

COMPONENTS: (1) 2-Methyl-2-butene; C ₅ H ₁₀ ; [513-35-9] (2) Water; H ₂ O; [7732-18-5]	EVALUATOR: G.T. Hefter, School of Mathematical and Physical Sciences, Murdoch University, Perth, Australia. November 1984.
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CRITICAL EVALUATION:

Quantitative solubility data for the 2-methyl-2-butene (1) and water (2) system have been reported in the publications listed in Table 1.

TABLE 1: Quantitative Solubility Studies of the
2-Methyl-2-butene (1) - Water (2) System

Reference	T/K	Solubility	Method
Englin <i>et al.</i> (ref 1)	293	(2) in (1)	analytical
Pavlova <i>et al.</i> (ref 2)	293-333	mutual	GLC, Karl Fischer

As only one study of the solubility of (1) in (2) has been reported (ref 2), no Critical Evaluation of those data can be made. The interested user is referred to the relevant data sheet for the experimental values.

Solubilities of 2-methyl-2-butene in various aqueous salt solutions have also been reported (ref 3) but will not be considered in this Evaluation.

The reported values for the solubility of (2) in (1) are listed in Table 2 and plotted in Figure 1. The agreement between the values at 293 K of Englin *et al.* (ref 1) and Pavlova *et al.* (ref 2) is reasonable and so the values in Table 2 may be considered "Tentative", subject to further studies.

TABLE 2: Tentative Values of the Solubility of
Water (2) in 2-Methyl-2-butene (1)

T/K	Solubility values		
	Reported values g(2)/100g sln	"Best" values ($\pm \sigma_n$) g(2)/100g sln	$10^3 x_2$
293	0.0435 (ref 1), 0.0388 (ref 2)	0.041 ± 0.02^a	1.6
313	0.0589 (ref 2)	0.059	2.3
333	0.0906 (ref 2)	0.091	3.5

^a This "Best" value obtained by averaging; σ_n has no statistical significance.

(continued next page)

COMPONENTS:

- (1) 2-Methyl-2-butene; C_5H_{10} ;
[513-35-9]
(2) Water; H_2O ; [7732-18-5]

EVALUATOR:

G.T. Hefter, School of Mathematical
and Physical Sciences, Murdoch
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CRITICAL EVALUATION: (continued)

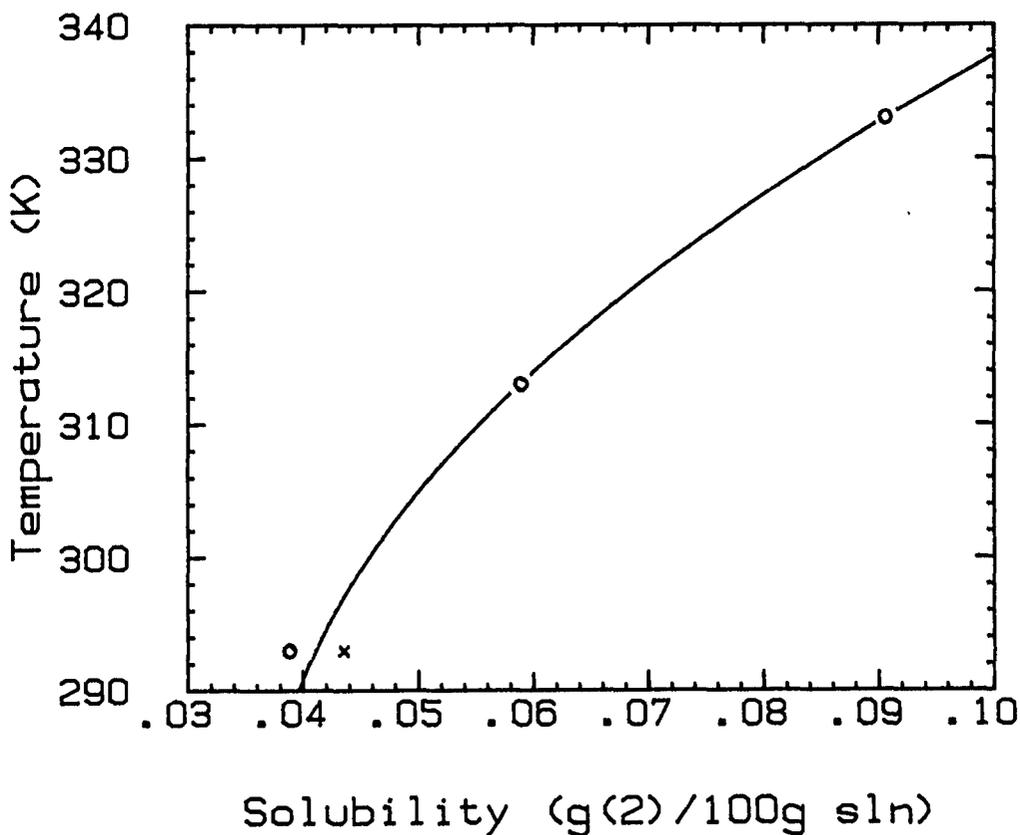


FIGURE 1. Solubility of water (2) in 2-methyl-2-butene: ref 1 (o); ref 2 (x).

REFERENCES

- Englin, B.A.; Plate, A.F.; Tugolukov, V.M.; Pryanishnikova, M.A. *Khim. Tekhnol. Topl. Masel* 1965, *10*, 42-6.
- Pavlova, S.P.; Pavlov, S.Yu.; Serafimov, L.A.; Kofman, L.S. *Promyshlennost. Sinteticheskogo Kauchuka* 1966, *3*, 18-20.
- Natarajan, G.S.; Venkatachalam, K.A. *J. Chem. Eng. Data* 1972, *17*, 328-9.

ACKNOWLEDGEMENT

The Evaluator thanks Dr Brian Clare for the graphics.

COMPONENTS: (1) 2-Methyl-2-butene; C ₅ H ₁₀ ; [513-35-9] (2) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Englin, B.A.; Plate, A.F.; Tugolukov, V.M.; Pryanishnikova, M.A. <i>Khim. Tekhnol. Topl. Masel</i> <u>1965</u> , 10, 42-6.
VARIABLES: One temperature: 20°C	PREPARED BY: A. Maczynski and Z. Maczynska
EXPERIMENTAL VALUES: The solubility of water in 2-methyl-2-butene at 20°C was reported to be 0.0435 g(2)/100 g sln. The corresponding mole fraction, x_2 , calculated by the compilers is 1.69×10^{-3} .	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: Component (1) was introduced into a thermostatted flask and saturated for 5 hr. with (2). Next, calcium hydride was added and the evolving hydrogen volume measured and hence the concentration of (2) in (1) was evaluated.	SOURCE AND PURITY OF MATERIALS: (1) not specified. (2) not specified. ESTIMATED ERROR: Not specified. REFERENCES:

COMPONENTS: (1) 2-Methyl-2-butene; C ₅ H ₁₀ ; [513-35-9] (2) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Pavlova, S.P.; Pavlov, S.Yu.; Serafimov, L.A.; Kofman, L.S. <i>Promyshlennost. Sinteticheskogo Kauchuka</i> <u>1966</u> , 3, 18-20.																											
VARIABLES: Temperature: 20-60°C	PREPARED BY: A. Maczynski																											
EXPERIMENTAL VALUES: <p style="text-align: center;">Solubility of 2-methyl-2-butene in water</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;"><u>t/°C</u></th> <th style="text-align: center;"><u>10⁵x₁</u></th> <th style="text-align: center;"><u>g(1)/100 g sln (compiler)</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20</td> <td style="text-align: center;">5.63</td> <td style="text-align: center;">0.0215</td> </tr> <tr> <td style="text-align: center;">40</td> <td style="text-align: center;">6.06</td> <td style="text-align: center;">0.0236</td> </tr> <tr> <td style="text-align: center;">50</td> <td style="text-align: center;">6.42</td> <td style="text-align: center;">0.0250</td> </tr> <tr> <td style="text-align: center;">60</td> <td style="text-align: center;">6.87</td> <td style="text-align: center;">0.0267</td> </tr> </tbody> </table> <p style="text-align: center;">Solubility of water in 2-methyl-2-butene</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;"><u>t/°C</u></th> <th style="text-align: center;"><u>10³x₂</u></th> <th style="text-align: center;"><u>g(2)/100 g sln (compiler)</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20</td> <td style="text-align: center;">1.51</td> <td style="text-align: center;">0.0388</td> </tr> <tr> <td style="text-align: center;">40</td> <td style="text-align: center;">2.29</td> <td style="text-align: center;">0.0589</td> </tr> <tr> <td style="text-align: center;">60</td> <td style="text-align: center;">3.52</td> <td style="text-align: center;">0.0906</td> </tr> </tbody> </table>		<u>t/°C</u>	<u>10⁵x₁</u>	<u>g(1)/100 g sln (compiler)</u>	20	5.63	0.0215	40	6.06	0.0236	50	6.42	0.0250	60	6.87	0.0267	<u>t/°C</u>	<u>10³x₂</u>	<u>g(2)/100 g sln (compiler)</u>	20	1.51	0.0388	40	2.29	0.0589	60	3.52	0.0906
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METHOD/APPARATUS/PROCEDURE: The solubility of (1) in (2) was determined by glc. The solubility of (2) in (1) was determined by the Karl Fischer reagent method.	SOURCE AND PURITY OF MATERIALS: (1) source not specified; better than 99.7 wt%. (2) doubly distilled. ESTIMATED ERROR: temp. ± 0.1 K REFERENCES:																											

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<p>VARIABLES:</p> <p>Temperature: 15-25°C</p>	<p>PREPARED BY:</p> <p>M.C. Haulait-Pirson, G.T. Hefter</p>																
<p>EXPERIMENTAL VALUES:</p> <p>Solubility of 2-methyl-2-butene in 0.001 mol/L HNO₃ solution.</p> <table border="1"> <thead> <tr> <th>$t/^{\circ}\text{C}$</th> <th>10^3 mol/L sln^a</th> <th>$\text{g(l)}/100 \text{ g sln}^b$ (compiler)</th> <th>$10^5 x_1$ (compiler)</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>5.15 ± 0.21</td> <td>0.037</td> <td>9.3</td> </tr> <tr> <td>20</td> <td>4.88 ± 0.16</td> <td>0.035</td> <td>8.8</td> </tr> <tr> <td>25</td> <td>4.61 ± 0.20</td> <td>0.033</td> <td>8.3</td> </tr> </tbody> </table> <p><i>a</i> Uncertainties stated to be "standard deviations from means".</p> <p><i>b</i> Assuming a solution density of 1.00 g mL⁻¹ at all temperatures.</p> <p><u>Compiler's note:</u> Although the data have not been measured in pure water the low concentration of the added acid is unlikely to cause the olefin solubility to differ markedly from that in pure water. Further solubility data are given in the paper for 0.05 and 0.1 mol L⁻¹ HCl.</p>		$t/^{\circ}\text{C}$	10^3 mol/L sln^a	$\text{g(l)}/100 \text{ g sln}^b$ (compiler)	$10^5 x_1$ (compiler)	15	5.15 ± 0.21	0.037	9.3	20	4.88 ± 0.16	0.035	8.8	25	4.61 ± 0.20	0.033	8.3
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<p>METHOD/APPARATUS/PROCEDURE:</p> <p>15 mL of the aqueous medium was equilibrated with 1 mL of (1) by mechanical shaking in a thermostatted glass burette. After settling (judged visually), 5 mL of the aqueous layer was withdrawn and the olefin content determined by titration with bromine using standard procedures.</p>	<p>SOURCE AND PURITY OF MATERIALS:</p> <p>(1) Prepared by dehydration of <i>t</i>-amyl alcohol and then washed, dried and fractionated. Purity (no specification) was determined by chromatography.</p> <p>(2) Not specified.</p> <p>ESTIMATED ERROR:</p> <p>Temp. ± 0.05 K Soly. see table above.</p> <p>REFERENCES:</p>																