CRITICAL EVALUATION:

The solubility of propane in the n-alkanes which are normally liquid has been studied by at least thirteen groups of workers. The sources for the propane solubilities in the particular n-alkane solvents are: pentane (9), hexane (1, 2, 3, 4, 6), heptane (1, 9), octane (4, 9), nonane (9), decane (5, 9, 10), dodecane (1), tetradecane (7), and hexadecane (1, 2, 7, 8, 11, 12, 13). Data from these sources are shown in the diagram below as the mole fraction propane solubility for a gas partial pressure at 101.325 kPa and 298.15 K, \( x_p \), as a linear function of the number of carbon atoms in the solvent molecule, \( C_n \). In a number of instances an extrapolation of the data was required for comparison at 298.15 K and for these cases "ex" has been added after the reference number. Except for the solubilities in hexane and heptane, the data of Jadot (9) appear to be erratic and are rejected. The chromatographic method used, effectively at low gas partial pressures, may have contributed to the apparently unreliable results. The data of Gerrard (5) for the solubility in decane is very much higher than any other data and is also rejected. The extrapolated data of Tilquin et al. (6) in hexane, of Chappelow and Prausnitz (11) in hexadecane and of Lin and Parcher (8) also in hexadecane appear to be at least 5% lower than those of several other workers and are classified as doubtful. The remaining data, classified as tentative, were used to determine a regression line which is shown in Figure 1 as a dashed line:

\[
 x_{C_3} = 0.1036 + 0.00197 \ C_n \\
\text{Correlation coefficient} = 0.975
\]

Figure 1. Solubility of propane in n-alkane solvents at 298.15 K.
There are conflicting data for the solubility in branched isomers of alkane solvents. The solubilities in the four branched C₆ solvents, 2-methylpentane, 3-methylpentane, 2,2'-dimethylbutane, (neo-hexane) and 2,3-dimethylbutane reported in ref. (3) are all similar to those in n-hexane; the mean value at 298.14 K is almost identical to that calculated from the equation shown above. These data suggest that branching in solvents has only a small effect if any on the solubility, provided that the same number of carbons are present in the solvent molecules. On the other hand, the extrapolated data for the solubility in 2,2'-dimethylbutane of Tilquin et al. (6) is some 15% higher than that for n-hexane solvent. Yet a similar comparison for butane gas solubility by those authors indicates a butane solubility in 2,2'-dimethylbutane which is significantly lower than in n-hexane. Furthermore, the propane solubility in 2,2,4,6,8,8-heptamethylnonane (C₁₆H₃₄) as reported by Richon and Renon (13) at 298.15 K is almost four times as great as that in n-hexadecane also as reported by the same authors, an incredible difference. In may be concluded that there are insufficient data to form a sound opinion concerning the effect of branching in alkane solvents.

The solubility of propane in n-alkane solvents of higher molecular weight are compared at 373.15 K, a temperature at which all the normally solid alkanes are liquids, in Figure 2. Extrapolation was

Figure 2. Solubility of propane and butane in high molecular weight n-alkane solvents at 373.15 K.
COMPONENTS:

(1) Propane; C₃H₈; [74-98-6]
   Butane; C₄H₁₀; [106-97-8]
   2-Methylpropane; C₄H₁₀; [75-28-5]

(2) Alkane solvents

EVALUATOR:

Walter Hayduk
Department of Chemical Engineering
University of Ottawa
Ottawa, Canada K1N 9B4

January, 1984

CRITICAL EVALUATION:

required in several instances to estimate the solubility at 373.15 K. Although scarce, the data show a trend consistent with that of lower molecular weight alkanes, a linear increase in mole fraction solubility with number of carbons per molecule of solvent. The data sources are: for heptadecane (12), octadecane (13,14), eicosane (11,14), docosane (14), octacosane (8) and hexatriacontane (8). These data are all classified as tentative. A straight line through the (extrapolated) data points, shown as a dashed line in Figure 2, has the following constants for use at 373.15 K:

\[ \chi_{C_3} = 0.02250 + 0.00105 C_n \]

Correlation coefficient = 0.964

The solubility of propane in the branched alkane, 2,6,10,15,19, 23-hexamethyltetracosane or squalane (C₃₀H₆₂) at 373.15 K (11) is similar to that for an n-alkane with the same number of carbons. These data are also classified as tentative.

The data for the solubility of butane in n-alkane solvents from pentane to hexadecane for a temperature of 298.15 K are shown in Figure 3. The sources of data are listed according to solvent: pentane (9), hexane (6,9), heptane (2,9), octane (2,9), nonane (9), decane (5,9,10), dodecane (2,10), and hexadecane (2,11,13). Except for the solvents hexane and heptane, the solubilities of Jadot (9) appear erratic as they did for propane solubilities and hence are rejected. The data of Montfort and Arriaga in decane and dodecane (10) appear too high and are also rejected. The extrapolated data of Chappelow and Prausnitz in hexadecane (11) appear low by more than 5% as they did for propane gas in the same solvent, and are rejected. The remaining data (2,5,6,13) are classified as tentative and were used to obtain a regression line for the mole fraction solubility at 298.15 K:

Figure 3. Solubility of butane in n-alkane solvents at 298.15 K.
CRITICAL EVALUATION: continued

\[ x_C^4 = 0.3975 + 0.00484 \ C^4 \]

\( \text{Correlation coefficient} = 0.813 \)

The solubility of butane in 2,2'-dimethylbutane (neohexane) \( \text{(6)} \) is classified as tentative. The solubility in 2,2,4,4,6,8,8-heptamethylnonane \( \text{(13)} \) is rejected because of an impossible fractional value for Henry's law constant.

Butane solubilities at 373.15 K in the high molecular weight (and normally solid) \( n \)-alkane solvents from hexadecane to hexatriacontane are shown in Figure 2. Mainly the data of Parcher et al. \( \text{(15)} \) are available for these solvents. The solvents and sources are: hexadecane \( \text{(11)} \), octadecane \( \text{(13)} \), eicosane \( \text{(11, 15)} \), docosane \( \text{(15)} \), tetracosane \( \text{(15)} \), octacosane \( \text{(15)} \), triacontane \( \text{(15)} \), dotriacontane \( \text{(15)} \), tetratriacontane \( \text{(15)} \) and hexatriacontane \( \text{(15)} \). These data are all classified as tentative. A regression equation for the solubility of butane at 373.15 K in high molecular weight \( n \)-alkane solvents is:

\[ x_C^4 = 0.06414 + 0.00203 \ C^4 \]

\( \text{Correlation coefficient} = 0.980 \)

The solubility of butane in 2,6,10,15,19,23-hexamethyltetracosane \( \text{(C30H62)} \) \( \text{(11)} \), as observed for propane, is similar to that for an alkane with the same number of carbons. These data are classified as tentative.

There are three sources of data for the solubility of 2-methylpropane in \( n \)-alkane solvents. These are listed by solvent: pentane \( \text{(9)} \), hexane \( \text{(6,9)} \), heptane \( \text{(9)} \), octane \( \text{(9)} \), nonane \( \text{(9)} \), and decane \( \text{(5,9)} \). There are insufficient data for the solubility of 2-methylpropane alone to assess the reliability of the Jadot data \( \text{(9)} \); however, based on the erratic nature of the solubilities of propane and butane by the same worker when compared with those of other workers, these data are also rejected. Only the data of Tilquin et al. \( \text{(6)} \) in heptane and of Gerrard \( \text{(5)} \) in decane remain; these are classified as tentative.

The solubility of 2-methylpropane in eicosane \( \text{(11)} \) is also classified as tentative.

In all cases the regression equations given in this Critical Evaluation are approximate only, because they are based, at least in part, on extrapolated and/or too few data to be highly reliable. Nor is it possible to ascribe useful limits of accuracy to them.

The solubility of the gases propane, 2-methylpropane, and butane appear to increase in the order listed, in each of the \( n \)-alkane solvents. The order of increasing solubility of gases has been related to the order of increasing normal boiling points of the gases \( \text{(17)} \) as obtained here.

References
COMPONENTS:
(1) Propane; C\textsubscript{3}H\textsubscript{8}; [74-98-6]
Butane; C\textsubscript{4}H\textsubscript{10}; [101-97-8]
2-Methylpropane; C\textsubscript{4}H\textsubscript{10}; [75-28-5]
(2) Alkane solvents

EVALUATOR:
Walter Hayduk
Department of Chemical Engineering
University of Ottawa
Ottawa, Canada K1N 9B4
January, 1984

CRITICAL EVALUATION: continued

### COMPONENTS:

1. Propane; \( \text{C}_3\text{H}_8 \); [74-98-6]
2. Pentane; \( \text{C}_5\text{H}_{12} \); [109-66-0]
   or
   Hexane; \( \text{C}_6\text{H}_{14} \); [110-54-3]

### ORIGINAL MEASUREMENTS:

Jadot, R.


### VARIABLES:

- \( T/K: \) 298.15
- \( P/kPa: \) 101.3

### PREPARED BY:

C.L. Young

### EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/K )</th>
<th>Henry's Law Constant, ( \mathcal{H} ) /atm</th>
<th>Mole fraction(^+) at partial pressure of 101.3 kPa, ( x_{\text{C}_3\text{H}_8} )</th>
<th>( # \Delta H^\infty ) /cal mol(^{-1})</th>
<th>( # \Delta H^\infty ) (/J mol(^{-1}))</th>
</tr>
</thead>
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<tr>
<td>298.15</td>
<td>9.916</td>
<td>0.1008</td>
<td>-</td>
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</tr>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>298.15</td>
<td>8.924</td>
<td>0.1121</td>
<td>200 (837)</td>
<td></td>
</tr>
</tbody>
</table>

\(+\) Calculated by compiler assuming \( x_{\text{C}_3\text{H}_8} = 1/\mathcal{H} \)

\(\#\) Excess partial molar enthalpy of solution at infinite dilution.

### AUXILIARY INFORMATION

**METHOD/APPARATUS/PROCEDURE:**

The conventional gas chromatographic technique 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 no allowance was made for surface adsorption.

**SOURCE AND PURITY OF MATERIALS:**

No details given.

**ESTIMATED ERROR:**

\( \delta T/K = \pm 0.05; \delta \mathcal{H} = \pm 2\% \)

**REFERENCES:**
COMPONENTS:
(1) Propane; C₃H₈; [74-98-6]
(2) Hexane; C₆H₁₄; [110-54-3]

ORIGINAL MEASUREMENTS:
Hayduk, W.; Walter, E.B.; Simpson, P.

VARIABLES:
T/K: 298.15
P/kPa: 101.325

PREPARED BY:
W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Ostwald Coefficient¹</th>
<th>Bunsen Coefficient²</th>
<th>Mole Fraction¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/cm³ cm⁻³</td>
<td>a/cm³(STP)cm⁻³atm⁻¹</td>
<td>x₁</td>
</tr>
<tr>
<td>298.15</td>
<td>23.75</td>
<td>21.76</td>
<td>0.115</td>
</tr>
</tbody>
</table>

¹ Original data.
² Calculated by compiler.
³ ΔG° calculated by compiler:

$$\Delta G°/J\ mol^{-1} = -RT \ln x_1 = 5.361$$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
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).

SOURCE AND PURITY OF MATERIALS:
1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.
2. Canlab. Chromatoquality grade of minimum specified purity 99.9 per cent.

ESTIMATED ERROR:
$$\delta T/K = 0.1$$
$$\delta x₁/x₁ = 0.01$$

REFERENCES:
1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M.
COMPONENTS:
(1) Propane; C\textsubscript{3}H\textsubscript{8}; [74-98-6]
(2) Hexane; C\textsubscript{6}H\textsubscript{14}; [110-54-3]

ORIGINAL MEASUREMENTS:
Hayduk, W.; Castañeda, R.

VARIABLES:
T/K: 298.15
P/kPa: 101.325

PREPARED BY:
W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Ostwald Coefficient\textsuperscript{1}</th>
<th>Bunsen Coefficient\textsuperscript{2}</th>
<th>Mole fraction\textsuperscript{1}</th>
<th>( \Delta G^o )\textsuperscript{3}</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>24.0</td>
<td>22.0</td>
<td>0.1166</td>
<td>5327.0</td>
</tr>
</tbody>
</table>

\textsuperscript{1} Original data.
\textsuperscript{2} Calculated by compiler.
\textsuperscript{3} Calculated by compiler from the following equation:
\[ \Delta G^o / J \text{ mol}^{-1} = -RT \ln x_1 \]

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
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).

SOURCE AND PURITY OF MATERIALS:
1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.
2. Canlab. 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.
COMPONENTS:

1. Propane; \( C_3H_8 \); [74-98-6]
2. Hexane; \( C_6H_{14} \); [110-54-3]

ORIGINAL MEASUREMENTS:
Thomsen, E.S.; Gjaldbaek, J.C.

VARIABLES:
- \( T/K \): 298.15
- \( P/kPa \): 101.325

PREPARED BY:
E.S. Thomsen, W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/K )</th>
<th>Ostwald Coefficient (^2 )</th>
<th>Bunsen Coefficient (^1 )</th>
<th>Mole Fraction (^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>23.7</td>
<td>21.6</td>
<td>0.115</td>
</tr>
</tbody>
</table>

\(^1\text{Original data.}\)
\(^2\text{Calculated by compiler's using a real gas molar volume.}\)

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
The method utilizes a combined glass manometer and bulb enclosed in an air thermostat which is shaken until equilibrium is established. Mercury is used for calibrating the volumes and as the confining liquid. Details in reference 1.

The absorbed gas volume is calculated from the initial dry gas, and final solvent vapor-saturated gas volume. The amount of solvent is determined by measuring the mass of mercury displaced.

SOURCE AND PURITY OF MATERIALS:
1. Phillips Petroleum Co.
Specified as research grade and GC analysis indicated 0.1 per cent air and 0.03 per cent ethane impurities.

ESTIMATED ERROR:
\[ \delta T/K = 0.05 \]
\[ \delta x_1/x_1 = 0.015 \]

REFERENCES:
1. Gjaldbaek, J.C.
COMPONENTS:

(1) Propane; C\textsubscript{3}H\textsubscript{8}; [74-98-6]
(2) Hexane; C\textsubscript{6}H\textsubscript{14}; [110-54-3]

ORIGINAL MEASUREMENTS:

Tilquin, B.; Decanniere, L.; Fontaine, R.; Claes, P.

VARIABLES:

T/K: 288.15
p/kPa: 5.04-7.31

EXPERIMENTAL VALUES:

<table>
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<th>t/°C</th>
<th>T/K</th>
<th>Ostwald coefficient\textsuperscript{1}</th>
<th>Mole fraction\textsuperscript{2}</th>
<th>Henry's constant\textsuperscript{2}</th>
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</thead>
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<tr>
<td>15.0</td>
<td>288.15</td>
<td>29.3</td>
<td>0.1382</td>
<td>27.2</td>
</tr>
</tbody>
</table>

\textsuperscript{1}Original data at low pressure reported as a distribution coefficient; if Henry's law and ideal gas law apply, the distribution coefficient is equivalent to the Ostwald coefficient as shown here.

\textsuperscript{2}Calculated by compiler for a gas partial pressure of 101.325 kPa assuming that Henry's law and ideal gas law apply.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

An all glass apparatus was used at a very low gas partial pressure. It contained a replaceable degassed solvent ampule equipped with a breakable point which could be broken by means of a magnetically activated plunger. The quantity of gas fed into the system was determined by measuring the pressure change in a known volume. The quantity of liquid was measured by weight. The pressure change was observed after the solvent was released.

Experimental details are described by Rzad and Claes.

SOURCE AND PURITY OF MATERIALS:

1. Source not given; minimum purity specified as 99.0 mole per cent.
2. Fluka pure grade; minimum purity specified as 99.0 mole per cent.

ESTIMATED ERROR:

\[ T/K = 0.05 \text{(estimated by compiler)} \]
\[ \delta x_2/x_2 = 0.01 \]

REFERENCES:

1. Rzad, S.; Claes, P.
COMPONENTS:
(1) Propane; \( C_3H_8; \) [74-98-6]
(2) Hexane; \( C_6H_{14}; \) [110-54-3]

ORIGINAL MEASUREMENTS:
Fleury, D.; Hayduk, W.

VARIABLES:
\( T/K: \) 258.15-323.15
\( P/kPa: \) 101.325

PREPARED BY:
W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/K )</th>
<th>Ostwald Coefficient(^1)</th>
<th>Bunsen Coefficient(^2)</th>
<th>Mole Fraction(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( L/cm^3 )</td>
<td>( cm^{-3} ) (STP)cm(^3)atm(^{-1})</td>
<td>( x_j )</td>
<td></td>
</tr>
<tr>
<td>258.15</td>
<td>83.4</td>
<td>88.2</td>
<td>0.336 (0.3352)(^3)</td>
</tr>
<tr>
<td>278.15</td>
<td>40.4</td>
<td>41.2</td>
<td>0.188 (0.1894)</td>
</tr>
<tr>
<td>298.15</td>
<td>23.6</td>
<td>21.6</td>
<td>0.116 (0.1154)</td>
</tr>
<tr>
<td>323.15</td>
<td>13.9</td>
<td>11.7</td>
<td>0.0675 (0.0676)</td>
</tr>
</tbody>
</table>

\(^1\) Original data.
\(^2\) Calculated by compiler.
\(^3\) The mole fraction solubility of the original data was used to determine the following equations for \( \Delta G^o \) and \( \ln x_j \) and table of smoothed values:
\[
\Delta G^o/J \text{ mol}^{-1} = 61.609 + 2.0476 T \text{ ln } T - 16494
\]
\[
\ln x_j = 1983.9/T - 0.24628 \text{ ln } T - 7.4103
\]

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
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).

SOURCE AND PURITY OF MATERIALS:
1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.

ESTIMATED ERROR:
\[
\delta T/K = 0.1
\]
\[
\delta x_j/x_j = 0.01
\]

REFERENCES:
1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M.
**COMPONENTS:**

1. Propane; $\text{C}_3\text{H}_8$; [74-98-6]
2. 2-Methylpentane; $\text{C}_6\text{H}_{14}$; [107-83-5]

**ORIGINAL MEASUREMENTS:**

Fleury, D.; Hayduk, W.  

**VARIABLES:**

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<tr>
<th>$T/K$</th>
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</thead>
<tbody>
<tr>
<td>$P/kPa$</td>
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**EXPERIMENTAL VALUES:**

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>Ostwald Coefficient$^1$</th>
<th>Bunsen Coefficient$^2$</th>
<th>Mole Fraction$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$L/cm^3 \ cm^{-3}$</td>
<td>$\alpha/cm^3 \ (STP) \ cm^{-3} \ atm^{-1}$</td>
<td>$x_l$</td>
</tr>
<tr>
<td>258.15</td>
<td>84.5</td>
<td>89.4</td>
<td>0.342 (0.339)$^3$</td>
</tr>
<tr>
<td>278.15</td>
<td>40.4</td>
<td>39.7</td>
<td>0.190 (0.192)</td>
</tr>
<tr>
<td>298.15</td>
<td>24.0</td>
<td>22.0</td>
<td>0.118 (0.118)</td>
</tr>
<tr>
<td>323.15</td>
<td>14.1</td>
<td>11.9</td>
<td>0.0695 (0.0694)</td>
</tr>
</tbody>
</table>

$^1$ Original data.  
$^2$ Calculated by compiler.  
$^3$ The mole fraction solubility of the original data was used to determine the following equations for $\Delta G^o$ and $\ln x_l$, and a table of smoothed values:

\[
\Delta G^o/J \ mol^{-1} = -RT \ln x_l = 74.596 T - 16937
\]

\[
\ln x_l = 2037/T - 8.972
\]

Std. deviation for $\Delta G^o = 19.8 J \ mol^{-1}$; Correlation coefficient = 0.9999

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>$\Delta G^o/J \ mol^{-1}$</th>
<th>$x_l$</th>
<th>$T/K$</th>
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<td>323.15</td>
<td>7169</td>
<td>0.0694</td>
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**AUXILIARY INFORMATION**

**METHOD/APPARATUS/PROCEDURE:**

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).

**SOURCE AND PURITY OF MATERIALS:**

1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.

**ESTIMATED ERROR:**

$\delta T/K = 0.1$  
$\delta x_l/x_l = 0.01$

**REFERENCES:**

1. Clever, H.L.; Battino, R.; Baylor, J.H.; Gross, P.M.  
### Alkanes

**COMPONENTS:**

1. Propane; \( C_3H_8 \); [74-98-6]
2. 3-Methylpentane; \( C_{6}H_{14} \); [96-14-0]

**ORIGINAL MEASUREMENTS:**

Fleury, D.; Hayduk, W.


**VARIABLES:**

- **T/K:** 258.15-323.15
- **P/kPa:** 101.325

**PREPARED BY:**

W. Hayduk

**EXPERIMENTAL VALUES:**

<table>
<thead>
<tr>
<th>T/K</th>
<th>Ostwald Coefficient ( L/cm^3 cm^{-3} )</th>
<th>Bunsen Coefficient ( a/cm^3 (STP)cm^{-3} atm^{-1} )</th>
<th>Mole Fraction ( x_l )</th>
</tr>
</thead>
<tbody>
<tr>
<td>258.15</td>
<td>84.2</td>
<td>89.1</td>
<td>0.338 (0.339)</td>
</tr>
<tr>
<td>278.15</td>
<td>42.2</td>
<td>41.4</td>
<td>0.193 (0.190)</td>
</tr>
<tr>
<td>298.15</td>
<td>23.3</td>
<td>21.3</td>
<td>0.113 (0.115)</td>
</tr>
<tr>
<td>323.15</td>
<td>13.8</td>
<td>11.7</td>
<td>0.0673 (0.0669)</td>
</tr>
</tbody>
</table>

1. Original data.
2. Calculated by compiler.

The mole fraction solubility of the original data was used to determine the following equations for \( AG^0 \) and \( \ln x_l \), and table of smoothed values:

\[
AG^0/J \text{ mol}^{-1} = -RT \ln x_l = 76.094 \frac{R}{T} - 17324 \\
\ln x_l = 2083.7/T - 9.1525
\]

Std. deviation for \( AG^0 = 33.7 J/ \text{ mol}^{-1} \); Correlation coefficient = 0.9999

<table>
<thead>
<tr>
<th>T/K</th>
<th>( AG^0/J \text{ mol}^{-1} )</th>
<th>( x_l )</th>
<th>T/K</th>
<th>( AG^0/J \text{ mol}^{-1} )</th>
<th>( x_l )</th>
</tr>
</thead>
<tbody>
<tr>
<td>258.15</td>
<td>2319</td>
<td>0.339</td>
<td>298.15</td>
<td>5363</td>
<td>0.115</td>
</tr>
<tr>
<td>273.15</td>
<td>3460</td>
<td>0.218</td>
<td>303.15</td>
<td>5743</td>
<td>0.102</td>
</tr>
<tr>
<td>283.15</td>
<td>4221</td>
<td>0.166</td>
<td>313.15</td>
<td>6504</td>
<td>0.0822</td>
</tr>
<tr>
<td>293.15</td>
<td>4982</td>
<td>0.130</td>
<td>323.15</td>
<td>7265</td>
<td>0.0669</td>
</tr>
</tbody>
</table>

**AUXILIARY INFORMATION**

**METHOD/APPARATUS/PROCEDURE:**

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).

**SOURCE AND PURITY OF MATERIALS:**

1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.

**ESTIMATED ERROR:**

\[
\delta T/K = 0.1 \\
\delta x_l/x_l = 0.01
\]

**REFERENCES:**

1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M.
COMPONENTS:
(1) Propane; \( \text{C}_3\text{H}_8 \); [74-98-6]
(2) 2,2'-Dimethylbutane 
(Neo-hexane); \( \text{C}_6\text{H}_{14} \); [75-83-2]

VARIABLES:
\[ \begin{align*}
\text{T/K} & : 288.15 \\
\text{P/kPa} & : 2.15-2.47
\end{align*} \]

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( t/\degree\text{C} )</th>
<th>( T/\text{K} )</th>
<th>Ostwald coefficient(^1) ( \text{L/cm}^2\text{cm}^{-3} )</th>
<th>Mole fraction(^2) ( x_1 )</th>
<th>Henry's constant(^2) ( \text{H/atm} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0</td>
<td>288.15</td>
<td>37.0</td>
<td>0.1735</td>
<td>35.0</td>
</tr>
</tbody>
</table>

\(^1\)Original data at low pressure reported as a distribution coefficient; if Henry's law and ideal gas law apply, the distribution coefficient is equivalent to the Ostwald coefficient as shown here.

\(^2\)Calculated by compiler for a gas partial pressure of 101.325 kPa assuming that Henry's law and ideal gas law apply.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
An all glass apparatus was used at a very low gas partial pressure. It contained a replaceable degassed solvent ampule equipped with a breakable point which could be broken by means of a magnetically activated plunger. The quantity of gas fed into the system was determined by measuring the pressure change in a known volume. The quantity of liquid was measured by weight. The pressure change was observed after the solvent was released.

Experimental details are described by Rzad and Claes(1).

SOURCE AND PURITY OF MATERIALS:

1. Source not given; minimum purity specified as 99.0 mole per cent.
2. Fluka pure grade; minimum purity specified as 99.0 mole per cent.

ESTIMATED ERROR:
\[ \begin{align*}
\text{T/K} & = 0.05 \text{(estimated by compiler)} \\
\delta x_1/x_1 & = 0.01
\end{align*} \]

REFERENCES:

1. Rzad, S.; Claes, P.
COMPONENTS:

(1) Propane; C\textsubscript{3}H\textsubscript{8}; [74-98-6]

(2) 2,2-Dimethylbutane; C\textsubscript{6}H\textsubscript{14}; [75-83-2]

ORIGINAL MEASUREMENTS:

Fleury, D.; Hayduk, W.

VARIABLES:

T/K: 258.15-313.15
P/kPa: 101.325

PREPARED BY:

W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Ostwald Coefficient\textsuperscript{1} L/cm\textsuperscript{3}cm\textsuperscript{-3}</th>
<th>Bunsen Coefficient\textsuperscript{2} a/cm\textsuperscript{3} (STP)cm\textsuperscript{-3}atm\textsuperscript{-1}</th>
<th>Mole Fraction\textsuperscript{1} x\textsubscript{1}</th>
</tr>
</thead>
<tbody>
<tr>
<td>258.15</td>
<td>86.7</td>
<td>91.7</td>
<td>0.346 (0.3467)\textsuperscript{3}</td>
</tr>
<tr>
<td>278.15</td>
<td>41.9</td>
<td>41.1</td>
<td>0.195 (0.1954)</td>
</tr>
<tr>
<td>298.15</td>
<td>23.8</td>
<td>21.8</td>
<td>0.116 (0.1146)</td>
</tr>
<tr>
<td>313.15</td>
<td>15.6</td>
<td>13.6</td>
<td>0.0779 (0.0786)</td>
</tr>
</tbody>
</table>

\textsuperscript{1}Original data.

\textsuperscript{2}Calculated by compiler.

\textsuperscript{3}The mole fraction solubility of the original data was used to determine the following equations for \(\Delta G^\circ\) and \(\ln x_1\) and table of smoothed values:

\[
\Delta G^\circ/J \text{ mol}^{-1} = -RT \ln x_1 = 63.901 T \ln T - 346.07 T \\
\ln x_1 = 41.6253 - 7.6860 \ln T
\]

Std. deviation for \(\Delta G^\circ = 18.9 \text{ J mol}^{-1};\ Correlation coefficient = 0.9999

<table>
<thead>
<tr>
<th>T/K</th>
<th>(\Delta G^\circ/J \text{ mol}^{-1})</th>
<th>(x_1)</th>
<th>T/K</th>
<th>(\Delta G^\circ/J \text{ mol}^{-1})</th>
<th>(x_1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>258.15</td>
<td>2273</td>
<td>0.3467</td>
<td>293.15</td>
<td>4963</td>
<td>0.1305</td>
</tr>
<tr>
<td>273.15</td>
<td>3391</td>
<td>0.2246</td>
<td>298.15</td>
<td>5370</td>
<td>0.1146</td>
</tr>
<tr>
<td>278.15</td>
<td>3776</td>
<td>0.1954</td>
<td>303.15</td>
<td>5783</td>
<td>0.1008</td>
</tr>
<tr>
<td>283.15</td>
<td>4166</td>
<td>0.1704</td>
<td>313.15</td>
<td>6623</td>
<td>0.0786</td>
</tr>
</tbody>
</table>

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

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).

SOURCE AND PURITY OF MATERIALS:

1. Matheson Co. Specified as instrument grade of minimum purity 99.5 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.
COMPONENTS:

(1) Propane; C\textsubscript{3}H\textsubscript{8}; [74-98-6]

(2) 2,3-Dimethylbutane; C\textsubscript{6}H\textsubscript{14}; [79-29-8]

ORIGINAL MEASUREMENTS:

Fleury, D.; Hayduk, W.


VARIABLES:

\( T/K: \) 258.15-318.15

\( P/kPa: \) 101.325

PREPARED BY:

W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/K )</th>
<th>Ostwald Coefficient(^1) ( L/cm^3 \text{ cm}^{-3} )</th>
<th>Bunsen Coefficient(^2) ( \alpha/cm^3 \text{ (STP) cm}^{-3} \text{ atm}^{-1} )</th>
<th>Mole Fraction(^1)</th>
<th>( x_l )</th>
</tr>
</thead>
<tbody>
<tr>
<td>258.15</td>
<td>86.3</td>
<td>91.3</td>
<td>0.341</td>
<td>(0.344)(^3)</td>
</tr>
<tr>
<td>278.15</td>
<td>41.9</td>
<td>41.1</td>
<td>0.191</td>
<td>(0.190)</td>
</tr>
<tr>
<td>298.15</td>
<td>24.2</td>
<td>22.2</td>
<td>0.115</td>
<td>(0.114)</td>
</tr>
<tr>
<td>318.15</td>
<td>14.7</td>
<td>12.6</td>
<td>0.0718</td>
<td>(0.0724)</td>
</tr>
</tbody>
</table>

\(^1\) Original data.

\(^2\) Calculated by compiler.

\(^3\) The mole fraction solubility of the original data was used to determine the following equations for \( \Delta G^0 \) and \( \ln x_l \) and table of smoothed values:

\[
\Delta G^0/J \text{ mol}^{-1} = -RT \ln x_l = 77.533 T - 17724
\]

\[
\ln x_l = 2131.8/T - 9.3256
\]

Std. deviation for \( \Delta G^0 = 26.1/J \text{ mol}^{-1} \); Correlation coefficient = 0.9999

<table>
<thead>
<tr>
<th>( T/K )</th>
<th>( \Delta G^0/J \text{ mol}^{-1} )</th>
<th>( x_l )</th>
<th>( T/K )</th>
<th>( \Delta G^0/J \text{ mol}^{-1} )</th>
<th>( x_l )</th>
</tr>
</thead>
<tbody>
<tr>
<td>258.15</td>
<td>2291</td>
<td>0.344</td>
<td>298.15</td>
<td>5392</td>
<td>0.114</td>
</tr>
<tr>
<td>273.15</td>
<td>3454</td>
<td>0.219</td>
<td>303.15</td>
<td>5780</td>
<td>0.101</td>
</tr>
<tr>
<td>283.15</td>
<td>4229</td>
<td>0.166</td>
<td>313.15</td>
<td>6555</td>
<td>0.0806</td>
</tr>
<tr>
<td>293.15</td>
<td>5004</td>
<td>0.128</td>
<td>318.15</td>
<td>6943</td>
<td>0.0724</td>
</tr>
</tbody>
</table>

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

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).

SOURCE AND PURITY OF MATERIALS:

1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.


ESTIMATED ERROR:

\( \delta T/K = 0.1 \)

\( \delta x_l/x_l = 0.01 \)

REFERENCES:

1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M.

**COMPONENTS:**

1. Propane; $\text{C}_3\text{H}_8$; [74-98-6]
2. Heptane; $\text{C}_7\text{H}_{16}$; [142-82-5]

**ORIGINAL MEASUREMENTS:**

Hayduk, W.; Walter, E.B.; Simpson, P.  

**VARIABLES:**

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>$P/kPa$</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15-318.15</td>
<td>101.325</td>
</tr>
</tbody>
</table>

**EXPERIMENTAL VALUES:**

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>Ostwald Coefficient $^1$</th>
<th>Bunsen Coefficient $^2$</th>
<th>Mole Fraction $^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$L/cm^3 \cdot cm^{-3}$</td>
<td>$\alpha/cm^3 \cdot (STP)cm^{-3} \cdot atm^{-1}$</td>
<td>$x_1$</td>
</tr>
<tr>
<td>298.15</td>
<td>21.65</td>
<td>19.8</td>
<td>0.117</td>
</tr>
<tr>
<td>308.15</td>
<td>17.30</td>
<td>15.3</td>
<td>0.0942</td>
</tr>
<tr>
<td>318.15</td>
<td>14.60</td>
<td>12.5</td>
<td>0.0798</td>
</tr>
</tbody>
</table>

$^1$ Original data.

$^2$ Calculated by compiler.

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

$$\Delta G^o/J \text{ mol}^{-1} = -RT \ln x_1 = 68.488 T - 15085$$

$$\ln x_1 = 1814.4/T - 8.2377$$

Std. deviation for $\Delta G^o = 28.4 \text{ J mol}^{-1}$; Correlation coefficient $= 0.9994$

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>$\Delta G^o/J \text{ mol}^{-1}$</th>
<th>$x_1$</th>
<th>$T/K$</th>
<th>$\Delta G^o/J \text{ mol}^{-1}$</th>
<th>$x_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>5335</td>
<td>0.116</td>
<td>313.15</td>
<td>6362</td>
<td>0.0868</td>
</tr>
<tr>
<td>303.15</td>
<td>5677</td>
<td>0.105</td>
<td>318.15</td>
<td>6705</td>
<td>0.0793</td>
</tr>
<tr>
<td>308.15</td>
<td>6020</td>
<td>0.0954</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**METHOD/APPARATUS/PROCEDURE:**

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).

**SOURCE AND PURITY OF MATERIALS:**

1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.
2. Canlab. Chromatoquality grade of minimum specified 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, F.M.  
### Components:

1. Propane; $\text{C}_3\text{H}_8$; [74-98-6]
2. Heptane; $\text{C}_7\text{H}_{16}$; [142-82-5]
   or
3. Octane; $\text{C}_8\text{H}_{18}$; [111-65-9]

### Original Measurements:

Jadot, R.


### Variables:

- $T/K$: 298.15
- $P/kPa$: 101.3

### Experimental Values:

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>$H/\text{atm}$</th>
<th>Mole Fraction $+$ at partial pressure of 101.3 kPa, $x_{\text{C}_3\text{H}_8}$</th>
<th>$# \Delta H$</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>8.29</td>
<td>0.1206</td>
<td>215 (900)</td>
</tr>
<tr>
<td>298.15</td>
<td>7.84</td>
<td>0.1276</td>
<td>230 (962)</td>
</tr>
</tbody>
</table>

$+$ Calculated by compiler assuming $x_{\text{C}_3\text{H}_8} = 1/H$

$\#$ Excess partial molar enthalpy of solution at infinite dilution.

### Auxiliary Information

**Method/Equipment/Procedure:**

The conventional gas chromatographic technique 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 no allowance was made for surface adsorption.

**Source and Purity of Materials:**

No details given.

**Estimated Error:**

$\delta T/K = \pm 0.05$; $\delta H = \pm 2\%$

**References:**
COMPONENTS:

(1) Propane; C₃H₈; [74-98-6]
(2) Octane; C₈H₁₈; [111-65-9]

VARIABLES:

T/K: 298.15
P/kPa: 101.325

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Ostwald Coefficient²</th>
<th>Bunsen Coefficient¹</th>
<th>Mole Fraction²</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>19.86</td>
<td>18.1</td>
<td>0.1191</td>
</tr>
</tbody>
</table>

¹Original data.
²Calculated by compilers using a real gas molar volume.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The method utilizes a combined glass manometer and bulb enclosed in an air thermostat which is shaken until equilibrium is established. Mercury is used for calibrating the volumes and as the confining liquid. Details in reference 1.

The absorbed gas volume is calculated from the initial dry gas, and final solvent vapor-saturated gas volume. The amount of solvent is determined by measuring the mass of mercury displaced.

SOURCE AND PURITY OF MATERIALS:

1. Phillips Petroleum Co.
   Specified as research grade and GC analysis indicated 0.1 per cent air and 0.03 per cent ethane impurities
2. British Drug House. Fractionation yielded boiling range of 0.02 K. Estimated about 1 per cent impurity.

ESTIMATED ERROR:

δT/K = 0.05
δx₁ x₁ = 0.015

REFERENCES:

1. Gjaldbaek, J.C.
COMPONENTS:

(1) Propane; C₃H₈; [74-98-6]
(2) Nonane; C₉H₂₀; [111-84-2]
  or
Decane; C₁₀H₂₂; [124-18-5]

ORIGINAL MEASUREMENTS:

Jadot, R.

VARIABLES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>298.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/kPa</td>
<td>101.3</td>
</tr>
</tbody>
</table>

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Henry's Law Constant, H/atm</th>
<th>Mole fraction+ at partial pressure of 101.3 kPa, xC₃H₈</th>
<th>#ΔH°/cal mol⁻¹</th>
<th>#ΔH°/J mol⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>7.566</td>
<td>0.1322</td>
<td>260 (1088)</td>
<td></td>
</tr>
<tr>
<td>298.15</td>
<td>7.058</td>
<td>0.1417</td>
<td>270 (1130)</td>
<td></td>
</tr>
</tbody>
</table>

+ Calculated by compiler assuming xC₃H₈ = 1/H

# Excess partial molar enthalpy of solution at infinite dilution.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The conventional gas chromatographic technique 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 no allowance was made for surface adsorption.

SOURCE AND PURITY OF MATERIALS:

No details given.

ESTIMATED ERROR:

δT/K = ±0.05; δH = ±2%

REFERENCES:
COMPONENTS:
(1) Propane; C<sub>3</sub>H<sub>8</sub>; [74-98-6]
(2) Decane; C<sub>10</sub>H<sub>22</sub>; [124-18-5]

ORIGINAL MEASUREMENTS:
Gerrard, W.

VARIABLES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>P/kPa: 101.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>268.2-298.2</td>
<td>101.3 kPa</td>
</tr>
</tbody>
</table>

PREPARED BY:
C. L. Young

EXPERIMENTAL VALUES:

Total pressure = 101.3 kPa

<table>
<thead>
<tr>
<th>T/K</th>
<th>Mole ratio</th>
<th>Mole fraction of propane <em>#</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>268.2</td>
<td>0.355</td>
<td>0.262</td>
</tr>
<tr>
<td>273.2</td>
<td>0.322</td>
<td>0.244</td>
</tr>
<tr>
<td>278.2</td>
<td>0.303</td>
<td>0.233</td>
</tr>
<tr>
<td>283.2</td>
<td>0.287</td>
<td>0.223</td>
</tr>
<tr>
<td>293.2</td>
<td>0.266</td>
<td>0.210</td>
</tr>
<tr>
<td>298.2</td>
<td>0.258</td>
<td>0.205</td>
</tr>
</tbody>
</table>

*#* Calculated by compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
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).

SOURCE AND PURITY OF MATERIALS:
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.
1972, 22, 623.
COMPONENTS:
(1) Propane; \( \text{C}_3\text{H}_8 \); [74-98-6]
(2) Decane; \( \text{C}_{10}\text{H}_{22} \); [124-18-5]

ORIGINAL MEASUREMENTS:
Monfort, J. P.; Arriaga, J. L.

VARIABLES:
\[
\begin{align*}
T/\text{K} & : 298.15 \\
P/\text{kPa} & : 101.325
\end{align*}
\]

PREPARED BY:
C. L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>(T/\text{K} )</th>
<th>Henry's Law Constant, ( H/\text{atm} )</th>
<th>Mole fraction* of propane at 101.3 kPa partial pressure ( x_{\text{C}_3\text{H}_8} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>8.02</td>
<td>0.125</td>
</tr>
</tbody>
</table>

* Calculated by compiler assuming a linear relationship between \( P_{\text{C}_3\text{H}_8} \) and \( x_{\text{C}_3\text{H}_8} \) (i.e., \( x_{\text{C}_3\text{H}_8}(1 \text{ atm}) = 1/H_{\text{C}_3\text{H}_8} \)).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
Chromatographic determination with exponential dilutor. Solvent saturated with gas. A stripping gas was slowly passed through the solution and the concentration of dissolved gas measured using gas chromatography. Details in source.

SOURCE AND PURITY OF MATERIALS:

1. Matheson sample, purity 99 per cent by mass.
2. Merck spectroscopic grade.

ESTIMATED ERROR:
\[
\delta T/\text{K} = \pm 0.03; \ \delta H = \pm 3\%.
\]

REFERENCES:
COMPONENTS:

(1) Propane; \( \text{C}_3\text{H}_8 \); [74-98-6]
(2) Dodecane; \( \text{C}_{12}\text{H}_{26} \); [112-40-3]

ORIGINAL MEASUREMENTS:

Hayduk, W.; Walter, E.B.; Simpson, P.

VARIABLES:

\( T/\text{K} : 298.15 - 318.15 \)
\( P/\text{kPa} : 101.325 \)

PREPARED BY:

W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/\text{K} )</th>
<th>Ostwald Coefficient(^1)</th>
<th>Bunsen Coefficient(^2)</th>
<th>Mole Fraction(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \text{L/cm}^3 \text{ cm}^{-3} )</td>
<td>( \alpha/\text{cm}^3 \text{ (STP) cm}^{-3} \text{ atm}^{-1} )</td>
<td>( x_1 )</td>
</tr>
<tr>
<td>298.15</td>
<td>14.95</td>
<td>13.70</td>
<td>0.123</td>
</tr>
<tr>
<td>308.15</td>
<td>12.24</td>
<td>10.85</td>
<td>0.101</td>
</tr>
<tr>
<td>318.15</td>
<td>10.21</td>
<td>8.77</td>
<td>0.0831</td>
</tr>
</tbody>
</table>

\(^1\) Original data.
\(^2\) Calculated by compiler.

The mole fraction solubility of the original data was used to determine the following equations for \( \Delta G^0 \) and \( \ln x_1 \) and a table of smoothed values:

\[
\Delta G^0/\text{J mol}^{-1} = -RT \ln x_1 = 69.328 T - 15480
\]

\[
\ln x_1 = \frac{1861.9}{T} - 8.3387
\]

Std. deviation for \( \Delta G^0 = 8.0 \text{ J mol}^{-1} \); Correlation coefficient = 0.9999

<table>
<thead>
<tr>
<th>( T/\text{K} )</th>
<th>( \Delta G^0/\text{J mol}^{-1} )</th>
<th>( x_1 )</th>
<th>( T/\text{K} )</th>
<th>( \Delta G^0/\text{J mol}^{-1} )</th>
<th>( x_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>5190</td>
<td>0.123</td>
<td>313.15</td>
<td>6230</td>
<td>0.0914</td>
</tr>
<tr>
<td>303.15</td>
<td>5536</td>
<td>0.111</td>
<td>318.15</td>
<td>6576</td>
<td>0.0832</td>
</tr>
</tbody>
</table>

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

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).

SOURCE AND PURITY OF MATERIALS:

1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.
2. Canlab. Specified olefin-free and of minimum purity 99.0 per cent.

ESTIMATED ERROR:

\( \delta T/\text{K} = 0.1 \)
\( \delta x_1/x_1 = 0.01 \)

REFERENCES:

1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M.
COMPONENTS:

(1) Propane; C\textsubscript{3}H\textsubscript{8}; [74-98-6]
(2) Tetradecane; C\textsubscript{14}H\textsubscript{30}; [629-59-4]

ORIGINAL MEASUREMENTS:

King, M.B.; Al-Najjar, H.

VARIABLES:

T/K: 303.15-343.15
P/kPa: 101.325

PREPARED BY:

W. Hayduk, C.L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Ostwald Coefficient\textsuperscript{2} L/cm\textsuperscript{3} cm\textsuperscript{-3}</th>
<th>Bunsen Coefficient\textsuperscript{2} a/cm\textsuperscript{3} (STP)cm\textsuperscript{-3}atm\textsuperscript{-1}</th>
<th>Mole Fraction\textsuperscript{1} x\textsubscript{1}</th>
</tr>
</thead>
<tbody>
<tr>
<td>303.15</td>
<td>12.36</td>
<td>11.07</td>
<td>0.117 (0.117)\textsuperscript{3}</td>
</tr>
<tr>
<td>323.15</td>
<td>8.71</td>
<td>7.30</td>
<td>0.0817(0.0817)</td>
</tr>
<tr>
<td>343.15</td>
<td>6.47</td>
<td>5.10</td>
<td>0.0596(0.0596)</td>
</tr>
</tbody>
</table>

\textsuperscript{1}Original data.

\textsuperscript{2}Calculated by compiler.

\textsuperscript{3}The mole fraction solubility of the original data was used to determine the following equations for \( \Delta G^o \) and \( \ln x_1 \) and table of smoothed values:

\[
\Delta G^o / J \text{ mol}^{-1} = -RT \ln x_1 = 65.955 T - 14585.2
\]

\[
\ln x_1 = 1754.29/T - 7.9330 \quad \text{Correlation coefficient} = 0.9999
\]

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The apparatus consists of a gas burette, an absorption spiral, a degassing chamber, a solution pipette and a magnetic stirrer. The solvent is degassed by spraying into an evacuated chamber. The solvent is then displaced by continuously injecting mercury, forcing the solvent into the absorption spiral which is also connected to the gas burette. Absorption takes place in the spiral while mixing is provided in the solution pipette to ensure that equilibrium is achieved. The volume of solution collected and corresponding volume of dry gas expelled from the gas burette are used in the calculation of solubility.

SOURCE AND PURITY OF MATERIALS:

1. Source not specified.
   Impurities not exceeding 0.6%.
2. Source and purity not specified.

ESTIMATED ERROR:

\( \delta T/K = 0.1 \)
\( \delta x_1/x_1 = 0.013 \) (authors)

REFERENCES:
COMPONENTS:
(1) Propane; C₃H₈; [74-98-6]
(2) Hexadecane; C₁₆H₃₄; [544-76-3]

ORIGINAL MEASUREMENTS:
Hayduk, W.; Walter, E.B.; Simpson, P.

VARIABLES:
T/K: 298.15-318.15
P/kPa: 101.325

PREPARED BY:
W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K (K)</th>
<th>Ostwald Coefficient¹</th>
<th>Bunsen Coefficient²</th>
<th>Mole Fraction¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/cm³ cm⁻³</td>
<td>a/cm³ (STP)cm⁻³ atm⁻¹</td>
<td>x₁</td>
</tr>
<tr>
<td>298.15</td>
<td>12.65</td>
<td>11.59</td>
<td>0.133</td>
</tr>
<tr>
<td>308.15</td>
<td>10.25</td>
<td>9.09</td>
<td>0.109</td>
</tr>
<tr>
<td>318.15</td>
<td>8.58</td>
<td>7.37</td>
<td>0.0896</td>
</tr>
</tbody>
</table>

¹ Original data.
² Calculated by compiler.

The mole fraction solubility of the original data was used to determine the following equations for ΔG° and ln x₁, and table of smoothed values:

ΔG°/J mol⁻¹ = -RT ln x₁ = 69.053 T - 15592
ln x₁ = 1875.4/T - 8.3056

Std. deviation for ΔG° = 7.3 J mol⁻¹; Correlation coefficient = 0.9999

<table>
<thead>
<tr>
<th>T/K (K)</th>
<th>ΔG°/J mol⁻¹</th>
<th>x₁</th>
<th>T/K (K)</th>
<th>ΔG°/J mol⁻¹</th>
<th>x₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>4996</td>
<td>0.133</td>
<td>313.15</td>
<td>6032</td>
<td>0.0986</td>
</tr>
<tr>
<td>303.15</td>
<td>5342</td>
<td>0.120</td>
<td>318.15</td>
<td>6377</td>
<td>0.0897</td>
</tr>
</tbody>
</table>

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

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).

SOURCE AND PURITY OF MATERIALS:

1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.
2. Canlab. Specified olefin-free and of minimum purity 99.0 per cent.

ESTIMATED ERROR:

δT/K = 0.1
δx₁/x₁ = 0.01

REFERENCES:

1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M.
<table>
<thead>
<tr>
<th>COMPONENTS:</th>
<th>ORIGINAL MEASUREMENTS:</th>
</tr>
</thead>
</table>
| (1) Propane; C₃H₈; [74-98-6] | Hayduk, W.; Castañeda, R.  
| (2) Hexadecane; C₁₆H₃₄; [544-76-3] |  |

<table>
<thead>
<tr>
<th>VARIABLES:</th>
<th>PREPARED BY:</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/K: 298.15</td>
<td>W. Hayduk</td>
</tr>
<tr>
<td>P/kPa: 101.325</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPERIMENTAL VALUES:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>T/K</td>
<td>Ostwald Coefficient¹</td>
</tr>
<tr>
<td>------</td>
<td>----------------------</td>
</tr>
<tr>
<td>298.15</td>
<td>12.93</td>
</tr>
</tbody>
</table>

¹ Original data.  
² Calculated by compiler.  
³ Calculated by compiler from the following equation:  
\[ \Delta G^o / J \text{ mol}^{-1} = -RT \ln x_1 \]

**AUXILIARY INFORMATION**

**METHOD/APPARATUS/PROCEDURE:**

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).

**SOURCE AND PURITY OF MATERIALS:**

1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.  
2. Canlab. 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.  
COMPONENTS:
(1) Propane; $C_3H_8$; [74-98-6]
(2)Hexadecane; $C_{16}H_{34}$; [544-76-3]

ORIGINAL MEASUREMENTS:
King, M.B.; Al-Najjar, H.

VARIABLES:
$T/K$: 303.15-343.15
$P/kPa$: 101.325

PREPARED BY:
W. Hayduk, C.L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>Ostwald Coefficient $^2$</th>
<th>Bunsen Coefficient $^2$</th>
<th>Mole Fraction $^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/cm$^3$ cm$^{-3}$</td>
<td>a/cm$^3$ (STP)cm$^{-3}$ atm$^{-1}$</td>
<td>$x_l$</td>
</tr>
<tr>
<td>303.15</td>
<td>11.86</td>
<td>10.62</td>
<td>0.125 (0.1246)</td>
</tr>
<tr>
<td>323.15</td>
<td>8.25</td>
<td>6.91</td>
<td>0.0865 (0.0871)</td>
</tr>
<tr>
<td>343.15</td>
<td>6.06</td>
<td>4.77</td>
<td>0.0625 (0.0623)</td>
</tr>
</tbody>
</table>

$^1$Original data.

$^2$Calculated by compiler.

The mole fraction solubility of the original data was used to determine the following equations for $\Delta G^0$ and $\ln x_l$ and table of smoothed values:

$$\Delta G^0/J \text{ mol}^{-1} = -RT \ln x_l = 46.512 T \ln T - 248.46 T$$

$$\ln x_l = 29.883 - 5.5941 \ln T, \text{Correlation coefficient} = 0.9998$$

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>$\Delta G^0/J \text{ mol}^{-1}$</th>
<th>$x_l$</th>
<th>$T/K$</th>
<th>$\Delta G^0/J \text{ mol}^{-1}$</th>
<th>$x_l$</th>
</tr>
</thead>
<tbody>
<tr>
<td>303.15</td>
<td>5249.8</td>
<td>0.1246</td>
<td>333.15</td>
<td>7231.7</td>
<td>0.0735</td>
</tr>
<tr>
<td>313.15</td>
<td>5895.9</td>
<td>0.1039</td>
<td>343.15</td>
<td>7920.9</td>
<td>0.0623</td>
</tr>
<tr>
<td>323.15</td>
<td>6556.6</td>
<td>0.0871</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
The apparatus consists of a gas burette, an absorption spiral, a degassing chamber, a solution pipette and a magnetic stirrer. The solvent is degassed by spraying into an evacuated chamber. The solvent is then displaced by continuously injecting mercury, forcing the solvent into the absorption spiral which is also connected to the gas burette. Absorption takes place in the spiral while mixing is provided in the solution pipette at the gas-liquid interface to ensure that equilibrium is achieved. The volume of solution collected and corresponding volume of dry gas expelled from the gas burette are used in the calculation of solubility.

SOURCE AND PURITY OF MATERIALS:
1. Source not specified. Impurities not exceeding 0.6%.
2. Source and purity not specified.

ESTIMATED ERROR:
$\delta T/K = 0.1$
$\delta x_l/x_l = 0.013$ (authors)

REFERENCES:
### COMPONENTS:

| (1) Propane; C₃H₈; [74-98-6] |
| (2) Hexadecane; C₁₆H₃₄; [544-76-3] |

### ORIGINAL MEASUREMENTS:

Chappelow, C.C.; Prausnitz, J.M.  
*A.I.Ch.E.J.* 1974, 20, 1097-1104.

### VARIABLES:

| T/K: 300-475 | P/kPa: 101.325 |

### PREPARED BY:

C.L. Young

### EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Henry's Constant a H/atm</th>
<th>Mole fraction b of propane at 1 atm. partial pressure, x₃C₃H₈</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>8.34</td>
<td>0.120</td>
</tr>
<tr>
<td>325</td>
<td>12.9</td>
<td>0.0775</td>
</tr>
<tr>
<td>350</td>
<td>18.6</td>
<td>0.0538</td>
</tr>
<tr>
<td>375</td>
<td>25.4</td>
<td>0.0394</td>
</tr>
<tr>
<td>400</td>
<td>33.2</td>
<td>0.0301</td>
</tr>
<tr>
<td>425</td>
<td>41.6</td>
<td>0.0240</td>
</tr>
<tr>
<td>450</td>
<td>50.1</td>
<td>0.0200</td>
</tr>
<tr>
<td>475</td>
<td>58.4</td>
<td>0.0171</td>
</tr>
</tbody>
</table>

a Authors stated measurements were made at several pressures and values of solubility used were all within the Henry's law region.

b Calculated by compiler assuming linear relationship between mole fraction and pressure.

---

### AUXILIARY INFORMATION

**METHOD/APPARATUS/PROCEDURE:**

Volumetric apparatus similar to that described by Dymond and Hildebrand (1). Pressure measured with a null detector and precision gauge. Details in ref. (2).

**SOURCE AND PURITY OF MATERIALS:**

Solvent degassed, no other details given.

**ESTIMATED ERROR:**

δT/K = ±0.1; δx₃C₃H₈ = ±1%

**REFERENCES:**

1. Dymond, J.; Hildebrand, J.H.  

2. Cukor, P.M.; Prausnitz, J.M.  
COMPONENTS:
(1) Propane; \( \text{C}_3\text{H}_8 \); [74-98-6]
(2) Hexadecane; \( \text{C}_{16}\text{H}_{34} \); [544-76-3]
    or Heptadecane; \( \text{C}_{17}\text{H}_{36} \); [629-78-7]

ORIGINAL MEASUREMENTS:
Lenoir, J-Y.; Renault, P.; Renon, H.

VARIABLES:
\( T/\text{K} \): 298.2, 323.2
\( P/\text{kPa} \): 101.3

PREPARED BY:
C. L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/\text{K} )</th>
<th>Henry's constant ( H_{\text{C}_3\text{H}_8}/\text{atm} )</th>
<th>Mole fraction at 1 atm* ( x_{\text{C}_3\text{H}_8} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexadecane; ( \text{C}<em>{16}\text{H}</em>{34} ); [544-76-3]</td>
<td>298.2</td>
<td>7.41</td>
</tr>
<tr>
<td>Heptadecane; ( \text{C}<em>{17}\text{H}</em>{36} ); [629-78-7]</td>
<td>323.2</td>
<td>12.5</td>
</tr>
</tbody>
</table>

* Calculated by compiler assuming a linear function of \( P_{\text{C}_3\text{H}_8} \) vs \( x_{\text{C}_3\text{H}_8} \)

i.e., \( x_{\text{C}_3\text{H}_8} (1 \text{ atm}) = \frac{1}{H_{\text{C}_3\text{H}_8}} \)

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:
\( \delta T/\text{K} = \pm 0.1; \delta H/\text{atm} = \pm 6\% \) (estimated by compiler).

REFERENCES:
COMPONENTS:

(1) Propane; \(C_3H_8\); [74-98-6]
(2) Hexadecane; \(C_{16}H_{34}\); [544-76-3]
    or
Octadecane; \(C_{18}H_{36}\); [593-45-3]

ORIGINAl MEASUREMENTS:

Richon, D.; Renon, H.


VARIABLES:

\begin{align*}
T/K &: 298.15, 323.15 \\
P/kPa &: 101.3
\end{align*}

PREPARED BY:

C.L. Young

EXPERIMENTAL VALUES:

\begin{center}
\begin{tabular}{|c|c|c|}
\hline
T/K & Limiting value of Henry's constant, \(H_\infty/\text{atm}\) & Mole fraction of propane, * \\
\hline
298.15 & 7.45 & 0.134 \\
323.15 & 11.3 & 0.0885 \\
\hline
\end{tabular}
\end{center}

* Calculated by compiler assuming mole fraction is a linear function of pressure up to 1 atm.

AUXILIARY INFORMATION

\textbf{METHOD/APPARATUS/PROCEDURE:}

Inert gas stripping plus gas chromatographic method. Details given in ref. (1). Method based on passing constant stream of inert gas through dissolved gas-solvent mixture and periodically injecting mixture into gas chromatograph. Henry's law constant determined from variation of gas peak area with time.

\textbf{SOURCE AND PURITY OF MATERIALS:}

1. L'Air Liquide sample, purity 99.5 mole per cent.
2. Hexadecane was a Merck sample, Octadecane was a Fluka sample, both had purities of not less than 99 mole per cent.

\textbf{ESTIMATED ERROR:}

\(\delta T/K = \pm 0.05\); \(\delta x_{C_3H_8} = \pm 4\%\) (estimated by compiler).

\textbf{REFERENCES:}

### Components:

(1) Propane; C$_3$H$_8$; [74-98-6]
(2) 2,2,4,4,6,8,8-Heptamethyl nonane; C$_{16}$H$_{34}$; [4390-04-9]

### Original Measurements:

Richon, D.; Renon, H.


### Variables:

<table>
<thead>
<tr>
<th>T/K</th>
<th>298.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/kPa</td>
<td>101.3</td>
</tr>
</tbody>
</table>

### Experimental Values:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Limiting value of Henry's constant, H$_\infty$/atm</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>2.01</td>
</tr>
</tbody>
</table>

### Auxiliary Information:

**Method/Apparatus/Procedure:**

Inert gas stripping plus gas chromatographic method. Details given in ref. (1). Method based on passing constant stream of inert gas through dissolved gas-solvent mixture and periodically injecting mixture into gas chromatograph. Henry's law constant determined from variation of gas peak area with time.

**Source and Purity of Materials:**

1. L'Air Liquide sample, purity 99.5 mole per cent.
2. Sigma sample, purity not less than 99 mole per cent.

**Estimated Error:**

$\delta T/K = \pm 0.05$; $\delta H_\infty = \pm 4\%$

(estimated by compiler).

**References:**

COMPONENTS:
(1) Propane; C\textsubscript{3}H\textsubscript{8}; [74-98-6]
(2) Octadecane; C\textsubscript{18}H\textsubscript{38}; [593-45-3]

ORIGINAL MEASUREMENTS:
Ng. S.; Harris, H.G.; Prausnitz, J.M.

VARIABLES:
\( T / \text{K} \): 308.2-423.2
\( P / \text{kPa} \): 101.325

PREPARED BY:
C.L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T / \text{K} )</th>
<th>Henry's Constant, ( H / \text{atm.} )</th>
<th>Mole fraction(^+) of propane in liquid, ( x_{C_3H_8} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>308.2</td>
<td>8.0</td>
<td>0.125</td>
</tr>
<tr>
<td>323.2</td>
<td>10.7</td>
<td>0.0935</td>
</tr>
<tr>
<td>343.2</td>
<td>15.1</td>
<td>0.0662</td>
</tr>
<tr>
<td>363.2</td>
<td>20.6</td>
<td>0.0485</td>
</tr>
<tr>
<td>373.2</td>
<td>23.1</td>
<td>0.0433</td>
</tr>
<tr>
<td>423.2</td>
<td>39.2</td>
<td>0.0255</td>
</tr>
</tbody>
</table>

\(^+\) At 1 atmosphere partial pressure, calculated by compiler assuming mole fraction equals \( 1/H \).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
Gas chromatographic method. Solvent supported on Chromosorb P in 6m column. Gas injected as sample, helium used as carrier gas. Henry's law constant calculated from knowledge of retention time and flow rate.

SOURCE AND PURITY OF MATERIALS:
1. Matheson sample, purity greater than 99 mole per cent.
2. Matheson, Coleman and Bell sample, m.pt. 27-28.5°C.

ESTIMATED ERROR:
\( \delta T / \text{K} = \pm 0.1 \); \( \delta H / \text{atm} = \pm 5\% \).

REFERENCES:
COMPONENTS:
(1) Propane; \( \text{C}_3\text{H}_8 \); [74-98-6]
(2) Eicosane; \( \text{C}_{20}\text{H}_{42} \); [112-95-8]

ORIGICAL MEASUREMENTS:
Chappelow, C.C.; Prausnitz, J.M.

VARIABLES:
\[ \begin{align*}
T/\text{K} & : 325-475 \\
p/\text{kPa} & : 101.325
\end{align*} \]

EXPERIMENTAL VALUES:
\[
\begin{array}{ccc}
T/\text{K} & \text{Henry's Constant}^a \text{H/atm} & \text{Mole fraction}^b \text{ of propane at 1 atm. partial pressure, } x_{\text{C}_3\text{H}_8} \\
325 & 12.7 & 0.0787 \\
350 & 18.3 & 0.0546 \\
375 & 25.6 & 0.0391 \\
400 & 34.1 & 0.0293 \\
425 & 43.1 & 0.0232 \\
450 & 52.0 & 0.0192 \\
475 & 60.3 & 0.0166
\end{array}
\]

---

\(^a\) Authors stated measurements were made at several pressures and values of solubility used were all within the Henry's law region.

\(^b\) Calculated by compiler assuming linear relationship between mole fraction and pressure.

METHOD/APPARATUS/PROCEDURE:
Volumetric apparatus similar to that described by Dymond and Hildebrand (1). Pressure measured with a null detector and precision gauge. Details in ref. (2).

SOURCE AND PURITY OF MATERIALS:
Solvent degassed; no other details given.

ESTIMATED ERROR:
\[
\delta T/\text{K} = \pm 0.1; \quad \delta x_{\text{C}_3\text{H}_8} = \pm 1\%
\]

REFERENCES:
### COMPONENTS:

1. Propane; $\text{C}_3\text{H}_8$; [74-98-6]
2. Eicosane; $\text{C}_{20}\text{H}_{42}$; [112-95-8]

### ORIGINAL MEASUREMENTS:

Ng. S.; Harris, H.G., Prausnitz, J.M. 

### VARIABLES:

- **T/K**: 323.2-413.2
- **P/kPa**: 101.325

### EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Henry's Constant, $H$/atm</th>
<th>Mole fraction of propane in liquid, $x_{\text{C}_3\text{H}_8}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>323.2</td>
<td>10.6</td>
<td>0.0943</td>
</tr>
<tr>
<td>343.2</td>
<td>14.9</td>
<td>0.0671</td>
</tr>
<tr>
<td>373.2</td>
<td>22.9</td>
<td>0.0437</td>
</tr>
<tr>
<td>393.2</td>
<td>28.9</td>
<td>0.0346</td>
</tr>
<tr>
<td>413.2</td>
<td>36.3</td>
<td>0.0275</td>
</tr>
</tbody>
</table>

* At 1 atmosphere partial pressure, calculated by compiler assuming mole fraction equals 1/$H$.

### AUXILIARY INFORMATION

**METHOD/APPARATUS/PROCEDURE:**

Gas chromatographic method. Solvent supported on Chromosorb P in 6 m column. Gas injected as sample, helium used as carrier gas. Henry's law constant calculated from knowledge of retention time and flow rate.

**SOURCE AND PURITY OF MATERIALS:**

1. Matheson sample, purity greater than 99 mole per cent.
2. Matheson, Coleman and Bell sample, m.pt. 35-36.5°C.

**ESTIMATED ERROR:**

$\Delta T/K = \pm 0.1$; $\Delta H/$atm $= \pm 5\%$

**REFERENCES:**
### COMPONENTS:

1. Propane; \( \text{C}_3\text{H}_8; [74-98-6] \)
2. Docosane; \( \text{C}_{22}\text{H}_{46}; [629-97-0] \)

### ORIGINAL MEASUREMENTS:


### VARIABLES:

\[ \begin{align*}
T/K & : 333.2-473.2 \\
P/kPa & : 101.325
\end{align*} \]

### EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/K )</th>
<th>Henry's Constant, ( H )</th>
<th>Mole fraction of propane in liquid, ( x_{\text{C}_3\text{H}_8} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>333.2</td>
<td>12.3</td>
<td>0.0813</td>
</tr>
<tr>
<td>383.2</td>
<td>24.9</td>
<td>0.0402</td>
</tr>
<tr>
<td>408.2</td>
<td>33.6</td>
<td>0.0298</td>
</tr>
<tr>
<td>433.2</td>
<td>44.0</td>
<td>0.0227</td>
</tr>
<tr>
<td>453.2</td>
<td>48.9</td>
<td>0.0204</td>
</tr>
<tr>
<td>473.2</td>
<td>60.5</td>
<td>0.0165</td>
</tr>
</tbody>
</table>

* At 1 atmosphere partial pressure, calculated by compiler assuming mole fraction equals \( 1/H \).

### AUXILIARY INFORMATION

**METHOD/APPARATUS/PROCEDURE:**

Gas chromatographic method. Solvent supported on Chromosorb P in 6 m column. Gas injected as sample, helium used as carried gas. Henry's law constant calculated from knowledge of retention time and flow rate.

**SOURCE AND PURITY OF MATERIALS:**

1. Matheson sample; purity greater than 99 mole per cent.
2. Matheson, Coleman and Bell sample, m.pt. 43-45°C.

**ESTIMATED ERROR:**

\[ \delta T/K = \pm 0.1; \quad \delta H/\text{atm} = \pm 5\% \]

**REFERENCES:**
COMPONENTS:

(1) Propane; \( \text{C}_3\text{H}_8 \); [74-98-6]

(2) 2,6,10,15,19,23-Hexamethyl-tetracosane, (squalane); \( \text{C}_{30}\text{H}_{62} \); [111-01-3]

ORIGINAL MEASUREMENTS:

Chappelow, C.C.; Prausnitz, J.M.


VARIABLES:

\( T/K: \) 300-475

\( P/kPa: \) 101.325

PREPARED BY:

C.L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/K )</th>
<th>Henry's Constant(^a) ( H/\text{atm} )</th>
<th>Mole fraction(^b) of propane at 1 atm. partial pressure, ( x_{\text{C}_3\text{H}_8} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>5.66</td>
<td>0.177</td>
</tr>
<tr>
<td>325</td>
<td>8.83</td>
<td>0.113</td>
</tr>
<tr>
<td>350</td>
<td>13.0</td>
<td>0.0769</td>
</tr>
<tr>
<td>375</td>
<td>17.9</td>
<td>0.0559</td>
</tr>
<tr>
<td>400</td>
<td>23.5</td>
<td>0.0426</td>
</tr>
<tr>
<td>425</td>
<td>29.6</td>
<td>0.0338</td>
</tr>
<tr>
<td>450</td>
<td>35.9</td>
<td>0.0279</td>
</tr>
<tr>
<td>475</td>
<td>41.7</td>
<td>0.0240</td>
</tr>
</tbody>
</table>

\(^a\) Authors stated measurements were made at several pressures and values of solubility used were all within the Henry's law region.

\(^b\) Calculated by compiler assuming linear relationship between mole fraction and pressure.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Volumetric apparatus similar to that described by Dymond and Hildebrand (1). Pressure measured with a null detector and precision gauge. Details in ref. (2).

SOURCE AND PURITY OF MATERIALS:

Solvent degassed; no other details given.

ESTIMATED ERROR:

\[ \delta T/K = \pm 0.1; \delta x_{\text{C}_3\text{H}_8} = \pm 1\% \]

REFERENCES:

1. Dymond, J.; Hildebrand, J.H.

2. Cukor, P.M.; Prausnitz, J.M.
COMPONENTS:

(1) Propane; C₃H₈; [74-98-6]
(2) Hexadecane; C₁₆H₃₄; [544-76-3]
    Octacosane; C₂₈H₅₈; [630-02-4]
    Hexatriacontane; C₃₆H₇₄; [630-06-8]

ORIGINAL MEASUREMENTS:

Lin, P. J.; Parcher, J. F.
J. Chromatog. Sci.

VARIABLES:

T/K: 298.2-413.2
P₁/kPa: 101.325

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Henry's law constant, $H$/atm</th>
<th>Mole fraction at a partial pressure of 1 atmosphere, $x_{C_3H_8}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.2</td>
<td>7.99</td>
<td>0.125</td>
</tr>
<tr>
<td>313.2</td>
<td>10.1</td>
<td>0.0990</td>
</tr>
<tr>
<td>328.2</td>
<td>13.4</td>
<td>0.0746</td>
</tr>
<tr>
<td>353.2</td>
<td>15.4</td>
<td>0.0649</td>
</tr>
<tr>
<td>373.2</td>
<td>19.3</td>
<td>0.0518</td>
</tr>
<tr>
<td>393.2</td>
<td>24.7</td>
<td>0.0405</td>
</tr>
<tr>
<td>413.2</td>
<td>25.7</td>
<td>0.0389</td>
</tr>
</tbody>
</table>

METHOD/APPARATUS/PROCEDURE:

Henry's law constant determined from retention volume of gas on a chromatographic column. Helium was used as a carrier gas and a mass spectrometer was used as a detector. The measured Henry's law constants were independent of sample size, flow rate and composition of injected sample. The dead volume was determined by two independent methods and the values agreed within experimental error.

SOURCE AND PURITY OF MATERIALS:

No details given.

ESTIMATED ERROR:

$\delta T/K = \pm 0.1$; $\delta x_{C_3H_8} = \pm 5\%$

(estimated by compiler).
### COMPONENTS:

1. Butane; $C_4H_{10}$; [106-97-8]
2. Pentane; $C_5H_{12}$; [109-66-0]
   or
   Hexane; $C_6H_{14}$; [110-54-3]

### ORIGINAL MEASUREMENTS:

Jadot, R.  

### VARIABLES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>298.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/kPa</td>
<td>101.3</td>
</tr>
</tbody>
</table>

### PREPARED BY:

C.L. Young

### EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Henry's Law Constant, $H$/atm</th>
<th>Mole fraction* at partial pressure of 101.3 kPa, $x_{C_4H_{10}}$</th>
<th>$\Delta H^\circ$ /cal mol$^{-1}$</th>
<th># Excess partial molar enthalpy of solution at infinite dilution.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>298.15</td>
<td>2.594</td>
<td>0.3858</td>
<td>150 (628)</td>
<td></td>
</tr>
<tr>
<td>298.15</td>
<td>2.524</td>
<td>0.3962</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Calculated by compiler assuming $x_{C_4H_{10}} = 1/H$.

# Excess partial molar enthalpy of solution at infinite dilution.

### AUXILIARY INFORMATION

**METHOD/APPARATUS/PROCEDURE:**

The conventional gas chromatographic technique 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 no allowance was made for surface adsorption.

**SOURCE AND PURITY OF MATERIALS:**

No details given.

**ESTIMATED ERROR:**

$\delta T/K = \pm 0.05; \delta H = \pm 2\%$

**REFERENCES:**


COMPONENTS:

(1) Butane; $C_4H_{10}$; [106-97-8]
(2) Hexane; $C_6H_{14}$; [110-54-3]

ORIGINAL MEASUREMENTS:

Hayduk, W., Castañeda, R.

VARIABLES:

$T/K$: 278.15-323.15
$P/kPa$: 101.325

PREPARED BY:

W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>Ostwald Coefficient</th>
<th>Bunsen Coefficient</th>
<th>Mole Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/cm³ cm⁻³</td>
<td>α/cm³ (STP) cm⁻³ atm⁻¹</td>
<td>$x_1$</td>
</tr>
<tr>
<td>278.15</td>
<td>480.3</td>
<td>471.7</td>
<td>0.737 (0.732)</td>
</tr>
<tr>
<td>298.15</td>
<td>113.4</td>
<td>103.9</td>
<td>0.386 (0.390)</td>
</tr>
<tr>
<td>323.15</td>
<td>47.4</td>
<td>40.1</td>
<td>0.199 (0.198)</td>
</tr>
</tbody>
</table>

1 Original data.
2 Calculated by compiler.
3 The mole fraction solubility of the original data was used to determine the following equations for $\Delta G^0$ and $\ln x_1$ and table of smoothed values:

\[
\Delta G^0/J \text{ mol}^{-1} = -RT \ln x_1 = 80.652 - 21713 \\
\ln x_1 = 2611.6/T - 9.7007
\]

Std. deviation for $\Delta G^0 = 22.9 J \text{ mol}^{-1}$; Correlation coefficient = 0.9999

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>$\Delta G^0/J \text{ mol}^{-1}$</th>
<th>$x_1$</th>
<th>$T/K$</th>
<th>$\Delta G^0/J \text{ mol}^{-1}$</th>
<th>$x_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>278.15</td>
<td>720.2</td>
<td>0.732</td>
<td>303.15</td>
<td>2737</td>
<td>0.338</td>
</tr>
<tr>
<td>283.15</td>
<td>1124</td>
<td>0.621</td>
<td>313.15</td>
<td>3543</td>
<td>0.256</td>
</tr>
<tr>
<td>293.15</td>
<td>1930</td>
<td>0.453</td>
<td>323.15</td>
<td>4350</td>
<td>0.198</td>
</tr>
<tr>
<td>298.15</td>
<td>2333</td>
<td>0.390</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

A volumetric method using a glass apparatus was employed. Degassed solvent contacted the gas while flowing as a thin film, 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).

SOURCE AND PURITY OF MATERIALS:

1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.
2. Canlab. 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.
COMPONENTS:
(1) Butane; C\textsubscript{4}H\textsubscript{10}; [106-97-8]
(2) Hexane; C\textsubscript{6}H\textsubscript{14}; [110-54-3]

ORIGiNAL MEASUREMENTS:
Tilquin, B.; Decanniere, L.; Fontaine, R.; Claes, P.

VARIABLES:
\[ T/K: \ 288.15 \]
\[ P/kPa: \ 7.97-8.11 \]

PREPARED BY:
W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( t/\degree C )</th>
<th>( T/K )</th>
<th>( \text{Ostwald Coefficient}^{1} )</th>
<th>( \text{Mole fraction}^{2} )</th>
<th>( \text{Henry's constant}^{2} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0</td>
<td>288.15</td>
<td>142.1</td>
<td>0.441</td>
<td>2.267</td>
</tr>
</tbody>
</table>

\(^{1}\)Original data at low pressure reported as a distribution coefficient; if Henry's law and ideal gas law apply, the distribution coefficient is equivalent to the Ostwald coefficient as shown here.

\(^{2}\)Calculated by compiler for a gas partial pressure of 101.325 kPa assuming that Henry's law and ideal gas law apply.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
An all glass apparatus was used at a very low gas partial pressure. It contained a replaceable degassed solvent ampule equipped with a breakable point which could be broken by means of a magnetically activated plunger. The quantity of gas fed into the system was determined by measuring the pressure change in a known volume. The quantity of liquid was measured by weight. The pressure change was observed after the solvent was released.

Experimental details are described by Rzad and Claes(1).

SOURCE AND PURITY OF MATERIALS:
1. Source not given; minimum purity specified as 99.0 mole per cent.
2. Fluka pure grade; minimum purity specified as 99.0 mole per cent.

ESTIMATED ERROR:
\[ T/K = 0.05 \] (estimated by compiler)
\[ \delta x_{1}/x_{1} = 0.01 \]

REFERENCES:
1. Rzad, S.; Claes, P.
COMPONENTS:

(1) Butane; C\textsubscript{4}H\textsubscript{10}; [106-97-8]
(2) 2,2'-Dimethylbutane (Neo-hexane); C\textsubscript{6}H\textsubscript{14}; [75-83-2]

ORIGINAL MEASUREMENTS:
Tilquin, B.; Decanniere, L.; Fontaine, R.; Claes, P.

VARIABLES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>P/kPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>288.15</td>
<td>3.68-3.71</td>
</tr>
</tbody>
</table>

PREPARED BY:
W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>t/°C</th>
<th>T/K</th>
<th>Ostwald coefficient\textsuperscript{1}</th>
<th>Mole Fraction\textsuperscript{2}</th>
<th>Henry's constant\textsuperscript{2}</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0</td>
<td>288.15</td>
<td>70.4</td>
<td>0.290</td>
<td>3.448</td>
</tr>
</tbody>
</table>

\textsuperscript{1}Original data at low pressure reported as a distribution coefficient; if Henry's law and ideal gas law apply, the distribution coefficient is equivalent to the Ostwald coefficient as shown here.

\textsuperscript{2}Calculated by compiler for a gas partial pressure of 101.325 kPa assuming that Henry's law and ideal gas law apply.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
An all glass apparatus was used at a very low gas partial pressure. It contained a replaceable degassed solvent ampule equipped with a breakable point which could be broken by means of a magnetically activated plunger. The quantity of gas fed into the system was determined by measuring the pressure change in a known volume. The quantity of liquid was measured by weight. The pressure change was observed after the solvent was released.

Experimental details are described by Rzad and Claes(1).

SOURCE AND PURITY OF MATERIALS:

1. Source not given; minimum purity specified as 99.0 mole per cent.
2. Fluka pure grade; minimum purity specified as 99.0 mole per cent.

ESTIMATED ERROR:

<table>
<thead>
<tr>
<th>(\sigma/K)</th>
<th>(\text{Estimated by compiler})</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\delta x_{1}/x_{1})</td>
<td>0.01</td>
</tr>
</tbody>
</table>

REFERENCES:

1. Rzad, S.; Claes, P.
COMPONENTS:
(1) Butane; \( \text{C}_4\text{H}_{10} \); [106-97-8]
(2) Heptane; \( \text{C}_7\text{H}_{16} \); [142-82-5]

ORIGINAL MEASUREMENTS:
Hayduk, W.; Castañeda, R.

VARIABLES:
\( T/\text{K} \): 278.15-323.15
\( P/\text{kPa} \): 101.325

PREPARED BY:
W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/\text{K} )</th>
<th>Ostwald Coefficient(^1) ( L/\text{cm}^3 \text{ cm}^{-3} )</th>
<th>Bunsen Coefficient(^2) ( \alpha/\text{cm}^3 (\text{STP}) \text{ cm}^{-3} \text{ atm}^{-1} )</th>
<th>Mole Fraction(^1) ( x_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>278.15</td>
<td>582</td>
<td>572</td>
<td>0.794 (0.795)</td>
</tr>
<tr>
<td>298.15</td>
<td>118.2</td>
<td>108.3</td>
<td>0.423 (0.423)</td>
</tr>
<tr>
<td>323.15</td>
<td>46.4</td>
<td>39.2</td>
<td>0.214 (0.214)</td>
</tr>
</tbody>
</table>

\(^1\) 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:
\[
\Delta G/\text{J mol}^{-1} = -RT \ln x_1 = 80.213 T - 21780
\]
\[
\ln x_1 = 2619.7/T - 9.6479
\]
Std. deviation for \( \Delta G = 2.7 \text{ J mol}^{-1} \); Correlation coefficient = 0.9999

<table>
<thead>
<tr>
<th>( T/\text{K} )</th>
<th>( \Delta G/\text{J mol}^{-1} )</th>
<th>( x_1 )</th>
<th>( T/\text{K} )</th>
<th>( \Delta G/\text{J mol}^{-1} )</th>
<th>( x_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>278.15</td>
<td>531.6</td>
<td>0.795</td>
<td>303.15</td>
<td>2537</td>
<td>0.366</td>
</tr>
<tr>
<td>283.15</td>
<td>932.7</td>
<td>0.673</td>
<td>313.15</td>
<td>3339</td>
<td>0.277</td>
</tr>
<tr>
<td>293.15</td>
<td>1735</td>
<td>0.491</td>
<td>323.15</td>
<td>4141</td>
<td>0.214</td>
</tr>
<tr>
<td>298.15</td>
<td>2136</td>
<td>0.423</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
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).

SOURCE AND PURITY OF MATERIALS:
1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.
2. Canlab. 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.
COMPONENTS:
(1) Butane; C₄H₁₀; [106-97-8]
(2) Heptane; C₇H₁₆; [142-82-5]
 or
Octane; C₈H₁₈; [111-65-9]

ORIGINAL MEASUREMENTS:
Jadot, R.

VARIABLES:
T/K: 298.15
P/kPa: 101.3

PREPARED BY:
C.L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Henry's Law Constant, H/atm</th>
<th>Mole fraction+ at partial pressure of 101.3 kPa, xₐ₄H₁₀</th>
<th>#ΔH° /cal mol⁻¹</th>
<th>#ΔH° (/J mol⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>2.280</td>
<td>0.4386</td>
<td>160 (669)</td>
<td></td>
</tr>
<tr>
<td>298.15</td>
<td>2.21</td>
<td>0.452</td>
<td>180 (753)</td>
<td></td>
</tr>
</tbody>
</table>

+ Calculated by compiler assuming xₐ₄H₁₀ = 1/H

# Excess partial molar enthalpy of solution at infinite dilution.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
The conventional gas chromatographic technique 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 no allowance was made for surface adsorption.

SOURCE AND PURITY OF MATERIALS:
No details given.

ESTIMATED ERROR:
δT/K = ±0.05; δH = ±2%

REFERENCES.
COMPONENTS:
(1) Butane; C₄H₁₀; [106-97-8]
(2) Octane; C₈H₁₈; [111-65-9]

ORIGINAL MEASUREMENTS:
Hayduk, W.; Castañeda, R.

VARIABLES:
T/K: 278.15-323.15
P/kPa: 101.325

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Ostwald Coefficient¹</th>
<th>Bunsen Coefficient²</th>
<th>Mole Fraction³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/cm³ cm⁻³</td>
<td>α/cm³ (STP) cm⁻³ atm⁻¹</td>
<td>x_l</td>
</tr>
<tr>
<td>278.15</td>
<td>545</td>
<td>535</td>
<td>0.799 (0.801)³</td>
</tr>
<tr>
<td>298.15</td>
<td>110.3</td>
<td>101.1</td>
<td>0.432 (0.430)</td>
</tr>
<tr>
<td>323.15</td>
<td>43.4</td>
<td>36.7</td>
<td>0.220 (0.220)</td>
</tr>
</tbody>
</table>

¹ Original data.
² Calculated by compiler.
³ The mole fraction solubility of the original data was used to determine the following equations for ΔG° and ln x_l and table of smoothed values:
ΔG°/J mol⁻¹ = -RT ln x_l = 78.904 T - 21434
ln x_l = 2578.1/T - 9.4905
Std. deviation for ΔG° = 9.1 J mol⁻¹; Correlation coefficient = 0.9999

<table>
<thead>
<tr>
<th>T/K</th>
<th>ΔG°/J mol⁻¹</th>
<th>x_l</th>
<th>T/K</th>
<th>ΔG°/J mol⁻¹</th>
<th>x_l</th>
</tr>
</thead>
<tbody>
<tr>
<td>278.15</td>
<td>513.0</td>
<td>0.801</td>
<td>303.15</td>
<td>2485</td>
<td>0.373</td>
</tr>
<tr>
<td>283.15</td>
<td>907.5</td>
<td>0.680</td>
<td>313.15</td>
<td>3275</td>
<td>0.284</td>
</tr>
<tr>
<td>293.15</td>
<td>1697</td>
<td>0.499</td>
<td>323.15</td>
<td>4064</td>
<td>0.220</td>
</tr>
<tr>
<td>298.15</td>
<td>2091</td>
<td>0.430</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
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).

SOURCE AND PURITY OF MATERIALS:
1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.
2. Canlab. Specified minimum purity 99.0 per cent

ESTIMATED ERROR:
δT/K = 0.1
δx_l/x_l = 0.01

REFERENCES:
1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M.
COMPONENTS:
(1) Butane; $\text{C}_4\text{H}_{10}$; \[106-97-8\]
(2) Nonane; $\text{C}_9\text{H}_{20}$; \[111-84-2\]
   or
Decane; $\text{C}_{10}\text{H}_{22}$; \[124-18-5\]

ORIGINAL MEASUREMENTS:
Jadot, R.

VARIABLES:
$T/K$: 298.15
$P/kPa$: 101.3

PREPARED BY:
C.L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>Henry's Law Constant, (H/\text{atm})</th>
<th>Mole fraction(^+) at partial pressure of 101.3 kPa, (x_{\text{C}<em>4\text{H}</em>{10}})</th>
<th>#(\Delta H^\circ) /cal mol(^{-1})</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>2.12</td>
<td>0.472</td>
<td>205 (858)</td>
</tr>
<tr>
<td>298.15</td>
<td>2.0</td>
<td>0.4888</td>
<td>210 (879)</td>
</tr>
</tbody>
</table>

\(^+\) Calculated by compiler assuming \(x_{\text{C}_4\text{H}_{10}} = 1/\text{H}\)

\# Excess partial molar enthalpy of solution at infinite dilution.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
The conventional gas chromatographic technique 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 no allowance was made for surface adsorption.

SOURCE AND PURITY OF MATERIALS:
No details given.

ESTIMATED ERROR:
\(\delta T/K = \pm 0.05; \delta H = \pm 2\%\)

REFERENCES:
COMPONENTS:
(1) Butane; C₄H₁₀; [106-97-8]
(2) Decane; C₁₀H₂₂; [124-18-5]

ORIGINAL MEASUREMENTS:
Honfort, J. P.; Arriaga, J. L.

VARIABLES:
T/K: 298.15
P/kPa: 101.325

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Henry's Law Constant, H/atm</th>
<th>Mole fraction⁺, x₄₄H₁₀</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>2.03</td>
<td>0.4926</td>
</tr>
</tbody>
</table>

⁺ Calculated by compiler assuming x₄₄H₁₀ = 1/H.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
Chromatographic determination with exponential dilutor. Solvent saturated with gas. A stripping gas was slowly passed through the solution and the concentration of dissolved gas measured using gas chromatography. Details in source.

SOURCE AND PURITY OF MATERIALS:
1. Matheson sample, purity 99 per cent by mass.
2. Merck spectroscopic grade.

ESTIMATED ERROR:
δT/K = ±0.03; δH = ±3%.

REFERENCES:
COMPONENTS:
(1) Butane; C₄H₁₀;  [106-97-8]
(2) Decane; C₁₅H₃₂;  [124-18-5]

ORIGINAL MEASUREMENTS:
Gerrard, W.

VARIABLES:
T/K: 268.2-298.2
P/kPa: 73.3, 101.3

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>p /mmHg</th>
<th>P*/kPa</th>
<th>Mole ratio</th>
<th>Mole fraction of propane #</th>
</tr>
</thead>
<tbody>
<tr>
<td>268.2</td>
<td>550</td>
<td>73.3</td>
<td>7.33</td>
<td>0.880</td>
</tr>
<tr>
<td>278.2</td>
<td>760</td>
<td>101.3</td>
<td>4.23</td>
<td>0.809</td>
</tr>
<tr>
<td>283.2</td>
<td>760</td>
<td>101.3</td>
<td>2.334</td>
<td>0.700</td>
</tr>
<tr>
<td>293.2</td>
<td>760</td>
<td>101.3</td>
<td>1.040</td>
<td>0.510</td>
</tr>
<tr>
<td>298.2</td>
<td>760</td>
<td>101.3</td>
<td>0.810</td>
<td>0.448</td>
</tr>
</tbody>
</table>

* Total pressure.
# Calculated by compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
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).

SOURCE AND PURITY OF MATERIALS:
No details given except that "all compounds were purified by conventional procedures".

ESTIMATED ERROR:
δT/K = ±0.1;  δx/x = ±3%
(estimated by compiler).

REFERENCES:
1. Gerrard, W.
COMPONENTS:

(1) Butane; $C_4H_{10}$; [106-97-8]

(2) Dodecane; $C_{12}H_{26}$; [112-40-3]

ORIGINAL MEASUREMENTS:

Monfort, J. P.; Arriaga, J. L. 

VARIABLES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>P/kPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>278.15</td>
<td>101.325</td>
</tr>
<tr>
<td>298.15</td>
<td></td>
</tr>
</tbody>
</table>

PREPARED BY:

C. L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Henry's Law Constant, $H$/atm</th>
<th>Mole fraction*, $x_{C_4H_{10}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>278.15</td>
<td>1.02</td>
<td>0.9804</td>
</tr>
<tr>
<td>298.15</td>
<td>2.04</td>
<td>0.4902</td>
</tr>
</tbody>
</table>

* Calculated by compiler assuming $x_{C_4H_{10}} = 1/H$.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Chromatographic determination with exponential dilutor. Solvent saturated with gas. A stripping gas was slowly passed through the solution and the concentration of dissolved gas measured using gas chromatography. Details in source.

SOURCE AND PURITY OF MATERIALS:

1. Matheson sample; purity 99 per cent by mass.

2. Merck spectroscopic grade.

ESTIMATED ERROR:

$\delta T/K = \pm 0.03$; $\delta H = \pm 3\%$.

REFERENCES:
Alkanes

COMPONENTS:
(1) Butane; C_4H_{10}; [106-97-8]
(2) Dodecane; C_{12}H_{26}; [112-40-3]

ORIGINAL MEASUREMENTS:
Hayduk, W.; Castañeda, R.

VARIABLES:
T/K: 278.15-323.15
P/kPa: 101.325

PREPARED BY:
W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Ostwald Coefficient¹</th>
<th>Bunsen Coefficient²</th>
<th>Mole Fraction¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/cm³ cm⁻³</td>
<td>a/cm³ (STP)cm⁻³ atm⁻¹</td>
<td>x_j</td>
</tr>
<tr>
<td>278.15</td>
<td>429</td>
<td>421.3</td>
<td>0.814 (0.0810)³</td>
</tr>
<tr>
<td>298.15</td>
<td>83.8</td>
<td>76.8</td>
<td>0.443 (0.447)</td>
</tr>
<tr>
<td>323.15</td>
<td>34.1</td>
<td>28.8</td>
<td>0.236 (0.235)</td>
</tr>
</tbody>
</table>

¹ Original data.
² Calculated by compiler.
³ The mole fraction solubility of the original data was used to determine the following equations for ΔG° and ln x_j and table of smoothed values:

ΔG°/J mol⁻¹ = -RT ln x_j = 75.594 T - 20540

ln x_j = 2470.5/T - 9.0924

Std. deviation for ΔG° = 17.1 J mol⁻¹; Correlation coefficient = 0.9999

<table>
<thead>
<tr>
<th>T/K</th>
<th>ΔG°/J mol⁻¹</th>
<th>x_j</th>
<th>T/K</th>
<th>ΔG°/J mol⁻¹</th>
<th>x_j</th>
</tr>
</thead>
<tbody>
<tr>
<td>278.15</td>
<td>486.7</td>
<td>0.180</td>
<td>303.15</td>
<td>2377</td>
<td>0.390</td>
</tr>
<tr>
<td>283.15</td>
<td>864.7</td>
<td>0.693</td>
<td>313.15</td>
<td>3133</td>
<td>0.300</td>
</tr>
<tr>
<td>293.15</td>
<td>1621</td>
<td>0.514</td>
<td>323.15</td>
<td>3888</td>
<td>0.235</td>
</tr>
<tr>
<td>298.15</td>
<td>1999</td>
<td>0.447</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
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 gas dissolved and volume of solvent injected.

Degassing was accomplished using a two stage vacuum process described by Clever et al. (1).

SOURCE AND PURITY OF MATERIALS:
1. Matheson Co. Specified instrument grade of minimum purity 99.5 per cent.
2. Canlab. Specified minimum purity 99.0 per cent.

ESTIMATED ERROR:
δT/K = 0.1
δx_j/x_j = 0.01

REFERENCES:
1. Clever, H.L.; Battino, R.; Saylor, J.H.; Gross, P.M.
COMPONENTS:
(1) Butane; $C_6H_{14}$; [106-97-8]  
(2) Hexadecane; $C_{16}H_{34}$; [544-76-3]

ORIGINAL MEASUREMENTS:
Hayduk, W.; Castañeda, R.  

VARIABLES:
T/K: 298.15-323.15  
P/kPa: 101.325

PREPARED BY:
W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Ostwald Coefficient $^1$</th>
<th>Bunsen Coefficient $^2$</th>
<th>Mole Fraction $^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$L/cm^3$ cm$^{-3}$</td>
<td>$\alpha/cm^3$ (STP)cm$^{-3}$ atm$^{-1}$</td>
<td>$x_1$</td>
</tr>
<tr>
<td>298.15</td>
<td>68.8</td>
<td>63.0</td>
<td>0.460</td>
</tr>
<tr>
<td>323.15</td>
<td>28.5</td>
<td>24.1</td>
<td>0.249</td>
</tr>
</tbody>
</table>

$^1$ Original data.  
$^2$ Calculated by compiler.

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

$$\Delta G^o/J \text{ mol}^{-1} = -RT \ln x_1 = 72.417 \frac{T}{T-19666}$$

$$\ln x_1 = 2365.4/T - 8.7102$$

<table>
<thead>
<tr>
<th>T/K</th>
<th>$\Delta G^o/J \text{ mol}^{-1}$</th>
<th>$x_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>1925</td>
<td>0.460</td>
</tr>
<tr>
<td>303.15</td>
<td>2287</td>
<td>0.404</td>
</tr>
<tr>
<td>313.15</td>
<td>3011</td>
<td>0.315</td>
</tr>
<tr>
<td>323.15</td>
<td>3736</td>
<td>0.249</td>
</tr>
</tbody>
</table>

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
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).

SOURCE AND PURITY OF MATERIALS:
1. Matheson Co. Specified as instrument grade of minimum purity 99.5 per cent.
2. Canlab. 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.  
COMPONENTS:

(1) Butane; \( \text{C}_4\text{H}_{10} \); [106-97-8]
(2) Hexadecane; \( \text{C}_{16}\text{H}_{34} \); [544-76-3]

ORIGINAL MEASUREMENTS:
Chappelow, C.C., Prausnitz, J.M.

VARIABLES:

\[\begin{align*}
T/K: & \quad 300-475 \\
P/kPa: & \quad 101.325 
\end{align*}\]

PREPARED BY:
C.L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>(T/K)</th>
<th>Henry's Constant(a) Mole fraction(b) of butane at 1 atm. partial pressure, (x_{\text{C}<em>4\text{H}</em>{10}})</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>2.60</td>
</tr>
<tr>
<td>325</td>
<td>4.18</td>
</tr>
<tr>
<td>350</td>
<td>7.08</td>
</tr>
<tr>
<td>375</td>
<td>10.8</td>
</tr>
<tr>
<td>400</td>
<td>15.4</td>
</tr>
<tr>
<td>425</td>
<td>20.8</td>
</tr>
<tr>
<td>450</td>
<td>26.8</td>
</tr>
<tr>
<td>475</td>
<td>33.1</td>
</tr>
</tbody>
</table>

\(a\) Authors stated measurements were made at several pressures and values of solubility used were all within the Henry's law region.

\(b\) Calculated by compiler assuming linear relationship between mole fraction and pressure.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
Volumetric apparatus similar to that described by Dymond and Hildebrand (1). Pressure measured with a null detector and precision gauge. Details in ref. (2).

SOURCE AND PURITY OF MATERIALS:
Solvent degassed; no other details given.

ESTIMATED ERROR:
\[\delta T/K = \pm 0.1; \delta x_{\text{C}_4\text{H}_{10}} = \pm 1\%\]

REFERENCES:
1. Dymond, J.; Hildebrand, J.H.
2. Cukor, P.M.; Prausnitz, J.M.
### COMPONENTS:
(1) Butane; \( \text{C}_4\text{H}_{10} \); [106-97-8]
(2) 2,2,4,4,6,8,8-Heptamethyl nonane; \( \text{C}_{16}\text{H}_{34} \); [4390-04-9]

### ORIGINAL MEASUREMENTS:
Richon, D.; Renon, H.

### VARIABLES:
- \( T/K: \) 298.15
- \( P/\text{kPa}: \) 101.3

### PREPARED BY:
C. L. Young

### EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/K )</th>
<th>Limiting value of Henry's constant, ( H^\infty/\text{atm} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>0.56</td>
</tr>
</tbody>
</table>

Evaluator's note: Value for Henry's law constant as it is found here and original reference appears incorrect because it cannot be less than one (giving a mole fraction solubility greater than one); hence this value is rejected.

### AUXILIARY INFORMATION

**METHOD/APPARATUS/PROCEDURE:**
Inert gas stripping plus gas chromatographic method. Details given in ref. (1). Method based on passing constant stream of inert gas through dissolved gas-solvent mixture and periodically injecting mixture into gas chromatograph. Henry's law constant determined from variation of gas peak area with time.

**SOURCE AND PURITY OF MATERIALS:**
1. L'Air Liquide sample, purity 99 mole per cent.
2. Sigma sample, purity not less than 99 mole per cent.

**ESTIMATED ERROR:**
\( \delta T/K = \pm 0.05; \quad \delta H^\infty = \pm 4\% \)
(estimated by compiler).

**REFERENCES:**
<table>
<thead>
<tr>
<th>COMPONENTS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Butane; C₄H₁₀; [106-97-8]</td>
</tr>
<tr>
<td>(2) Hexadecane; C₁₆H₃₄; [544-76-3] or Octadecane; C₁₈H₃₈; [593-45-3]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ORIGINAL MEASUREMENTS:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>VARIABLES:</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/K: 298.15, 323.15</td>
</tr>
<tr>
<td>P/kPa: 101.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PREPARED BY:</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. L. Young</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXPERIMENTAL VALUES:</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/K</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Hexadecane</td>
</tr>
<tr>
<td>298.15</td>
</tr>
<tr>
<td>323.15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AUXILIARY INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>METHOD APPARATUS/PROCEDURE:</td>
</tr>
<tr>
<td>Inert gas stripping plus gas chromatographic method. Details given in ref. (1). Method based on passing constant stream of inert gas through dissolved gas-solvent mixture and periodically injecting mixture into gas chromatograph. Henry's law constant determined from variation of gas peak area with time.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOURCE AND PURITY OF MATERIALS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. L'Air Liquide sample, purity 99 mole per cent.</td>
</tr>
<tr>
<td>2. Hexadecane was a Merck sample, Octadecane was a Fluka sample, both had purities of not less than 99 mole per cent.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ESTIMATED ERROR:</th>
</tr>
</thead>
<tbody>
<tr>
<td>δT/K = ±0.05; δH° = ±4% (estimated by compiler).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REFERENCES:</th>
</tr>
</thead>
</table>
COMPONENTS:
(1) Butane; C₄H₁₀; [106-97-8]
(2) Eicosane; C₂₀H₄₂; [112-95-8]

ORIGINAL MEASUREMENTS:
Chappelow, C.C.; Prausnitz, J.M.

VARIABLES:
T/K: 325-475
P/kPa: 101.325

PREPARED BY:
C.L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Henry's Constant a</th>
<th>Mole fraction b of butane at 1 atm. partial pressure, x_{C₄H₁₀}</th>
</tr>
</thead>
<tbody>
<tr>
<td>325</td>
<td>3.90</td>
<td>0.2564</td>
</tr>
<tr>
<td>350</td>
<td>6.30</td>
<td>0.1587</td>
</tr>
<tr>
<td>375</td>
<td>9.88</td>
<td>0.1012</td>
</tr>
<tr>
<td>400</td>
<td>14.0</td>
<td>0.0714</td>
</tr>
<tr>
<td>425</td>
<td>18.8</td>
<td>0.0532</td>
</tr>
<tr>
<td>450</td>
<td>24.8</td>
<td>0.0403</td>
</tr>
<tr>
<td>475</td>
<td>29.4</td>
<td>0.0340</td>
</tr>
</tbody>
</table>

a Authors stated measurements were made at several pressures and values of solubility used were all within the Henry's law region.
b Calculated by compiler assuming linear relationship between mole fraction and pressure.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
Volumetric apparatus similar to that described by Dymond and Hildebrand (1). Pressure measured with a null detector and precision gauge. Details in ref. (2).

SOURCE AND PURITY OF MATERIALS:
Solvent degassed; no other details given.

ESTIMATED ERROR:
δT/K = ±0.1; δx_{C₄H₁₀} = ±1%

REFERENCES:
1. Dymond, J.; Hildebrand, J.H.
2. Cukor, P.M.; Prausnitz, J.M.
COMPONENTS:
(1) Butane; \(\text{C}_4\text{H}_{10}\); [106-97-8]
(2) Eicosane; \(\text{C}_{20}\text{H}_{42}\); [112-95-8]
or Docosane; \(\text{C}_{22}\text{H}_{46}\); [629-97-0]

ORIGINAL MEASUREMENTS:
Parcher, J. F.; Weiner, P. H.;
Hussey, C. L.; Westlake, T. N.
J. Chem. Eng. Data

VARIABLES:
\(T/K\): 353.2-393.2
\(P_1/kPa\): 101.325

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>(T/K)</th>
<th>Specific retention volume /cm(^3) g(^{-1})</th>
<th>Henry's law Constant (a) (H/\text{atm})</th>
<th>Mole fraction at a partial pressure of 1 atm (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>353.2</td>
<td>11.48</td>
<td>6.91</td>
<td>0.145</td>
</tr>
<tr>
<td>353.2</td>
<td>10.69</td>
<td>6.75</td>
<td>0.148</td>
</tr>
<tr>
<td>373.2</td>
<td>7.42</td>
<td>9.72</td>
<td>0.103</td>
</tr>
<tr>
<td>393.2</td>
<td>5.63</td>
<td>12.82</td>
<td>0.0780</td>
</tr>
</tbody>
</table>

\(a\) Calculated by compiler using equation given by authors (see below).

\(b\) Calculated by compiler assuming Henry's law is valid up to 1 atmosphere.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
Gas chromatographic method in which butane was used as injected solute and long chain alkane as stationary liquid. Thermal conductivity detector used. Calculation of mole fraction at 1 atmosphere pressure involves considerable approximation. No allowance was made for the presence of the carrier gas when estimating gas phase imperfection contribution to Henry's law constant. Henry's law constant given by

\[ H = \frac{273.15R}{MW_{\text{solvent}} \times \text{Specific retention volume}} \]

SOURCE AND PURITY OF MATERIALS:
2. No impurity detected when analysed by GC on SE-30 column.

ESTIMATED ERROR:
\(\delta T/K = \pm 0.1; \ \delta H/\text{atm} = \pm 1.0\%\)
(estimated by compiler).

REFERENCES:
COMPONENTS:

1. Butane; \( \text{C}_4\text{H}_10 \); [106-97-8]
2. Tetracosane; \( \text{C}_{24}\text{H}_{50} \); [646-31-1]
   or Octacosane; \( \text{C}_{28}\text{H}_{58} \); [630-02-4]

ORIGINAL MEASUREMENTS:

Parcher, J. F.; Weiner, P. H.; Hussey, C. L.; Westlake, T. N.

VARIABLES:

\[
\begin{align*}
T/K & : 353.2-393.2 \\
P/kPa & : 101.325
\end{align*}
\]

PREPARED BY:
C. L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Specific retention volume /cm(^3) g(^{-1})</th>
<th>Henry's law Constant (a) H/atm</th>
<th>Mole fraction at a partial pressure of 1 atm (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>353.2</td>
<td>10.34</td>
<td>6.40</td>
<td>0.156</td>
</tr>
<tr>
<td>373.2</td>
<td>7.82</td>
<td>8.46</td>
<td>0.118</td>
</tr>
<tr>
<td>393.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>353.2</td>
<td>9.95</td>
<td>5.71</td>
<td>0.175</td>
</tr>
<tr>
<td>373.2</td>
<td>6.84</td>
<td>8.30</td>
<td>0.120</td>
</tr>
<tr>
<td>393.2</td>
<td>5.00</td>
<td>11.35</td>
<td>0.0881</td>
</tr>
</tbody>
</table>

\(a\) Calculated by compiler using equation given by authors (see below).

\(b\) Calculated by compiler assuming Henry's law is valid up to 1 atmosphere.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Gas chromatographic method in which butane was used as injected solute and long chain alkane as stationary liquid. Thermal conductivity detector used. Calculation of mole fraction at 1 atmosphere pressure involves considerable approximation. No allowance was made for the presence of the carrier gas when estimating gas phase imperfection contribution to Henry's law constant. Henry's law constant given by

\[
H = \frac{273.15R}{\text{MW}_{\text{solvent}}} \times \text{Specific retention volume}
\]

SOURCE AND PURITY OF MATERIALS:

2. No impurity detected when analysed by GC on SE-30 column.

ESTIMATED ERROR:

\(\delta T/K = \pm 0.1; \; \delta H/\text{atm} = \pm 1.0\%\) (estimated by compiler).

REFERENCES:
### COMPONENTS:

(1) Butane; \( \text{C}_4\text{H}_{10} \); [106-97-8]

(2) 2,6,10,15,19,23-Hexamethylltetraicosane, (squalane); \( \text{C}_{30}\text{H}_{62} \); [111-01-3]

### ORIGINAL MEASUREMENTS:

Chappelow, C.C.; Prausnitz, J.M.


### VARIABLES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>P/kPa</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>101.325</td>
<td></td>
</tr>
<tr>
<td>325</td>
<td></td>
<td></td>
</tr>
<tr>
<td>350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>375</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>425</td>
<td></td>
<td></td>
</tr>
<tr>
<td>450</td>
<td></td>
<td></td>
</tr>
<tr>
<td>475</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Henry's Constant ( H/\text{atm} )</th>
<th>Mole fraction ( b ) of butane at 1 atm. partial pressure, ( \text{x}_{\text{C}<em>4\text{H}</em>{10}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>2.10</td>
<td>0.4762</td>
</tr>
<tr>
<td>325</td>
<td>2.95</td>
<td>0.3390</td>
</tr>
<tr>
<td>350</td>
<td>5.15</td>
<td>0.1942</td>
</tr>
<tr>
<td>375</td>
<td>8.34</td>
<td>0.1199</td>
</tr>
<tr>
<td>400</td>
<td>12.2</td>
<td>0.0820</td>
</tr>
<tr>
<td>425</td>
<td>16.3</td>
<td>0.0613</td>
</tr>
<tr>
<td>450</td>
<td>20.3</td>
<td>0.0493</td>
</tr>
<tr>
<td>475</td>
<td>24.0</td>
<td>0.0417</td>
</tr>
</tbody>
</table>

\( a \) Authors stated measurements were made at several pressures and values of solubility used were all within the Henry's law region.

\( b \) Calculated by compiler assuming linear relationship between mole fraction and pressure.

### AUXILIARY INFORMATION

**METHOD/APPARATUS/PROCEDURE:**

Volumetric apparatus similar to that described by Dymond and Hildebrand (1). Pressure measured with a null detector and precision gauge. Details in ref. (2).

**SOURCE AND PURITY OF MATERIALS:**

Solvent degassed; no other details given.

**ESTIMATED ERROR:**

\( \delta T/K = \pm 0.1; \delta x_{\text{C}_4\text{H}_{10}} = \pm 1\% \)

**REFERENCES:**

1. Dymond, J.; Hildebrand, J.H.

2. Cukor, P.M.; Prausnitz, J.M.
COMPONENTS:

(1) Butane; \( \text{C}_4\text{H}_{10} \); [106-97-8]
(2) Triacontane; \( \text{C}_{30}\text{H}_{62} \); [638-68-6]
or Dotriacontane; \( \text{C}_{32}\text{H}_{66} \); [544-85-4]

ORIGINAL MEASUREMENTS:
Parcher, J. F.; Weiner, P. H.; Hussey, C. L.; Westlake, T. N.

VARIABLES:

\[
\begin{align*}
T/K: & \quad 353.2-393.2 \\
P/kPa: & \quad 101.325
\end{align*}
\]

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Specific retention volume /cm(^3) g(^{-1})</th>
<th>Henry's law Constant ( \text{H}/\text{atm} )</th>
<th>Mole fraction at a partial pressure of 1 atm (^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[638-68-6]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>353.2</td>
<td>9.29</td>
<td>5.71</td>
<td>0.175</td>
</tr>
<tr>
<td>393.2</td>
<td>4.81</td>
<td>11.02</td>
<td>0.0907</td>
</tr>
<tr>
<td></td>
<td>[544-85-4]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>353.2</td>
<td>9.57</td>
<td>5.19</td>
<td>0.193</td>
</tr>
<tr>
<td>373.2</td>
<td>6.31</td>
<td>7.88</td>
<td>0.127</td>
</tr>
<tr>
<td>393.2</td>
<td>4.78</td>
<td>10.40</td>
<td>0.0962</td>
</tr>
</tbody>
</table>

\( a \) Calculated by compiler using equation given by authors (see below).

\( b \) Calculated by compiler assuming Henry's law is valid up to 1 atmosphere.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Gas chromatographic method in which butane was used as injected solute and long chain alkane as stationary liquid. Thermal conductivity detector used. Calculation of mole fraction at 1 atmosphere pressure involves considerable approximation. No allowance was made for the presence of the carrier gas when estimating gas phase imperfection contribution to Henry's law constant. Henry's law constant given by

\[
\text{H} = \frac{273.15 \text{R} \times \text{Specific retention volume}}{\text{MW solvent}}
\]

SOURCE AND PURITY OF MATERIALS:

2. No impurity detected when analysed by GC on SE-30 column.

ESTIMATED ERROR:

\( \delta T/K = \pm 0.1\); \( \delta \text{H}/\text{atm} = \pm 1.0\%

(estimated by compiler).

REFERENCES:
COMPONENTS:
(1) Butane; C₄H₁₀; \([106-97-8]\)
(2) Tetratriacontane; C₃₄H₇₀; \([14167-59-0]\)
or Hexatriacontane; C₃₆H₇₄; \([630-06-8]\)

ORIGINAL MEASUREMENTS:
Parcher, J. F.; Weiner, P. H.;
Hussey, C. L.; Westlake, T. N.
*J. Chem. Eng. Data*

VARIABLES:
\(K/K\): 353.2-393.2
\(P/kPa\): 101.325

PREPARED BY:
C. L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>Specific retention volume/cm³ g⁻¹</th>
<th>Henry's law Constant a H/atm</th>
<th>Mole fraction at a partial pressure of 1 atm b</th>
</tr>
</thead>
<tbody>
<tr>
<td>353.2</td>
<td>9.22</td>
<td>5.08</td>
<td>0.197</td>
</tr>
<tr>
<td>373.2</td>
<td>6.18</td>
<td>7.57</td>
<td>0.132</td>
</tr>
<tr>
<td>393.2</td>
<td>4.69</td>
<td>9.98</td>
<td>0.100</td>
</tr>
<tr>
<td>Tetratriacontane; C₃₄H₇₀; ([14167-59-0])</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>353.2</td>
<td>9.05</td>
<td>4.88</td>
<td>0.205</td>
</tr>
<tr>
<td>373.2</td>
<td>6.19</td>
<td>7.14</td>
<td>0.140</td>
</tr>
<tr>
<td>393.2</td>
<td>4.55</td>
<td>9.72</td>
<td>0.103</td>
</tr>
<tr>
<td>Hexatriacontane; C₃₆H₇₄; ([630-06-8])</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(a\) Calculated by compiler using equation given by authors (see below).

\(b\) Calculated by compiler assuming Henry's law is valid up to 1 atmosphere.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
Gas chromatographic method in which butane was used as injected solute and long chain alkane as stationary liquid. Thermal conductivity detector used. Calculation of mole fraction at 1 atmosphere pressure involves considerable approximation.
No allowance was made for the presence of the carrier gas when estimating gas phase imperfection contribution to Henry's law constant.
Henry's law constant given by

\[ H = \frac{273.15R}{MW_{solvent} \times \text{Specific retention volume}} \]

SOURCE AND PURITY OF MATERIALS:
2. No impurity detected when analysed by GC on SE-30 column.

ESTIMATED ERROR:
\(\delta T/K = \pm 0.1\); \(\delta H/\text{atm} = \pm 1.0\%\)
(estimated by compiler).

REFERENCES:
**COMPONENTS:**

1. 2-Methylpropane; $\text{C}_8\text{H}_{16}$; [75-28-5]
2. Pentane; $\text{C}_5\text{H}_{12}$; [109-66-0]
   or Hexane; $\text{C}_6\text{H}_{14}$; [110-54-3]

**ORIGINAL MEASUREMENTS:**

Jadot, R. 

**VARIABLES:**

- $T/K$: 298.15
- $P/kPa$: 101.325

**EXPERIMENTAL VALUES:**

<table>
<thead>
<tr>
<th>$T/K$</th>
<th>Henry's Law Constant, $H/\text{atm}$</th>
<th>Mole fraction$^+$ at partial pressure of 101.3 kPa, $x_{\text{C}<em>8\text{H}</em>{16}}$</th>
<th>$\bar{\Delta}H^{\infty}$ /cal mol$^{-1}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>3.744</td>
<td>0.2650</td>
<td>-</td>
</tr>
<tr>
<td>298.15</td>
<td>3.600</td>
<td>0.2778</td>
<td>230 (962)</td>
</tr>
</tbody>
</table>

$^+$ Calculated by compiler assuming $x_{\text{C}_8\text{H}_{16}} = 1/H$.  
$^{\#}$ Excess partial molar enthalpy of solution at infinite dilution.

**AUXILIARY INFORMATION**

**METHOD/APPARATUS/PROCEDURE:**

The conventional gas chromatographic technique 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 no allowance was made for surface adsorption.

**SOURCE AND PURITY OF MATERIALS:**

No details given.

**ESTIMATED ERROR:**

$\delta T/K = \pm 0.05; \delta H = \pm 2\%$

**REFERENCES:**
COMPONENTS:

(1) 2-Methylpropane (isobutane); C\textsubscript{4}H\textsubscript{10}; [75-28-5]
(2) Hexane; C\textsubscript{6}H\textsubscript{14}; [110-54-3]

ORIGINAL MEASUREMENTS:

Tilquin, B.; Decanniere, L.; Fontaine, R.; Claes, P.

VARIABLES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>P/kPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>288.15</td>
<td>5.04-5.17</td>
</tr>
</tbody>
</table>

PREPARED BY:

W. Hayduk

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>t/°C</th>
<th>T/K</th>
<th>Ostwald coefficient\textsuperscript{1}</th>
<th>Mole fraction\textsuperscript{2}</th>
<th>Henry's constant\textsuperscript{2}</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0</td>
<td>288.15</td>
<td>82.0</td>
<td>0.313</td>
<td>3.195</td>
</tr>
</tbody>
</table>

\textsuperscript{1}Original data at low pressure reported as a distribution coefficient; if Henry's law and ideal gas law apply, the distribution coefficient is equivalent to the Ostwald coefficient as shown here.

\textsuperscript{2}Calculated by compiler for a gas partial pressure of 101.325 kPa assuming that Henry's law and ideal gas law apply.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

An all glass apparatus was used at a very low gas partial pressure. It contained a replaceable degassed solvent ampule equipped with a breakable point which could be broken by means of a magnetically activated plunger. The quantity of gas fed into the system was determined by measuring the pressure change in a known volume. The quantity of liquid was measured by weight. The pressure change was observed after the solvent was released.

Experimental details are described by Rzad and Claes(1).

SOURCE AND PURITY OF MATERIALS:

1. Source not given; minimum purity specified as 99.0 mole per cent.
2. Fluka pure grade; minimum purity specified as 99.0 mole per cent.

ESTIMATED ERROR:

\[ \delta T/K = 0.05 \] (estimated by compiler)

\[ \delta x_1/x_1 = 0.01 \]

REFERENCES:

1. Rzad, S.; Claes, P.
**COMPONENTS:**

1. 2-Methylpropane (isobutane); $C_4H_{10}$; [75-28-5]
2. 2,2'-Dimethylbutane (Neo-hexane); $C_6H_{14}$; [75-83-2]

**ORIGINAL MEASUREMENTS:**

Tilquin, B.; Decanniere, L.; Fontaine, R.; Claes, P.

**VARIABLES:**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/K</td>
<td>288.15</td>
</tr>
<tr>
<td>P/kPa</td>
<td>2.11-3.03</td>
</tr>
</tbody>
</table>

**PREPARED BY:**

W. Hayduk

**EXPERIMENTAL VALUES:**

<table>
<thead>
<tr>
<th>$t/°C$</th>
<th>T/K</th>
<th>$x_1$</th>
<th>$H/atm$</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0</td>
<td>288.15</td>
<td>0.420</td>
<td>2.381</td>
</tr>
</tbody>
</table>

1Original data at low pressure reported as a distribution coefficient; if Henry's law and ideal gas law apply, the distribution coefficient is equivalent to the Ostwald coefficient as shown here.
2Calculated by compiler for a gas partial pressure of 101.325 kPa assuming that Henry's law and ideal gas law apply.

**METHOD/APPARATUS/PROCEDURE:**

An all glass apparatus was used at a very low gas partial pressure. It contained a replaceable degassed solvent ampule equipped with a breakable point which could be broken by means of a magnetically activated plunger. The quantity of gas fed into the system was determined by measuring the pressure change in a known volume. The quantity of liquid was measured by weight. The pressure change was observed after the solvent was released.

Experimental details are described by Rzad and Claes (1).

**SOURCE AND PURITY OF MATERIALS:**

1. Source not given; minimum purity specified as 99.0 mole per cent.
2. Fluka pure grade; minimum purity specified as 99.0 mole per cent.

**ESTIMATED ERROR:**

$T/K = 0.05$ (estimated by compiler)
$\delta x_1/x_1 = 0.01$

**REFERENCES:**

1. Rzad, S.; Claes, P.
COMPONENTS:
(1) 2-Methylpropane; \( \text{C}_4\text{H}_{10} \);
\[ 75-28-5 \]
(2) Heptane; \( \text{C}_7\text{H}_{16} \); \[142-82-5\]
or
Octane; \( \text{C}_8\text{H}_{18} \); \[111-65-9\]

ORIGINAL MEASUREMENTS:
Jadot, R.

VARIABLES:
\( T/K: \) 298.15
\( P/\text{kPa}: \) 101.325

PREPARED BY:
C.L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/K )</th>
<th>Henry's Law Constant, ( \frac{H}{\text{atm}} )</th>
<th>Mole fraction(^+) at partial pressure of 101.3 kPa, ( \chi_{\text{C}<em>4\text{H}</em>{10}} )</th>
<th>( #\Delta H^\circ ) /cal mol(^{-1}) ((/J) mol(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>298.15</td>
<td>3.352</td>
<td>0.2983</td>
<td>415 (1736)</td>
</tr>
<tr>
<td>298.15</td>
<td>3.109</td>
<td>0.3216</td>
<td>550 (2301)</td>
</tr>
</tbody>
</table>

\(^+\) Calculated by compiler assuming \( \chi_{\text{C}_4\text{H}_{10}} = \frac{1}{H} \).

\( \#\) Excess partial molar enthalpy of solution at infinite dilution.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
The conventional gas chromatographic technique 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 no allowance was made for surface adsorption.

SOURCE AND PURITY OF MATERIALS:
No details given.

ESTIMATED ERROR:
\( \delta T/K = \pm 0.05; \delta H = \pm 2\% \)

REFERENCES:
COMPONENTS:

(1) 2-Methylpropane, (isobutane) \( \text{C}_4\text{H}_{10} \); [75-28-5]
(2) Decane; \( \text{C}_{10}\text{H}_{22} \); [124-18-5]

ORIGINAL MEASUREMENTS:

Gerrard, W.

VARIABLES:

\[ T/K: 273.15 \]
\[ P/kPa: 13.3-101.3 \]

PREPARED BY:

C.L. Young

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>T/K</th>
<th>P/mmHg</th>
<th>P/kPa</th>
<th>( x_{\text{C}<em>4\text{H}</em>{10}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>273.15</td>
<td>100</td>
<td>13.3</td>
<td>0.093</td>
</tr>
<tr>
<td>200</td>
<td>26.7</td>
<td></td>
<td>0.180</td>
</tr>
<tr>
<td>300</td>
<td>40.0</td>
<td></td>
<td>0.270</td>
</tr>
<tr>
<td>400</td>
<td>53.3</td>
<td></td>
<td>0.345</td>
</tr>
<tr>
<td>500</td>
<td>66.7</td>
<td></td>
<td>0.438</td>
</tr>
<tr>
<td>600</td>
<td>80.0</td>
<td></td>
<td>0.520</td>
</tr>
<tr>
<td>700</td>
<td>93.3</td>
<td></td>
<td>0.600</td>
</tr>
<tr>
<td>760</td>
<td>101.3</td>
<td></td>
<td>0.645</td>
</tr>
</tbody>
</table>

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 0.2 K. 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.
2. Gerrard, W.
COMPONENTS:
(1) 2-Methylpropane; C₆H₁₀; [75-28-5]
(2) Nonane; C₉H₁₈; [111-84-2]
OR
Decane; C₁₀H₂₂; [124-18-5]

ORIGINAL MEASUREMENTS:
Jadot, R.

VARIABLES:
\( T/K: \) 298.15
\( P/kPa: \) 101.325

PREPARED BY:
C.L. Young

<table>
<thead>
<tr>
<th>EXPERIMENTAL VALUES:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>( T/K )</td>
<td>Henry's Law Constant, ( H/atm )</td>
<td>Mole fraction+ at partial pressure of 101.3kPa, ( x_{C₆H₁₀} )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>((/\text{cal mol}^{-1}))</td>
</tr>
<tr>
<td>Nonane; C₉H₁₈; [111-84-2]</td>
<td>298.15</td>
<td>2.984</td>
</tr>
<tr>
<td></td>
<td>298.15</td>
<td>2.880</td>
</tr>
</tbody>
</table>

+ Calculated by compiler assuming \( x_{C₆H₁₀} = 1/H \).

# Excess partial molar enthalpy of solution at infinite dilution.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
The conventional gas chromatographic technique 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 no allowance was made for surface adsorption.

SOURCE AND PURITY OF MATERIALS:
No details given.

ESTIMATED ERROR:
\( \delta T/K = \pm 0.05; \delta H = \pm 2\% \)

REFERENCES.
COMPONENTS:

(1) 2-Methylpropane; (isobutane), \( \text{C}_4\text{H}_{10} \); [75-28-5]
(2) Eicosane; \( \text{C}_{20}\text{H}_{42} \); [112-95-8]

ORIGINAL MEASUREMENTS:

VARIABLES:

\[
\begin{align*}
T/\text{K} & : 325-475 \\
P/\text{kPa} & : 101.325
\end{align*}
\]

EXPERIMENTAL VALUES:

<table>
<thead>
<tr>
<th>( T/\text{K} )</th>
<th>Henry's Constant(^a) ( H/\text{atm} )</th>
<th>Mole fraction of 2-methyl propane at 1 atm. partial pressure, ( x_{\text{C}<em>4\text{H}</em>{10}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>325</td>
<td>5.80</td>
<td>0.1724</td>
</tr>
<tr>
<td>350</td>
<td>9.15</td>
<td>0.1093</td>
</tr>
<tr>
<td>375</td>
<td>13.3</td>
<td>0.0752</td>
</tr>
<tr>
<td>400</td>
<td>18.1</td>
<td>0.0552</td>
</tr>
<tr>
<td>425</td>
<td>23.6</td>
<td>0.0424</td>
</tr>
<tr>
<td>450</td>
<td>29.8</td>
<td>0.0336</td>
</tr>
<tr>
<td>475</td>
<td>36.0</td>
<td>0.0278</td>
</tr>
</tbody>
</table>

\(^a\) Authors stated measurements were made at several pressures and values of solubility used were all within the Henry's law region.

\(^b\) Calculated by compiler assuming linear relationship between mole fraction and pressure.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Volumetric apparatus similar to that described by Dymond and Hildebrand (1). Pressure measured with a null detector and precision gauge. Details in ref. (2).

SOURCE AND PURITY OF MATERIALS:

Solvent degassed; no other details given.

ESTIMATED ERROR:

\[
\delta T/\text{K} = \pm 0.1; \ \delta x_{\text{C}_4\text{H}_{10}} = \pm 1\%
\]

REFERENCES: