COMPONENTS:	ORIGINAL MEASUREMENTS:
1. *N,N*-Dimethylmethanamine, (Trimethylamine); C_3H_9N; [75-50-3] 2. Hexane; C_6H_{14}; [110-54-3]	Halban, H. *Z. Phys. Chem.* <u>1913</u>, *84*, 129-159.
VARIABLES: Concentration	PREPARED BY: P. G. T. Fogg

EXPERIMENTAL VALUES:

T/K	Concentration of C_3H_9N in solution/ mol dm^{-3}	$p_{C_3H_9N}$/mmHg	Concentration of C_3H_9N in solution/ concentration in gas phase	Mole fraction in solution* $x_{C_3H_9N}$
298.2	0.0886	22.0	75.0	0.0115
	0.1661	41.1	75.0	0.0214
	0.1702	41.9	75.3	0.0219

* Calculated by the compiler, using the density of the solvent given in ref. (1), on the assumption that dissolution of gas caused negligible change of volume of the liquid phase.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The partial pressures of trimethyl-amine above solutions of concentrat-ions determined by titration, were measured by a dynamic method (refs. (2) & (3)). Mixtures of hydrogen and oxygen, produced by electrolysis of sodium hydroxide solution, were passed through each solution of trimethylamine. The trimethylamine in the gas stream was absorbed in hydrochloric acid and estimated from changes in electrical conductivity due to partial neutralisation of the acid. The volumes of hydrogen/oxygen gas mixture produced by electrolysis were found from the barometric pressure and changes in a copper voltameter in series with the cell for producing the gas. The partial pressures of trimethylamine were calculated on the assumption that equilibrium was established between trimethylamine in solution and that in the gas phase, during passage of hydrogen/oxygen mixture through the solution.

SOURCE AND PURITY OF MATERIALS:

1. Hydrated chloride from Kahlbaum; reacted with KOH; gas dried with NaOH.

2. Kahlbaum *n-Hexan aus Propyljodid*; distilled over Na; b.p. 67.85-68.10°C (745 mmHg).

ESTIMATED ERROR:

REFERENCES:
1. Dreisbach, R.R. *Physical Properties of Chemical Compounds*, Vol. 2, A.C.S. Washington, <u>1959</u>.
2. Gaus, *Z. Anorg. Chem.* <u>1900</u>, *25*, 236.
3. Abegg, R.; Riesenfeld, H. *Z. Phys. Chem.* <u>1902</u>, *40*, 84.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. *N,N*-Dimethylmethanamine, (trimethylamine); C_3H_9N; [75-50-3] 2. Hexane; C_6H_{14}; [110-54-3]	Wolff, H.: Würtz, R. *Ber. Bunsenges. Phys. Chem.* 1968, *72*, 101-109.

VARIABLES:
    Composition, temperature
	PREPARED BY:
	        P. G. T. Fogg

EXPERIMENTAL VALUES:

Variation of total vapor pressure/Torr with variation of temperature and of mole fraction of C_3H_9N in the liquid phase, $x_{C_3H_9N}$

$x_{C_3H_9N}$	T/K				
	223.15	233.15	253.15	273.15	293.15
0	1.8	3.7	14.1	45.7	121.0
0.0508	4.7	9.6	30.8	81.4	180.2
0.1048	8.6	15.9	46.9	117.2	260.3
0.131	10.2	18.7	54.7	134.7	293.9
0.157	12.5	22.7	64.0	154.7	330.9
0.188	13.5	24.4	69.9	168.7	360.3
0.200	15.4	27.1	76.8	182.5	383.6
0.254	18.5	32.8	92.1	216.7	450.6
0.302	21.2	38.1	106.3	249.2	514.2
0.343	23.2	41.9	117.0	274.7	567.1
0.422	27.4	49.6	138.1	322.1	659.3
0.474	30.7	54.9	152.3	355.0	727.2
0.513	32.1	57.6	160.6	375.5	770.7
0.560	35.2	62.3	173.6	405.0	829.0
0.601	37.0	66.7	185.8	433.5	887.9
0.654	40.0	71.4	198.9	464.4	950.7
0.703	42.2	76.3	212.3	493.2	1007.8
0.758	45.1	80.8	224.5	525.0	1076.4

Cont.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Apparatus described previously was used (1), (2). Liquid mixtures of accurately known composition were introduced into a cell held in a thermostat controlled to ± 0.02°C. The total vapor pressure was measured by a mercury manometer. The authors calculated activity coefficients of each component from the vapor pressure data by a method described by Barker (3). Constants for Redlich-Kister equations (4) were evaluated and reported. The compositions of the vapor phase were also calculated by the authors.	1. Prepared from commercial *reinst* trimethylammonium chloride; repeatedly fractionated until the first and last fractions had vapor pressures which differed by less than the limits of error of the pressure measurements. 2. Fluka "*Reinstpräparat*"; purity 99.96 mol %.

ESTIMATED ERROR:

$\delta T/K$ = ± 0.02 (estimated by authors)

REFERENCES:
1. Wolff, H.; Höpfner, A. *Z. Elektro-chem.* 1962, *66*, 149.
2. Wolff, H.; Höppel, H.-E. *Ber. Bun-senges. Phys. Chem.* 1966, *70*, 874.
3. Barker, J.A. *Aust. J. Chem.* 1953, *6*, 207.
4. Redlich, O.; Kister, A.T. *Ind. Eng. Chem.* 1948, *21*, 345.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. *N,N*-Dimethylmethanamine, (trimethylamine); C$_3$H$_9$N; [75-50-3] 2. Hexane; C$_6$H$_{14}$; [110-54-3]	Wolff, H.; Würtz, R. *Ber. Bunsenges. Phys. Chem.* <u>1968</u>, *72*, 101-109.

EXPERIMENTAL VALUES: Cont.

	T/K				
xC$_3$H$_9$N	223.15	233.15	253.15	273.15	293.15
0.806	47.2	85.2	238.7	555.4	1173.6
0.886	51.1	90.6	253.0	591.6	1213.8
0.901	52.8	94.2	263.1	612.9	1259.5
1	57.4	103.9	289.2	675.8	1388.2

760 Torr = 1 atm = 1.013 x 10^5 Pa

Constants for calculation of activity coefficients from the Redlich-Kister equations given below.

T/K	A	B	C
223.15	0.257	0.060	+0.014
233.15	0.225	0.032	-0.022
243.15	0.203	0.035	-0.024
253.15	0.197	0.022	-0.001
263.15	0.173	0.027	-0.000
273.15	0.145	0.018	-0.006
283.15	0.121	0.003	-0.013
293.15	0.100	0.009	-0.013

$$\ln f_1 = A\,x_2^2 - B\,x_2^2(1 - 4\,x_1) + C\,x_2^2(1 - 8\,x_1 + 12\,x_1^2)$$

$$\ln f_2 = A\,x_1^2 + B\,x_1^2(1 - 4\,x_2) + C\,x_1^2(1 - 8\,x_2 + 12\,x_2^2)$$

where f_1 = activity coefficient of trimethylamine
       f_2 = activity coefficient of hexane
       x_1 = mole fraction of trimethylamine in the liquid phase
       x_2 = mole fraction of hexane in the liquid phase

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. *N,N*-Dimethylmethanamine, (Trimethylamine); C_3H_9N; [75-50-3] 2. Heptane; C_7H_{16}; [142-82-5] 3. Cyclohexanone; $C_6H_{10}O$; [108-94-1] Cyclopentanone; C_5H_8O; [120-92-3] 3-Pentanone; $C_5H_{10}O$; [96-22-0] 2-Butanone; C_4H_8O; [78-93-3]	Wheeler, O.H.; Levy, E.M. *Can. J. Chem.* <u>1959</u>, *37*, 1727-1732
	PREPARED BY: P. G. T. Fogg

EXPERIMENTAL VALUES:

	Conc.of component 3 /mol dm^{-3}	T/K	Henry's law constant H / (mmHg / $x_{C_3H_9N}$)
Heptane	–	233.2 273.2	148 864
Heptane + cyclohexanone	1.0	233.2 273.2	111 814
Heptane + cyclopentanone	1.0	233.2 273.2	123 884
Heptane + 3-pentanone	1.0	233.2 273.2	133 908
Heptane + 2-butanone	1.0	233.2 273.2	138 944

760 mmHg = 1 atm = 1.013×10^5 Pa

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The absorption vessel of known volume was connected by narrow bore tubing to a mercury manometer and by a tap to a storage vessel connected to a second manometer. The whole was attached to a high-vacuum line. 10 cm^3 of liquid were introduced into the absorption vessel and repeatedly frozen and pumped to remove air. Trimethylamine was distilled into the storage vessel and from there small samples transferred to the absorption vessel. The liquid was stirred by a magnetic stirrer and the final pressure in the absorption vessel measured. The quantity of trimethylamine admitted to the absorption vessel was calculated from the volume of the storage vessel and the change of pressure in this vessel. Allowance was made for the trimethylamine in the gas phase in the absorption vessel when the quantity dissolved was calculated.	1. Eastman-Kodak white-label grade; dried over CaH_2; non-condensible gases removed. 2. From Matheson, Coleman, & Bell; distilled over Na; b.p.98.3°C; n_D(20°C) 1.3884. 3. Eastman-Kodak white label grade; dried over $CaSO_4$ and distilled. $C_6H_{10}O$: b.p. 155.7°C; n_D(20°C) 1.4506 C_5H_8O : b.p. 129.5°C; n_D(20°C) 1.4369 $C_5H_{10}O$: b.p. 101.6°C; n_D(20°C) 1.3929 C_4H_8O : b.p. 79.5°C; n_D(20°C) 1.3786
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. *N,N*-Dimethylmethanamine, (Trimethylamine); C_3H_9N; [75-50-3] 2. Heptane; C_7H_{16}; [142-82-5] 3. Cyclohexanone; $C_6H_{10}O$; [108-94-1] Cyclopentanone; C_5H_8O; [120-92-3] 3-Pentanone; $C_5H_{10}O$; [96-22-0] 2-Butanone; C_4H_8O; [78-93-3]	Wheeler, O.H.; Levy, E.M. *Can. J. Chem.* <u>1959</u>, *37*, 1727-1732.

EXPERIMENTAL VALUES:

The authors gave two small scale graphs showing linear variations of $x_{C_3H_9N}$ with $p_{C_3H_9N}$ for all the systems. Experimental points were not marked on these graphs. The authors stated that measurements were made over a pressure range to $p_{C_3H_9N}$ = 160 mmHg. The lines drawn on the graphs show a variation of pressure from a few mmHg to about 140 mmHg for all measurements at $0°C$, from a few mmHg to about 70 mmHg for solutions in pure heptane at $-40°C$ and from a few mmHg to about 50 mmHg for other solutions at $-40°C$.

The authors also gave a table of values of $x_{C_3H_9N}$ for various values of $p_{C_3H_9N}$ for the cyclohexanone-heptane mixture at $0°C$, apparently to a maximum $p_{C_3H_9N}$ of 17 mmHg. This data is inconsistent with other data in the paper and the compiler considers that the authors have confused mmHg with cmHg and that this has led to errors by a factor of 10.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. *N,N*-Dimethylmethanamine (trimethylamine); C_3H_9N; [75-50-3] 2. Decane; $C_{10}H_{22}$; [124-18-5]	Gerrard, W. *Solubility of Gases and Liquids,* *Plenum,* <u>1976</u>, Chapter 10.
VARIABLES: Pressure	PREPARED BY: C. L. Young

EXPERIMENTAL VALUES:

T/K	P/mmHg	P/10⁵Pa	Mole fraction of trimethylamine in liquid, $x_{(CH_3)_3N}$
283.15	100	0.133	0.108
	200	0.267	0.211
	300	0.400	0.313
	400	0.533	0.416
	500	0.667	0.517
	600	0.800	0.624
	700	0.933	0.728
	760	1.013	0.786

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Amine was passed into a known weight of pure liquid in a bubbler tube at a total pressure measured by a manometer assembly. The amount of absorbed gas was estimated by weighing. The temperature was manually controlled to within 0.2K. The apparatus and procedure are described by Gerrard [1,2].	1. British Drug Houses or Cambrian Gases sample. 2. Purified and attested by conventional procedures.

ESTIMATED ERROR:
$\delta T/K = \pm 0.1$; $\delta s/s = \pm 3\%$
(estimated by compiler)

REFERENCES:
1. Gerrard, W.
J. Appl. Chem. Biotechnol. <u>1972</u>, 22 623-650.
2. Gerrard, W.
Solubility of Gases and Liquids.
Plenum Press, New York. <u>1976</u>.
Chapter 1.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. N,N-Dimethylmethanamine, (Trimethylamine); C_3H_9N; [75-50-3] 2. Benzene; C_6H_6; [71-43-2]	Halban, H. Z. Phys. Chem. 1913, 84, 129-159.
VARIABLES: Concentration	PREPARED BY: P. G. T. Fogg

EXPERIMENTAL VALUES:

T/K	Concentration of C_3H_9N in solution/ mol dm^{-3}	$p_{C_3H_9N}$/mmHg	Concentration of C_3H_9N in solution/ concentration in gas phase	Mole fraction in solution* $x_{C_3H_9N}$
298.2	0.1621	27.8	108	0.0143
	0.1692	28.5	110	0.0149
	0.1901	32.9	108	0.0167
	0.1928	33.1	108	0.0169

* Calculated by the compiler, using the density of the solvent given in ref. (1), on the assumption that dissolution of gas caused negligible change of volume of the liquid phase.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The partial pressures of trimethyl-amine above solutions of concentrations determined by titration, were measured by a dynamic method (refs. (2) & (3)). Mixtures of hydrogen and oxygen, produced by electrolysis of sodium hydroxide solution, were passed through each solution of trimethylamine. The trimethylamine in the gas stream was absorbed in hydrochloric acid and estimated from changes in electrical conductivity due to partial neutralisation of the acid. The volumes of hydrogen/ oxygen gas mixture produced by electrolysis were found from the barometric pressure and changes in a copper voltameter in series with the cell for producing the gas. The partial pressures of trimethylamine were calculated on the assumption that equilibrium was established between trimethylamine in solution and that in the gas phase, during passage of hydrogen/oxygen mixture through the solution.

SOURCE AND PURITY OF MATERIALS:

1. Hydrated chloride from Kahlbaum; reacted with KOH; gas dried with NaOH.

2. From Kahlbaum; contained no thiophene; distilled over Na.

ESTIMATED ERROR:

REFERENCES:
1. Dreisbach, R.R. Physical Properties of Chemical Compounds, Vol. 1, A.C.S. Washington. 1955.
2. Gaus,   Z. Anorg. Chem. 1900, 25, 236.
3. Abegg, R.; Riesenfeld, H. Z. Phys. Chem. 1902, 40, 84.

COMPONENTS:	ORIGINAL MEASUREMENTS:
1. *N,N*-Dimethylmethanamine (trimethylamine); C_3H_9N; [75-50-3] 2. Aromatic hydrocarbons	Gerrard, W. *Solubility of Gases and Liquids,* *Plenum,* 1976, Chapter 10.
VARIABLES: Pressure	PREPARED BY: C. L. Young

EXPERIMENTAL VALUES:

T/K	P/mmHg	$P/10^5 Pa$	Mole fraction of trimethylamine in liquid, $x_{(CH_3)_3N}$
Benzene; C_6H_6; [71-43-2]
283.15	700	0.933	0.69
	760	1.013	0.74
Methylbenzene (toluene); C_7H_8; [108-88-3]
283.15	700	0.933	0.718
	760	1.013	0.768
1,3-Dimethylbenzene (*m*-xylene); C_8H_{10}; [108-38-3]
283.15	700	0.933	0.716
	760	1.013	0.768
1,3,5-Trimethylbenzene (mesitylene); C_9H_{12}; [108-67-8]
283.15	100	0.133	0.096
	200	0.267	0.192
	300	0.400	0.284
	400	0.533	0.382
	500	0.667	0.488
	600	0.800	0.600
	700	0.933	0.700
	760	1.013	0.756

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Amine was passed into a known weight of pure liquid in a bubbler tube at a total pressure measured by a manometer assembly. The amount of absorbed gas was estimated by weighing. The temperature was manually controlled to within 0.2K. The apparatus and procedure are described by Gerrard [1,2].	1. British Drug Houses or Cambrian Gases sample. 2. Purified and attested by conventional procedures.
	ESTIMATED ERROR: $\delta T/K = \pm0.1$; $\delta x/x = \pm3\%$ (estimated by compiler)
	REFERENCES: 1. Gerrard, W. *J. Appl. Chem. Biotechnol.* 1972, *22* 623-650. 2. Gerrard, W. *Solubility of Gases and Liquids.* *Plenum Press, New York.* 1976. Chapter 1.