COMPONENTS:	EVALUATOR:
(1) Methane; CH_4; [74-82-8] (2) Cycloalkenes Cyclohexene Pinene	H. Lawrence Clever Chemistry Department Emory University Atlanta, GA 30322 USA 1984, January

CRITICAL EVALUATION:

Methane + Cyclohexene; C_6H_{10}; [110-83-8]

Methane + 2,6,6-Trimethylbicyclo[3.1.1]hept-2-ene or pinene; $C_{10}H_{16}$; [80-56-8]

Guerry (ref. 2) reported the solubility of methane in cyclohexene at 293.15 and 298.15 K and McDaniel (ref. 1) reported the solubility of methane in pinene at five temperatures between 293.15 and 328.35 K. Other methane solubility values reported by these authors have proved unreliable, often being too small by 20 to 50 percent. Thus these data are classed as doubtful.

Guerry's data leads to a partial molal enthalpy of solution of -1.18 kJ mol^{-1} of methane in cyclohexene and McDaniels data leads to a value of -8.13 kJ mol^{-1} of methane in pinene. McDaniel's value appears to be too large and Guerry's value too small when the enthalpies are compared to more reliable values in other hydrocarbon solvents.

The smoothed solubility data which should be used with caution because they are probably both too small and of incorrect temperature coefficient are in Table 1.

Table 1. Solubility of methane in cyclohexene and pinene. Mole fraction solubility at 101.325 kPa partial pressure methane.

T/K	Mol Fraction, $10^3 x_1$	
	Cyclohexene	Pinene
293.15	2.48	3.29
298.15	2.46	3.11
303.15	-	2.95
313.15	-	2.66
323.15	-	2.41

References

1. McDaniel, A. S. *J. Phys. Chem.* 1911, *15*, 587-610.

2. Guerry, D. Ph.D. thesis, Vanderbilt University, 1944.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Methane; CH_4; [74-82-8] (2) 2,6,6-Trimethylbicyclo[3.1.1] hept-2-ene or pinene; $C_{10}H_{16}$; [80-56-8]	McDaniel, A. S. *J. Phys. Chem.* 1911, *15*, 587-610.
VARIABLES: T/K = 293.15 - 328.35 p_1/kPa = 101.3 (1 atm)	**PREPARED BY:** H. L. Clever

EXPERIMENTAL VALUES:

Temperature		Mol Fraction	Bunsen Coefficient[a]	Ostwald Coefficient[b]
t/°C	T/K	$10^3 x_1$	α	L/cm^3 cm^{-3}
20.0	293.15	3.21	0.4565	0.4888
25.0	298.15	2.98	0.4235	0.4623[c]
30.1	303.25	2.93	0.4163	0.4620
39.1	312.25	2.76	0.3914	0.4472
45.0	318.15	2.69	0.3811	0.4440
55.2	328.35	2.17	0.3076	0.3694

[a] Bunsen coefficient, α/cm^3(STP) cm^{-3} atm^{-1}.

[b] Listed as absorption coefficient in the original paper. Interpreted to be equivalent to Ostwald coefficient by compiler.

[c] Ostwald coefficient (absorption coefficient) estimated as 298.15 K value by author.

[d] Mole fraction and Bunsen coefficient values calculated by compiler assuming ideal gas behavior.

EVALUATOR'S COMMENT: McDaniel's data should be used with caution. His values are often 20 percent or more too small when compared with more reliable data.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:
The apparatus is all glass. It consists of a gas buret connected to a contacting vessel. The solvent is degassed by boiling under reduced pressure. Gas pressure or volume is adjusted using mercury displacement. Equilibration is achieved at atm pressure by hand shaking, and incrementally adding gas to the contacting chamber. Solubility measured by obtaining total uptake of gas by known volume of the solvent.

SOURCE AND PURITY OF MATERIALS:
(1) Methane. Prepared by reaction of methyl iodide with zinc-copper. Passed through water and sulfuric acid.

(2) Pinene.

ESTIMATED ERROR:

$\delta L/L \geq -0.20$

REFERENCES: