tentative are the data for the solubility of *2-methylpropane* in (g) nitrobenzene (5,7), and (h) 1-methyl-2-pyrrolidinone (4). The letters shown in front of the solvents correspond to the same solvents as shown in Figure 1 and listed in Table 1 while the numbers refer to the data sources. In addition to the data listed in Table 1 are the solubility of *propane* in quinoline (1) and in (k) cyclohexylamine (6), and also of *butane* in 1-methyl-2-nitrobenzene (1) and in quinoline (1). The latter data are also classified as tentative.

A comparison of the data for the solubility of *propane* in (g) nitrobenzene suggests that the data of Lenoir (4) and Ezheleva (5) are too low so that these data are rejected. The solubility of *propane* in (i) *N,N*-dimethylformic acid (1 and 2) and in (j) benzenamine (aniline) (1) appear at variance with data of others, and are also rejected.

Table 1. Mole fraction solubility at 298.15 K and classification

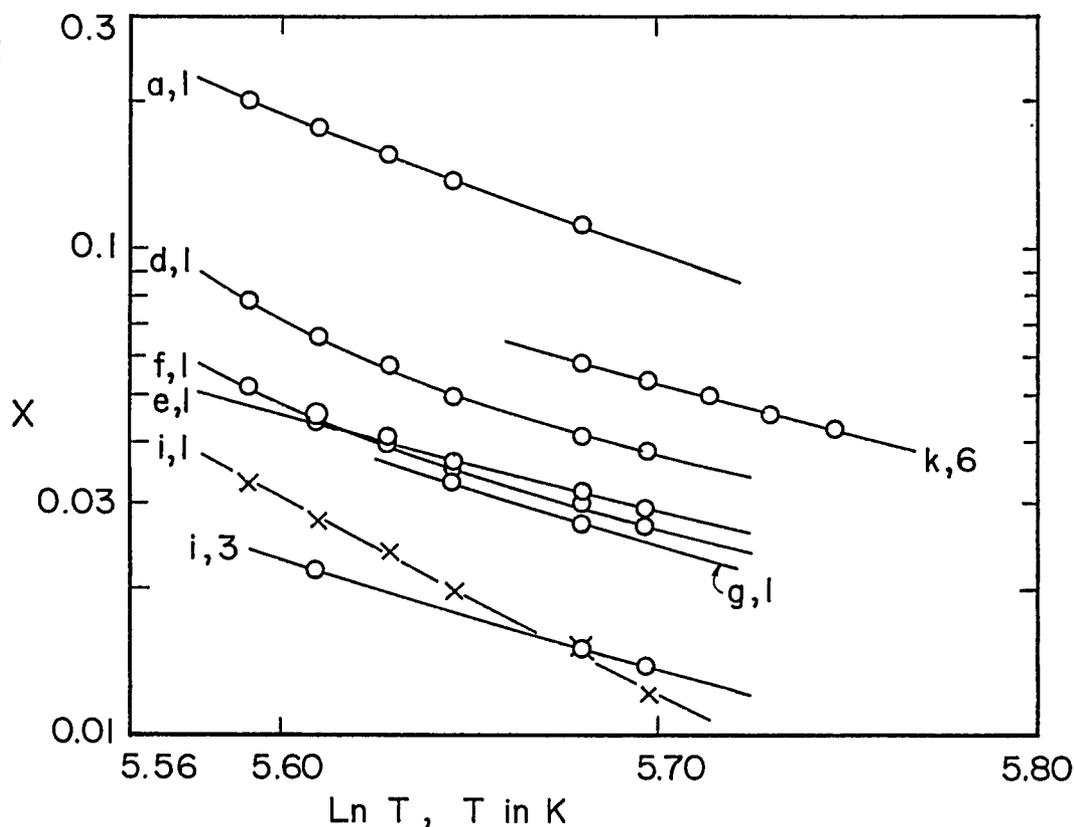
Solvent	<i>Propane</i>	<i>Butane</i>	<i>2-Methylpropane</i>	Classification
(a) Octanamide	0.111(1)		0.31 ¹ (1)	Tentative
(b) Hexamethylphosphoric triamide	0.0503(4)		0.164 (4)	Tentative
(c) <i>N,N</i> -Dimethylbenzenamine (N,N-dimethylaniline)	0.054 ¹ (1)		0.156 (1)	Tentative
(d) Benzonitrile	0.0375(1)		0.111 (1)	Tentative
(e) Benzene-methanamine (benzylamine)	0.0291(1)		0.0942(1)	Tentative
(f) <i>N</i> -Methylbenzenamine (N-methylaniline)	0.0267		0.0934(1)	Tentative
(g) Nitrobenzene	0.025 ¹ (1) 0.023 ¹ (4) 0.018 ¹ (5)	0.067 (5,7)	0.072 ¹ (1)	Tentative Rejected Rejected
(h) 1-Methyl-2-pyrrolidinone	0.0175(4)	0.030 (4)	0.0543(4)	Tentative
(i) <i>N,N</i> -Dimethylformic acid	0.0139(3) 0.0119(1)		0.040 ¹ (1)	Tentative Rejected
(j) Benzenamine (aniline)	0.0412(4) 0.124 (1)		0.0395(4,1)	Tentative Rejected

¹ Extrapolated

<p>COMPONENTS:</p> <p>(1) Propane; C_3H_8; [74-98-6] Butane; C_4H_{10}; [106-97-8] 2-Methylpropane; C_4H_{10}; [75-28-5]</p> <p>(2) Nitrogen-containing solvents</p>	<p>EVALUATOR:</p> <p>Walter Hayduk Department of Chemical Engineering University of Ottawa Ottawa, Canada K1N 9B4</p> <p>March, 1984</p>
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CRITICAL EVALUATION:

Figure 2. Solubility of propane in several solvents as a function of temperature.



To show the temperature variation of solubility, selected data for the solubilities of propane are shown in Figure 2 as a function of temperature on log scales. It may be observed that there is a nearly systematic temperature coefficient of solubility for the various solvents, as usually obtained. The two comparable data for the solvent, *N,N*-dimethylformamide (1,3) are also shown. Because the temperature coefficient is much higher of worker (1) than for comparable solubilities in other solvents, it is expected that the data of (3) are more reliable for this solvent. Some other data (not shown) were also observed to have an inconsistent solubility behavior. Hence, the representation of data as shown in Figure 2 was also useful for checking the consistency of the data.

References

- Gerrard, W., *J. Appl. Chem. Biotechnol.* 1973, 23, 1-17.
- Rosenthal, W. *Thès. fac. sci. Univ. Strasbourg (France)* 1954.
- Howard, W.B.; Schoch, E.P.; Mayforth, F.R. *Petrol. Refiner* 1954, 33, 143-156.
- Lenoir, J.-Y.; Renault, P.; Renon, H. *J. Chem. Eng. Data* 1971, 16, 340-342.

<p>COMPONENTS:</p> <p>(1) Propane; C_3H_8; [74-98-6] Butane; C_4H_{10}; [106-97-8] 2-Methylpropane; C_4H_{10}; [75-28-5]</p> <p>(2) Nitrogen-containing solvents</p>	<p>EVALUATOR:</p> <p>Walter Hayduk Department of Chemical Engineering University of Ottawa Ottawa, Canada K1N 9B4</p> <p>March, 1984</p>
<p>CRITICAL EVALUATION:</p> <ol style="list-style-type: none">5. Ezheleva, A.E.; Zorin, A.D. <i>Tr. Khim. Khim. Tech. (Gorkii)</i> <u>1961</u>, 1, 37-40.6. Keevil, T.A.; Taylor, D.R.; Steitwieser, A. <i>J. Chem. Eng. Data</i> <u>1978</u>, 23, 237-239.7. Gerrard, W. <i>Solubility of Gases and Liquids</i>, Plenum, New York, <u>1976</u>, Chapter 12.8. Hayduk, W., Ed. <i>Solubility Data Series, Vol. 9, Ethane</i> Pergamon Press, Oxford, England <u>1982</u>, 195-199.9. Linford, R.G.; Hildebrand, J.H. <i>Trans. Far. Soc.</i> <u>1970</u>, 66, 577-581.10. Fleury, D.; Hayduk, W. <i>Can. J. Chem. Eng.</i> <u>1975</u>, 53, 195-199.	

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Propane: C_3H_8 : [74-98-6] (2) N,N -Dimethylformamide; C_3H_7NO : [68-12-2]		Rosenthal, W. <i>Thès. fac. sci. Univ. Strasbourg (France) 1954.</i>	
VARIABLES:		PREPARED BY:	
T/K : 293.15 P/kPa : 101.325		W. Hayduk	
EXPERIMENTAL VALUES:			
T/K	Ostwald Coefficient ¹ $L/cm^3 cm^{-3}$	Bunsen Coefficient ² $\alpha/cm^3 (STP) cm^{-3}$	Mole Fraction ² x_1
293.15	5.68	5.27	0.0182
¹ Original data. ² Calculated by compiler using real gas molar volumes.			
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
The solvent was charged into an evacuated cell after degassing, and the mass of solvent was determined by weight. Gas was introduced into the cell from a measuring burette in which the gas was stored over mercury. The cell was agitated while the gas pressure was maintained by adjusting the gas volume. The Ostwald coefficient was determined from the mass of solvent and volume of gas used. Solubilities were measured at pressures above and below atmospheric.		1. Source and purity not given. 2. S.E.P.P.I.C. of Paris. Purity not given. Exposure to air avoided. Distilled prior to use.	
		ESTIMATED ERROR:	
		$\delta T/K$ = 0.2 $\delta P/kPa$ = 0.1 $\delta x_1/x_1$ = 0.02 (compiler)	
		REFERENCES:	

COMPONENTS: (1) Propane; C ₃ H ₈ ; [74-98-6] (2) N,N-Dimethyl formic acid (dimethyl formamide); C ₃ H ₇ NO; [68-12-2]		ORIGINAL MEASUREMENTS: Howard, W.B.; Schoch, E.P.; Mayforth, F.R. <i>Petrol. Refiner</i> <u>1954</u> , 33, 143-146.	
VARIABLES: T/K: 273.15-298.15		PREPARED BY: W. Hayduk	
EXPERIMENTAL VALUES:			
T/K	Bunsen Coefficient ¹ α/cm ³ (STP)cm ⁻³ atm ⁻¹	Ostwald Coefficient ² L/cm ³ cm ⁻³	Mole Fraction ² x ₁
273.15	6.5	6.50	0.0219
298.15	4.0	4.37	0.0139
<p>¹ Data as listed in paper; original source indicated as Technical literature from Grasselli Chemicals Department, E.I. du Pont de Nemours.</p> <p>² Ostwald coefficient and mole fraction calculated by compiler.</p>			
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE: Description of apparatus and method not available.		SOURCE AND PURITY OF MATERIALS: Source, purities, not available.	
		ESTIMATED ERROR: δα/α = 0.10 (estimated by compiler)	
		REFERENCES:	

<p>COMPONENTS:</p> <p>(1) Propane; C₃H₈; [74-98-6] (2) <i>N,N</i>-Dimethylformamide; C₃H₇NO; [68-12-2]</p>	<p>ORIGINAL MEASUREMENTS:</p> <p>Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1973</u>, 23, 1-17.</p>																					
<p>VARIABLES:</p> <p>T/K: 268.2-298.2 P/kPa: 101.3</p>	<p>PREPARED BY:</p> <p>C. L. Young</p>																					
<p>EXPERIMENTAL VALUES:</p> <p style="text-align: center;">Total pressure = 101.3 kPa</p>																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">T/K</th> <th style="text-align: left;">Mole ratio</th> <th style="text-align: left;">Mole fraction of propane[#]</th> </tr> </thead> <tbody> <tr> <td>268.2</td> <td>0.034</td> <td>0.033</td> </tr> <tr> <td>273.2</td> <td>0.0283</td> <td>0.0275</td> </tr> <tr> <td>278.2</td> <td>0.0244</td> <td>0.0238</td> </tr> <tr> <td>283.2</td> <td>0.020</td> <td>0.0196</td> </tr> <tr> <td>293.2</td> <td>0.0150</td> <td>0.0148</td> </tr> <tr> <td>298.2</td> <td>0.0120</td> <td>0.0119</td> </tr> </tbody> </table>		T/K	Mole ratio	Mole fraction of propane [#]	268.2	0.034	0.033	273.2	0.0283	0.0275	278.2	0.0244	0.0238	283.2	0.020	0.0196	293.2	0.0150	0.0148	298.2	0.0120	0.0119
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<p>[#] Calculated by compiler.</p>																						
<p style="text-align: center;">AUXILIARY INFORMATION</p>																						
<p>METHOD/APPARATUS/PROCEDURE:</p> <p>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).</p>	<p>SOURCE AND PURITY OF MATERIALS:</p> <p>No details given except that "all compounds were purified by conventional procedures".</p> <p>ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta x/x = \pm 3\%$ (estimated by compiler).</p> <p>REFERENCES:</p> <p>1. Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1972</u>, 22, 623.</p>																					

COMPONENTS: (1) Propane; C_3H_8 ; [74-98-6] (2) 1-Methyl-2-pyrrolidinone; C_5H_9NO ; [872-50-4]	ORIGINAL MEASUREMENTS: Lenoir, J-Y.; Renault, P.; Renon, H. <i>J. Chem. Eng. Data</i> <u>1971</u> , <i>16</i> , 340-2	
VARIABLES: T/K : 298.15 P/kPa : 101.325	PREPARED BY: C.L. Young	
EXPERIMENTAL VALUES:		
T/K	Henry's Constant $H_{C_3H_8}/atm$	Mole fraction at 1 atm* $x_{C_3H_8}$
298.15	57.2	0.0175
<p>* Calculated by compiler assuming a linear function of $p_{C_3H_8}$ vs $x_{C_3H_8}$, ie. $x_{C_3H_8} (1 atm) = 1/H_{C_3H_8}$</p>		
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: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler).	
	REFERENCES:	

COMPONENTS: (1) Propane; C_3H_8 ; [74-98-6] (2) Nitrobenzene; $C_6H_5NO_2$; [98-95-3]	ORIGINAL MEASUREMENTS: Lenoir, J.-Y.; Renault, P.; Renon, H. <i>J. Chem. Eng. Data</i> <u>1971</u> , <i>16</i> , 340-2.						
VARIABLES: T/K : 298 P/kPa : 101.3	PREPARED BY: C.L. Young						
EXPERIMENTAL VALUES:							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">T/K</th> <th style="text-align: center;">Henry's constant $H_{C_3H_8}^H/atm$</th> <th style="text-align: center;">Mole fraction at 1 atm* $x_{C_3H_8}$</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">298</td> <td style="text-align: center;">44.1</td> <td style="text-align: center;">0.0227</td> </tr> </tbody> </table>		T/K	Henry's constant $H_{C_3H_8}^H/atm$	Mole fraction at 1 atm* $x_{C_3H_8}$	298	44.1	0.0227
T/K	Henry's constant $H_{C_3H_8}^H/atm$	Mole fraction at 1 atm* $x_{C_3H_8}$					
298	44.1	0.0227					
<p>* Calculated by compiler assuming a linear function of $p_{C_3H_8}$ vs $x_{C_3H_8}$, i.e., $x_{C_3H_8}(1\text{ atm}) = 1/H_{C_3H_8}$</p>							
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: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler). REFERENCES:						

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) Propane; C_3H_8 ; [74-98-6] (2) Nitrobenzene; $C_6H_5NO_2$; [98-95-3]		Ezheleva, A.E.; Zorin, A.D. <i>Tr. Khim. Khim. Tech. (Gorkii)</i> 1961, 1, 37-40.	
VARIABLES: T/K : 303.15-343.15 P/kPa : 101.325 and above		PREPARED BY: 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	4.25	3.81	0.0175(0.0161) ³
313.15	2.99	2.59	0.0120(0.0136)
323.15	2.91	2.44	0.0113(0.0116)
333.15	2.89	2.35	0.0109(0.0100)
343.15	2.29	1.80	0.0084(0.0086)
<p>¹Original data given as the inverse of Henry's constant which is equivalent to mole fraction at a gas partial pressure of 101.325 kPa.</p> <p>²Ostwald and Bunsen coefficients calculated by compiler using authors' assumption that solvent is non-volatile.</p> <p>³From equation of smoothed data: $\ln x_1 = 24.787 - 5.0607 \ln T$ Correlation coefficient = 0.9391</p>			
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
<p>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.</p> <p>The solvent was considered non-volatile and the gas pressure was considered to be the total pressure.</p>		<ol style="list-style-type: none"> Source and purity not given. Gas purified by low temperature fractionation and analyzed by gas chromatography. Source and purity not given. Refractive index measured: $n_D^{20} = 1.5560$ 	
		ESTIMATED ERROR: $\delta T/K = 0.05$ $\delta x_1/x_1 = 0.05$ (estimated by compiler)	
		REFERENCES:	

COMPONENTS: (1) Propane; C_3H_6 ; [115-07-1] (2) Benzenamine, (Aniline); C_6H_7N ; [62-53-3]	ORIGINAL MEASUREMENTS: Lenoir, J-Y.; Renault, P.; Renon, H. <i>J. Chem. Eng. Data</i> <u>1971</u> , 16, 340-2						
VARIABLES: T/K : 298.15 P/kPa : 101.3	PREPARED BY: C.L. Young						
EXPERIMENTAL VALUES: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">T/K</th> <th style="text-align: center;">Henry's constant $H_{C_3H_6}/atm$</th> <th style="text-align: center;">Mole fraction at 1 atm* $x_{C_3H_6}$</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">298.15</td> <td style="text-align: center;">43.5</td> <td style="text-align: center;">0.0230</td> </tr> </tbody> </table>		T/K	Henry's constant $H_{C_3H_6}/atm$	Mole fraction at 1 atm* $x_{C_3H_6}$	298.15	43.5	0.0230
T/K	Henry's constant $H_{C_3H_6}/atm$	Mole fraction at 1 atm* $x_{C_3H_6}$					
298.15	43.5	0.0230					
<p>* Calculated by compiler assuming a linear function of $p_{C_3H_6}$ vs $x_{C_3H_6}$, i.e. $x_{C_3H_6} (1 atm) = 1/H_{C_3H_6}$</p>							
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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: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler). REFERENCES:						

<p>COMPONENTS:</p> <p>(1) Propane; C₃H₈; [74-98-6]</p> <p>(2) Cyclohexylamine; C₆H₁₃N; [108-91-8]</p>	<p>ORIGINAL MEASUREMENTS:</p> <p>Keevil, T.A.; Taylor, D.R. Streitwieser, A.</p> <p><i>J. Chem. Eng. Data.</i> 1978, 23, 237-239.</p>
<p>VARIABLES:</p> <p>T/K: 298.4-313.1</p> <p>P/kPa: 101.325</p>	<p>PREPARED BY:</p> <p>C.L. Young</p>
<p>EXPERIMENTAL VALUES:</p> <p>Partial pressure of propane = 1 atm = 101.3 kPa.</p>	
<p>T/K</p>	<p>Mole fraction of propane, $x_{\text{C}_3\text{H}_8}$</p>
<p>298.4</p> <p>303.2</p> <p>308.1</p> <p>313.1</p>	<p>0.0537</p> <p>0.0497</p> <p>0.0455</p> <p>0.0421</p>
<p>$\log x_{\text{C}_3\text{H}_8} = 11.368 - 5.107 \log (T/K)$</p> <p>Std. dev. = 0.0015.</p>	
<p>AUXILIARY INFORMATION</p>	
<p>METHOD APPARATUS/PROCEDURE:</p> <p>Volumetric apparatus of moderate accuracy. Solvent confined to glass bulb and known amount of gas added. Pressure measured using a mercury manometer together with a null point manometer in which the gas pressure was balanced by dry air. Details in source.</p>	<p>SOURCE AND PURITY OF MATERIALS:</p> <ol style="list-style-type: none"> No details given Degassed and dried over lithium cyclohexylamide. <p>ESTIMATED ERROR:</p> <p>$\delta T/K = \pm 0.1$; $\delta x_{\text{C}_3\text{H}_8} = \pm 1\%$</p> <p>REFERENCES:</p>

COMPONENTS: (1) Propane; C_3H_8 ; [74-98-6] (2) Benzenamine, (Aniline); C_6H_7N ; [62-53-3]	ORIGINAL MEASUREMENTS: Lenoir, J-Y.; Renault, P.; Renon, H. <i>J. Chem. Eng. Data</i> <u>1971</u> , <i>16</i> , 340-2						
VARIABLES: T/K : 298 P/kPa : 101.3	PREPARED BY: C. L. Young						
EXPERIMENTAL VALUES:							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">T/K</th> <th style="text-align: center;">Henry's constant $H_{C_3H_8}/atm$</th> <th style="text-align: center;">Mole fraction at 1 atm* $x_{C_3H_8}$</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">298</td> <td style="text-align: center;">70.5</td> <td style="text-align: center;">0.0142</td> </tr> </tbody> </table>		T/K	Henry's constant $H_{C_3H_8}/atm$	Mole fraction at 1 atm* $x_{C_3H_8}$	298	70.5	0.0142
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298	70.5	0.0142					
<p>* Calculated by compiler assuming a linear function of $p_{C_3H_8}$ vs $x_{C_3H_8}$, i.e., $x_{C_3H_8}(1 atm) = 1/H_{C_3H_8}$</p>							
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: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler). REFERENCES:						

<p>COMPONENTS:</p> <p>(1) Propane; C_3H_8; [74-98-6]</p> <p>(2) 1-Phenylethanone (acetophenone); C_8H_8O; [98-86-2]</p> <p>Nitrobenzene; $C_6H_5NO_2$; [98-95-3]</p>	<p>ORIGINAL MEASUREMENTS:</p> <p>Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1973</u>, 23, 1-17.</p>																		
<p>VARIABLES:</p> <p>T/K: 283.2, 293.2</p> <p>P/kPa: 101.3</p>	<p>PREPARED BY:</p> <p>C. L. Young</p>																		
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COMPONENTS: (1) Propane; C_3H_8 ; [74-98-6] (2) Quinoline; C_9H_7N ; [91-22-5] or Benzenamine; C_6H_7N ; [62-53-3]	ORIGINAL MEASUREMENTS: Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1973</u> , 23, 1-17.	
VARIABLES: T/K : 268.2-298.2 P/kPa : 101.3	PREPARED BY: C. L. Young	
EXPERIMENTAL VALUES: <p style="text-align: center;">Total pressure = 101.3 kPa</p>		
T/K	Mole ratio	Mole fraction of propane [#]
293.2	Quinoline; C_9H_7N ; [91-22-5] 0.0242	0.0236
268.2 298.2	Benzenamine; C_6H_7N ; [62-53-3] 0.0176 0.0126	0.0173 0.0124
<p style="text-align: center;"># Calculated by compiler.</p>		
<p style="text-align: center;">AUXILIARY INFORMATION</p>		
METHOD/APPARATUS/PROCEDURE: <p>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).</p>	SOURCE AND PURITY OF MATERIALS: <p>No details given except that "all compounds were purified by conventional procedures".</p> ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta x/x = \pm 3\%$ (estimated by compiler).	
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COMPONENTS: (1) Propane; C_3H_8 ; [74-98-6] (2) Hexamethylphosphoric triamide; $C_6H_{18}N_3OP$; [680-31-9]	ORIGINAL MEASUREMENTS: Lenoir, J.-Y.; Renault, P.; Renon, H. <i>J. Chem. Eng. Data</i> <u>1971</u> , <i>16</i> , 340-2.	
VARIABLES: T/K : 298.2 P/kPa : 101.3	PREPARED BY: C.L. Young	
EXPERIMENTAL VALUES:		
T/K	Henry's constant $H_{C_3H_8}/atm$	Mole fraction at 1 atm* $x_{C_3H_8}$
298.2	19.9	0.0503
<p>* Calculated by compiler assuming a linear function of $p_{C_3H_8}$ vs $x_{C_3H_8}$, i.e., $x_{C_3H_8}(1\text{ atm}) = 1/H_{C_3H_8}$</p>		
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METHOD/APPARATUS/PROCEDURE: <p>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.</p>	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.	
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	REFERENCES:	

COMPONENTS: (1) Propane; C ₃ H ₈ ; [74-98-6] (2) Benzonitrile; C ₇ H ₅ N; [100-47-0]	ORIGINAL MEASUREMENTS: Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1973</u> , 23, 1-17.																					
VARIABLES: T/K: 268.2-298.2 P/kPa: 101.3	PREPARED BY: C. L. Young																					
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COMPONENTS: (1) Propane; C ₃ H ₈ ; [74-98-6] (2) <i>N</i> -Methylbenzenamine (<i>N</i> -methyl-aniline); C ₇ H ₉ N; [100-61-8]	ORIGINAL MEASUREMENTS: Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1973</u> , 23, 1-17.																					
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<p>COMPONENTS:</p> <p>(1) Propane; C_3H_8; [74-98-6]</p> <p>(2) <i>N,N</i>-Dimethylbenzenamine (<i>N,N</i>-Dimethylaniline); $C_8H_{11}N$; [121-69-7] or Benzenemethanamine (<i>Benzylamine</i>); C_7H_9N; [100-46-9]</p>	<p>ORIGINAL MEASUREMENTS:</p> <p>Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1973</u>, 23, 1-17.</p>																														
<p>VARIABLES:</p> <p>T/K: 278.2-298.2 P/kPa: 101.3</p>	<p>PREPARED BY:</p> <p>C. L. Young</p>																														
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COMPONENTS: (1) Propane; C_3H_8 ; [74-98-6] (2) 1-Octanamine; $C_8H_{19}N$; [111-86-4]	ORIGINAL MEASUREMENTS: Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1973</u> , 23, 1-17.	
VARIABLES: T/K : 268.2-293.2 P/kPa : 101.3	PREPARED BY: C. L. Young	
EXPERIMENTAL VALUES: <p style="text-align: center;">Total pressure = 101.3 kPa</p>		
T/K	Mole ratio	Mole fraction of propane [#]
268.2 273.2 278.2 283.2 293.2	0.250 0.217 0.184 0.161 0.125	0.200 0.178 0.155 0.139 0.111
<p style="text-align: center;"># Calculated by compiler.</p>		
AUXILIARY INFORMATION		
METHOD/APPARATUS/PROCEDURE: <p>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).</p>	SOURCE AND PURITY OF MATERIALS: <p>No details given except that "all compounds were purified by conventional procedures".</p> ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta x/x = \pm 3\%$ (estimated by compiler). REFERENCES: 1. Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1972</u> , 22, 623.	

<p>COMPONENTS:</p> <p>(1) Butane; C_4H_{10}; [106-97-8] (2) <i>N,N</i>-Dimethylformamide; C_3H_7NO; [68-12-2]</p>	<p>ORIGINAL MEASUREMENTS:</p> <p>Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1973</u>, 23, 1-17.</p>												
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COMPONENTS: (1) Butane; C_4H_8 ; [106-97-8] (2) 1-Methyl-2-pyrrolidinone ; C_5H_9NO ; [872-50-4]	ORIGINAL MEASUREMENTS: Lenoir, J-Y.; Renault, P.; Renon, H. <i>J. Chem. Eng. Data</i> <u>1971</u> , <i>16</i> , 340-2	
VARIABLES: T/K : 298.15 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* $x_{C_4H_{10}}$
298.15	18.4	0.0543
<p>* Calculated by compiler assuming a linear function of $p_{C_4H_{10}}$ vs $x_{C_4H_{10}}$, i.e. $x_{C_4H_{10}}(1 atm) = 1/H_{C_4H_{10}}$</p>		
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: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler).	
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COMPONENTS: (1) Butane; C_4H_{10} ; [106-97-8] (2) Hexamethylphosphoric triamide, $C_6H_{18}N_3OP$; [680-31-9]	ORIGINAL MEASUREMENTS: Lenoir, J.-Y.; Renault, P.; Renon, H. <i>J. Chem Eng. Data</i> <u>1971</u> , <i>16</i> , 340-2.	
VARIABLES: T/K : 298.2 P/kPa : 101.3	PREPARED BY: C.L. Young	
EXPERIMENTAL VALUES:		
T/K	Henry's constant C_4H_{10}/atm	Mole fraction at 1 atm* C_4H_{10}
298.2	6.09	0.164
<p>* Calculated by compiler assuming a linear function of $p_{C_4H_{10}}$ vs $x_{C_4H_{10}}$, i.e., $x_{C_4H_{10}}(1atm) = 1/H_{C_4H_{10}}$</p>		
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: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler).	
	REFERENCES:	

<p>COMPONENTS:</p> <p>(1) Butane; C_4H_{10}; [106-97-8] (2) Quinoline; C_9H_7N; [91-22-5] or Benzenamine; C_6H_7N; [62-53-3]</p>	<p>ORIGINAL MEASUREMENTS:</p> <p>Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1973</u>, 23, 1-17.</p>	
<p>VARIABLES:</p> <p>T/K: 278.2 P/kPa: 101.3</p>	<p>PREPARED BY:</p> <p>C. L. Young</p>	
<p>EXPERIMENTAL VALUES:</p> <p style="text-align: center;">Total pressure = 101.3 kPa</p>		
<p>T/K</p>	<p>Mole ratio</p>	<p>Mole fraction of butane[#]</p>
<p>278.2</p>	<p>Quinoline; C_9H_7N; [91-22-5] 0.333</p>	<p>0.250</p>
<p>278.2</p>	<p>Benzenamine; C_6H_7N; [62-53-3] 0.074</p>	<p>0.0689</p>
<p>[#] Calculated by compiler.</p>		
<p style="text-align: center;">AUXILIARY INFORMATION</p>		
<p>METHOD APPARATUS/PROCEDURE:</p> <p>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).</p>	<p>SOURCE AND PURITY OF MATERIALS:</p> <p>No details given except that "all compounds were purified by conventional procedures".</p> <p>ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta x/x = \pm 3\%$ (estimated by compiler).</p> <p>REFERENCES:</p> <p>1. Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1972</u>, 22, 623.</p>	

COMPONENTS: (1) Butane; C_4H_{10} ; [106-97-8] (2) Benzenamine, (Aniline); C_6H_7N ; [62-53-3]	ORIGINAL MEASUREMENTS: Lenoir, J-Y.; Renault, P.; Renon, H. <i>J. Chem. Eng. Data</i> <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	25.3	0.0395
<p>* Calculated by compiler assuming a linear function of $p_{C_4H_{10}}$ vs $x_{C_4H_{10}}$, i.e., $x_{C_4H_{10}}(1 atm) = 1/H_{C_4H_{10}}$</p>		
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: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler).	
	REFERENCES:	

<p>COMPONENTS:</p> <p>(1) Butane; C_4H_{10}; [106-97-8]</p> <p>(2) Nitrobenzene; $C_6H_5NO_2$; [98-95-3]</p> <p>1-Methyl-2-nitrobenzene; $C_7H_7NO_2$; [88-72-2]</p>	<p>ORIGINAL MEASUREMENTS:</p> <p>Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1973</u>, 23, 1-17.</p>																											
<p>VARIABLES:</p> <p>T/K: 278.2-298.2</p> <p>P/kPa: 101.3</p>	<p>PREPARED BY:</p> <p>C. L. Young</p>																											
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COMPONENTS: (1) 2-Methylpropane; (isobutane); C_4H_{10} ; [75-28-5] (2) 1-Methyl-2-pyrrolidinone; C_5H_9NO ; [872-50-4]	ORIGINAL MEASUREMENTS: Lenoir, J-Y.; Renault, P.; Renon, H. <i>J. Chem. Eng. Data</i> <u>1971</u> , <i>16</i> , 340-2	
VARIABLES: T/K : 298.15 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* $x_{C_4H_{10}}$
298.15	33.3	0.0300
* 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		
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	ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler).	
	REFERENCES:	

COMPONENTS: (1) 2-Methylpropane, (isobutane); C ₄ H ₁₀ ; [75-28-5] (2) Nitrobenzene; C ₆ H ₅ NO ₂ ; [98-95-3]		ORIGINAL MEASUREMENTS: Gerrard, W. <i>Solubility of Gases and Liquids</i> , 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	0.012
	200	26.7	0.027
	300	40.0	0.041
	400	53.3	0.053
	500	66.7	0.068
	600	80.0	0.087
	700	93.3	0.111
	760	101.3	0.134
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE: 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).		SOURCE AND PURITY OF MATERIALS: No details given.	
		ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta x/x = \pm 3\%$ (estimated by compiler).	
		REFERENCES: 1. Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1972</u> 22, 623-650. 2. Gerrard, W. <i>Solubility of Gases and Liquids</i> , Plenum Press, New York, <u>1976</u> Chapter 1.	

COMPONENTS:		ORIGINAL MEASUREMENTS:	
(1) 2-Methylpropane (isobutane); C ₄ H ₁₀ ; [75-28-5]		Ezheleva, A.E.; Zorin, A.D.	
(2) Nitrobenzene; C ₆ H ₅ NO ₂ ; [98-95-3]		<i>Tr. Khim. Khim. Tech. (Gorkii)</i> 1961, 1, 37-40.	
VARIABLES:		PREPARED BY:	
T/K: 303.15-343.15		W. Hayduk	
P/kPa: 101.325 and above			
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	12.3	10.9	0.0495(0.0501) ³
313.15	11.6	9.97	0.0455(0.0435)
323.15	9.40	7.80	0.0360(0.0364)
333.15	7.76	6.23	0.0290(0.0296)
343.15	6.53	5.08	0.0238(0.0234)
<p>¹Original data given as the inverse of Henry's constant which is equivalent to mole fraction at a gas partial pressure of 101.325 kPa.</p> <p>²Ostwald and Bunsen coefficients calculated by compiler using authors' assumption that solvent is non-volatile.</p> <p>³From equation of smoothed data:</p> $\ln x_1 = 293.07 - 44.650 \ln T - 12405.7/T$ <p>Correlation coefficient = 0.9947</p>			
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
<p>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.</p> <p>The solvent was considered non-volatile and the gas pressure was considered to be the total pressure.</p>		<p>1. Source and purity not given. Gas purified by low temperature fractionation and analyzed by gas chromatography.</p> <p>2. Source and purity not given. Refractive index measured:</p> $n_D^{20} = 1.5560$	
		ESTIMATED ERROR:	
		$\delta T/K = 0.05$ $\delta x_1/x_1 = 0.05$ (estimated by compiler)	
		REFERENCES:	