

<p>COMPONENTS:</p> <p>(1) Bicyclo[4.4.0]decane (decahydronaphthalene; decalin); $C_{10}H_{18}$; [91-17-8]</p> <p>(2) Water; H_2O; [7732-18-5]</p>	<p>EVALUATOR:</p> <p>G.T. Hefter, School of Mathematical and Physical Sciences, Murdoch University, Perth, W.A., Australia.</p> <p>April 1986.</p>
---	--

CRITICAL EVALUATION:

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

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

Reference	T/K	Solubility	Method
Booth and Everson (ref 1)	298	(1) in (2)	volumetric
Englin <i>et al.</i> (ref 2)	293-313	(2) in (1)	analytical
Price (ref 3)	298	(1) in (2)	GLC

The original data in all of these publications are compiled in the Data Sheets immediately following this Critical Evaluation. For convenience further discussion of this system will be divided into two parts.

1. SOLUBILITY OF DECALIN (1) IN WATER (2)

The solubility of decalin in water has been reported only at 298K (Table 1). However, the datum of Booth and Everson (ref 1) in v/v fraction, is only an order of magnitude result and must thus be excluded. Since this leaves only the single datum of $8.89 \times 10^{-5}g(1)/100g \text{ sln}$ ($x_1 = 1.16 \times 10^{-7}$) of Price (ref 3) no Critical Evaluation is possible. Nevertheless, it may be noted that the solubility values reported by Price are usually reliable although for the higher hydrocarbons his results are often about 20% (relative) lower than Recommended values.

2. SOLUBILITY OF WATER (2) IN DECALIN (1)

As only the data of Englin *et al.* (ref 2) over the range 293-313K are available no Critical Evaluation is possible. However, it may be noted that the data of Englin *et al.* are generally reliable when $T < 300K$ but are somewhat high at higher temperatures. The interested user is referred to the relevant data sheet for the experimental values.

REFERENCES

- Booth, H.S.; Everson, H.E. *Ind. Eng. Chem.* 1948, *40*, 1491-3.
- Englin, B.A.; Plate, A.F.; Tugolukov, V.M.; Pryanishnikova, M.A. *Khim. Tekhnol. Topl. Masel* 1965, *10*, 42-6.
- Price, L.C. *Am. Assoc. Petrol. Geol. Bull.* 1976, *60*, 213-44.

COMPONENTS: (1) Bicyclo[4.4.0]decane (Decahydro-naphthalene); C ₁₀ H ₁₈ ; [91-17-8] (2) Water; H ₂ O; [7732-18-5]	ORIGINAL MEASUREMENTS: Booth, H.S.; Everson, H. <i>Ind. Eng. Chem.</i> <u>1948</u> , 4, 1491-3.
VARIABLES: One temperature: 25°C	PREPARED BY: G.T. Hefter
EXPERIMENTAL VALUES: The solubility of bicyclo[4.4.0]decane in water at 25°C was reported to be <0.02 mL(1)/100 mL(2). A similar result was reported for (1) in 40.0% (w/w?) aqueous sodium xylenesulfonate.	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: A known volume of water, typically 50 mL, was placed in a stoppered Babcock tube having a neck graduated from 0 to 1.6 mL in steps of 0.03 mL. An excess of solute was added and the mixture allowed to come to equilibrium in a constant temperature bath then centrifuged. The amount of solute dissolved was determined by subtracting the undissolved solute, measured directly in the tube, from the total added.	SOURCE AND PURITY OF MATERIALS: (1) "Highest grade commercial sample available"; no other details given. (2) Distilled. ESTIMATED ERROR: Not specified. REFERENCES:

COMPONENTS: (1) Bicyclo[4.4.0]decane (decahydronaphthalene; decalin) $C_{10}H_{18}$; [91-17-8] (2) Water; H_2O ; [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: Temperature: 20-40°C	PREPARED BY: A. Maczynski and M.C. Haulait-Pirson												
EXPERIMENTAL VALUES: <p style="text-align: center;">Solubility of Water in Bicyclo[4.4.0]decane</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">$t/^\circ C$</th> <th style="text-align: center;">$g(2)/100\ g\ sln$</th> <th style="text-align: center;">$10^4 x_2$ (compiler)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20</td> <td style="text-align: center;">0.0063</td> <td style="text-align: center;">4.84</td> </tr> <tr> <td style="text-align: center;">30</td> <td style="text-align: center;">0.0105</td> <td style="text-align: center;">8.06</td> </tr> <tr> <td style="text-align: center;">40</td> <td style="text-align: center;">0.0164</td> <td style="text-align: center;">12.58</td> </tr> </tbody> </table>		$t/^\circ C$	$g(2)/100\ g\ sln$	$10^4 x_2$ (compiler)	20	0.0063	4.84	30	0.0105	8.06	40	0.0164	12.58
$t/^\circ C$	$g(2)/100\ g\ sln$	$10^4 x_2$ (compiler)											
20	0.0063	4.84											
30	0.0105	8.06											
40	0.0164	12.58											
AUXILIARY INFORMATION													
METHOD/APPARATUS/PROCEDURE: Component (1) was introduced into a thermostatted flask and saturated for 5 hours 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) Bicyclo[4.4.0]decane (decahydronaphthalene; decalin); $C_{10}H_{18}$; [91-17-8] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Price, L.C. <i>Am. Assoc. Petrol. Geol. Bull.</i> <u>1976, 60, 213-44.</u>
VARIABLES: One temperature: 25°C	PREPARED BY: M.C. Haulait-Pirson
EXPERIMENTAL VALUES: <p>The solubility of bicyclo[4.4.0]decane in water at 25°C and at system pressure was reported to be 0.889 mg(1)/kg(2). The corresponding mass percent and mole fraction, x_1, calculated by the compiler are 8.89×10^{-5} g(1)/100 g sln and 1.16×10^{-7}.</p>	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: The solubility was determined at laboratory temperatures by use of screw-cap test tubes. The (1) phase floated on top of the water and insured saturation of the (2) phase in 2 to 4 days. Analyses were carried out by GLC using a Hewlett-Packard model 5751 gas chromatograph with dual-flame ionization detectors. Many details are given in the paper.	SOURCE AND PURITY OF MATERIALS: (1) Phillips Petroleum Company; Chemical Samples Company or Aldrich Chemical Company; 99+%. (2) distilled. ESTIMATED ERROR: temp. $\pm 1^\circ C$ soly. ± 0.031 mg(1)/kg(2) REFERENCES: