

COMPONENTS:		ORIGINAL MEASUREMENTS:		
1. N,N-Dimethylmethanamine, (Trimethylamine); C <sub>3</sub> H <sub>9</sub> N; [75-50-3]  2. Trichloromethane, (chloroform); CHCl <sub>3</sub> ; [67-66-3]		Halban, H. Z. Phys. Chem. <u>1913</u> , 84, 129-159.		
VARIABLES:		PREPARED BY:		
Concentration		P. G. T. Fogg		
EXPERIMENTAL VALUES:				
T/K	Concentration of C <sub>3</sub> H <sub>9</sub> N in solution/ mol dm <sup>-3</sup>	p <sub>C<sub>3</sub>H<sub>9</sub>N</sub> /mmHg	Concentration of C <sub>3</sub> H <sub>9</sub> N in solution/ concentration in gas phase	Mole fraction in solution* <sup>x</sup> C <sub>3</sub> H <sub>9</sub> N
298.2	0.1552	4.82	598	0.0124
	0.1995	6.14	593	0.0158
	0.276	8.84	580	0.0218
<p>* 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.</p>				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
<p>The partial pressures of trimethylamine above solutions of concentrations determined by titration, were measured by a dynamic method (refs. (2) &amp; (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.</p>		1. Hydrated chloride from Kahlbaum; reacted with KOH; gas dried with NaOH.  2. From Kahlbaum; dried over CaCl <sub>2</sub> and distilled.		
		ESTIMATED ERROR:		
		REFERENCES:		
		1. Dreisbach, R.R. <i>Physical Properties of Chemical Compounds</i> , Vol. 2, A.C.S., Washington, 1959. 2. Gaus, Z. Anorg. Chem. 1900, 25, 236. 3. Abegg, R.; Riesenfeld, H. Z. Phys. Chem. 1902, 40, 84.		

<p>COMPONENTS:</p> <p>1. N,N-Dimethylmethanamine (trimethylamine); C<sub>3</sub>H<sub>9</sub>N; [75-50-3]</p> <p>2. Trichloromethane; CHCl<sub>3</sub>; [67-66-3]</p>	<p>ORIGINAL MEASUREMENTS:</p> <p>Gerrard, W.</p> <p><i>Solubility of Gases and Liquids, Plenum, 1976, Chapter 10.</i></p>								
<p>VARIABLES:</p>	<p>PREPARED BY:</p> <p>C. L. Young</p>								
<p>EXPERIMENTAL VALUES:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">T/K</th> <th style="text-align: center;">P/mmHg</th> <th style="text-align: center;">P/10<sup>5</sup>Pa</th> <th style="text-align: center;">Mole fraction of N,N-dimethylmethanamine in liquid, <math>x_{C_3H_9N}</math></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">298.15</td> <td style="text-align: center;">760</td> <td style="text-align: center;">1.013</td> <td style="text-align: center;">0.554</td> </tr> </tbody> </table>		T/K	P/mmHg	P/10 <sup>5</sup> Pa	Mole fraction of N,N-dimethylmethanamine in liquid, $x_{C_3H_9N}$	298.15	760	1.013	0.554
T/K	P/mmHg	P/10 <sup>5</sup> Pa	Mole fraction of N,N-dimethylmethanamine in liquid, $x_{C_3H_9N}$						
298.15	760	1.013	0.554						
<p>AUXILIARY INFORMATION</p>									
<p>METHOD APPARATUS/PROCEDURE:</p> <p>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).</p>	<p>SOURCE AND PURITY OF MATERIALS:</p> <ol style="list-style-type: none"> <li>1. British Drug Houses or Cambrian Gases sample.</li> <li>2. Purified and attested by conventional procedures.</li> </ol> <p>ESTIMATED ERROR:</p> <p><math>\delta T/K = \pm 0.1</math>; <math>\delta x/x = \pm 3\%</math> (estimated by compiler).</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> <li>1. Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1972</u>, <i>22</i>, 623-650.</li> <li>2. Gerrard, W. <i>Solubility of Gases and Liquids, Plenum Press, New York. 1976, Chapter 1.</i></li> </ol>								

<p>COMPONENTS:</p> <p>1. N,N-Dimethylmethanamine, (trimethylamine); C<sub>3</sub>H<sub>9</sub>N; [75-50-3]</p> <p>2. Tetrachloromethane (carbon tetrachloride); CCl<sub>4</sub>; [56-23-5]</p>	<p>ORIGINAL MEASUREMENTS:</p> <p>Wolff, H.; Würtz, R. <i>Ber. Bunsenges. Phys. Chem.</i> <u>1968</u>, <i>72</i>, 101-109.</p>																																																																								
<p>VARIABLES:</p> <p>Composition, temperature</p>	<p>PREPARED BY:</p> <p>P. G. T. Fogg</p>																																																																								
<p>EXPERIMENTAL VALUES:</p> <p>Variation of the total vapor pressure/Torr with variation of temperature and of mole fraction of C<sub>3</sub>H<sub>9</sub>N in the liquid phase, <math>x_{\text{C}_3\text{H}_9\text{N}}</math></p> <table border="1" data-bbox="259 610 1079 1124"> <thead> <tr> <th></th> <th colspan="3">T/K</th> </tr> <tr> <th><math>x_{\text{C}_3\text{H}_9\text{N}}</math></th> <th>253.15</th> <th>273.15</th> <th>293.15</th> </tr> </thead> <tbody> <tr><td>0</td><td>10.0</td><td>33.0</td><td>90.5</td></tr> <tr><td>0.0502</td><td>17.7</td><td>51.0</td><td>130.4</td></tr> <tr><td>0.1029</td><td>21.5</td><td>73.6</td><td>177.1</td></tr> <tr><td>0.152</td><td>31.6</td><td>90.6</td><td>218.6</td></tr> <tr><td>0.202</td><td>41.7</td><td>114.8</td><td>269.8</td></tr> <tr><td>0.254</td><td>51.6</td><td>139.8</td><td>322.6</td></tr> <tr><td>0.304</td><td>62.3</td><td>166.1</td><td>378.7</td></tr> <tr><td>0.351</td><td>73.5</td><td>190.9</td><td>425.0</td></tr> <tr><td>0.396</td><td>85.5</td><td>221.5</td><td>491.9</td></tr> <tr><td>0.403</td><td>87.5</td><td>227.2</td><td>501.7</td></tr> <tr><td>0.453</td><td>101.4</td><td>259.5</td><td>564.4</td></tr> <tr><td>0.507</td><td>117.7</td><td>296.5</td><td>639.8</td></tr> <tr><td>0.553</td><td>133.6</td><td>330.1</td><td>700.6</td></tr> <tr><td>0.604</td><td>152.8</td><td>372.0</td><td>787.1</td></tr> <tr><td>0.655</td><td>176.0</td><td>414.0</td><td>855.9</td></tr> <tr><td>0.701</td><td>186.3</td><td>445.6</td><td>924.2</td></tr> </tbody> </table> <p style="text-align: right;">Cont.</p>			T/K			$x_{\text{C}_3\text{H}_9\text{N}}$	253.15	273.15	293.15	0	10.0	33.0	90.5	0.0502	17.7	51.0	130.4	0.1029	21.5	73.6	177.1	0.152	31.6	90.6	218.6	0.202	41.7	114.8	269.8	0.254	51.6	139.8	322.6	0.304	62.3	166.1	378.7	0.351	73.5	190.9	425.0	0.396	85.5	221.5	491.9	0.403	87.5	227.2	501.7	0.453	101.4	259.5	564.4	0.507	117.7	296.5	639.8	0.553	133.6	330.1	700.6	0.604	152.8	372.0	787.1	0.655	176.0	414.0	855.9	0.701	186.3	445.6	924.2
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<p>METHOD/APPARATUS/PROCEDURE:</p> <p>Apparatus described previously was used (1), (2). Liquid mixtures of accurately known composition were introduced into a cell held in a thermostat controlled to <math>\pm 0.02^\circ\text{C}</math>. The total vapor pressure was measured by a mercury manometer but contact between vapor and mercury was avoided by using a sensitive quartz spiral manometer as a null instrument with pressure of vapor balanced against that of carbon dioxide. Metal taps were used so as to avoid contact between vapor and tap grease.</p> <p>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.</p>	<p>SOURCE AND PURITY OF MATERIALS:</p> <p>1. Prepared from commercial <i>reinst</i> 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 (1).</p> <p>2. Merck "Uvasol"</p> <p>ESTIMATED ERROR:</p> <p><math>\delta T/\text{K} = \pm 0.02</math> (estimated by authors)</p> <p>REFERENCES:</p> <p>1. Wolff, H.; Höpfner, A. <i>Z. Elektrochem.</i> <u>1962</u>, <i>66</i>, 149.</p> <p>2. Wolff, H.; Höppel, H.-E. <i>Ber. Bunsenges. Phys. Chem.</i> <u>1966</u>, <i>70</i>, 874.</p> <p>3. Barker, J.A. <i>Aust. J. Chem.</i> <u>1953</u>, <i>6</i>, 207.</p> <p>4. Redlich, O.; Kister, A.T. <i>Ind. Eng. Chem.</i> <u>1948</u>, <i>21</i>, 345.</p>																																																																								

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1. N,N-Dimethylmethanamine, (trimethylamine); C <sub>3</sub> H <sub>9</sub> N; [75-50-3]		Wolff, H.; Würtz, R. <i>Ber. Bunsenges. Phys. Chem.</i> <u>1968</u> , 72, 101-109.	
2. Tetrachloromethane (carbon tetrachloride); CCl <sub>4</sub> ; [56-23-5]			
EXPERIMENTAL VALUES: Cont.			
		T/K	
$x_{\text{C}_3\text{H}_9\text{N}}$	253.15	273.15	293.15
0.753	206.7	488.2	1006.8
0.801	223.9	527.8	1088.6
0.824	231.8	545.9	1117.3
0.925	264.8	619.5	1269.5
1	289.2	675.8	1388.2
760 Torr = 1 atm = 1.013 x 10 <sup>5</sup> Pa			
Constants for calculation of activity coefficients from the Redlich-Kister equations given below			
T/K	A	B	C
253.15	-0.882	-0.056	+0.077
263.15	-0.726	-0.081	+0.083
273.15	-0.640	-0.058	+0.051
283.15	-0.541	-0.064	+0.005
293.15	-0.489	-0.044	-0.011
$\ln f_1 = A x_2^2 - B x_2^2(1 - 4 x_1) + C x_2^2(1 - 8 x_1 + 12 x_1^2)$ $\ln f_2 = A x_1^2 + B x_1^2(1 - 4 x_2) + C x_1^2(1 - 8 x_2 + 12 x_2^2)$			
where $f_1$ = activity coefficient of trimethylamine $f_2$ = activity coefficient of carbon tetrachloride $x_1$ = mole fraction of trimethylamine in the liquid phase $x_2$ = mole fraction of carbon tetrachloride in the liquid phase			

COMPONENTS:			ORIGINAL MEASUREMENTS:
1. N,N-Dimethylmethanamine (trimethylamine); C <sub>3</sub> H <sub>9</sub> N; [75-50-3]			Gerrard, W.
2. 2,2,2-Trichloroethanol (1,1,1-trichloro-2-hydroxyethane); C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub> O; [115-20-8]			<i>Solubility of Gases and Liquids</i> , <i>Plenum 1976</i> , Chapter 10.
VARIABLES:			PREPARED BY:
Temperature, pressure			C. L. Young
EXPERIMENTAL VALUES:			
			Mole fraction of trimethylamine in liquid, $x$ (CH <sub>3</sub> ) <sub>3</sub> N
T/K	P/mmHg	P/10 <sup>5</sup> Pa	
278.15	100	0.133	0.478
	200	0.267	0.545
	300	0.400	0.600
	400	0.533	0.660
	500	0.667	0.722
	600	0.800	0.800
	700	0.933	0.875
	760	1.013	0.930
283.15	100	0.133	0.454
	200	0.267	0.515
	300	0.400	0.567
	400	0.533	0.613
	500	0.667	0.660
	600	0.800	0.713
	700	0.933	0.780
	760	1.013	0.820
293.15	760	1.013	0.689
298.15	760	1.013	0.654
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:
			$\delta T/K = \pm 0.1$ ; $\delta x/x = \pm 3\%$ (estimated by compiler)
			REFERENCES:
			1. Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1972</u> , 22 623-650. 2. Gerrard, W. <i>Solubility of Gases and Liquids</i> . Plenum Press, New York. <u>1976</u> . Chapter 1.

COMPONENTS:			ORIGINAL MEASUREMENTS:
1. N,N-Dimethylmethanamine (trimethylamine); C <sub>3</sub> H <sub>9</sub> N; [75-50-3]			Gerrard, W.
2. Bromobenzene; C <sub>6</sub> H <sub>5</sub> Br; [108-86-1]			<i>Solubility of Gases and Liquids</i> , <i>Plenum, 1976</i> , Chapter 10.
VARIABLES:			PREPARED BY:
Pressure			C. L. Young
EXPERIMENTAL VALUES:			
T/K	P/mmHg	P/10 <sup>5</sup> Pa	Mole fraction of trimethylamine in liquid, $x$ (CH <sub>3</sub> ) <sub>3</sub> N
283.15	100	0.133	0.088
	200	0.267	0.182
	300	0.400	0.290
	400	0.533	0.386
	500	0.667	0.496
	600	0.800	0.600
	700	0.933	0.710
	760	1.013	0.770
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
<p>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.</p> <p>The apparatus and procedure are described by Gerrard [1,2].</p>		1. British Drug Houses or Cambrian Gases sample.	
		2. Purified and attested by conventional procedures.	
		ESTIMATED ERROR:	
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1. N,N-Dimethylmethanamine (trimethylamine); C <sub>3</sub> H <sub>9</sub> N; [75-50-3]			Gerrard, W.  <i>Solubility of Gases and Liquids</i> , <i>Plenum, 1976</i> , Chapter 10.
2. Iodobenzene; C <sub>6</sub> H <sub>5</sub> I; [591-50-4]			
VARIABLES:			PREPARED BY:
Pressure			C. L. Young
EXPERIMENTAL VALUES:			
T/K	P/mmHg	P/10 <sup>5</sup> Pa	Mole fraction of trimethylamine in liquid, $x$ (CH <sub>3</sub> ) <sub>3</sub> N
283.15	100	0.133	0.100
	200	0.267	0.202
	300	0.400	0.303
	400	0.533	0.398
	500	0.667	0.502
	600	0.800	0.606
	700	0.933	0.715
	760	1.013	0.780
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
<p>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].</p>		1. British Drug Houses or Cambrian Gases sample.  2. Purified and attested by conventional procedures.	
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1. N,N-Dimethylmethanamine (trimethylamine); C <sub>3</sub> H <sub>9</sub> N; [75-50-3]			Gerrard, W.
2. 1-Bromo-3-methylbenzene (m-Bromotoluene); C <sub>7</sub> H <sub>7</sub> Br; [95-46-5]			<i>Solubility of Gases and Liquids</i> , <i>Plenum 1976</i> , Chapter 10.
VARIABLES:			PREPARED BY:
Pressure			C. L. Young
EXPERIMENTAL VALUES:			
T/K	P/mmHg	P/10 <sup>5</sup> Pa	Mole fraction of trimethylamine in liquid, x(CH <sub>3</sub> ) <sub>3</sub> N
283.15	100	0.133	0.089
	200	0.267	0.171
	300	0.400	0.261
	400	0.533	0.362
	500	0.667	0.476
	600	0.800	0.590
	700	0.933	0.704
	760	1.013	0.772
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
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1. N,N-Dimethylmethanamine, (Trimethylamine); C <sub>3</sub> H <sub>9</sub> N; [75-50-3]  2. 1-Bromo-naphthalene; C <sub>10</sub> H <sub>7</sub> Br; [90-11-9]		Halban, H. Z. Phys. Chem. <u>1913</u> , 84, 129-159.		
VARIABLES:		PREPARED BY:		
Concentration		P. G. T. Fogg		
EXPERIMENTAL VALUES:				
T/K	Concentration of C <sub>3</sub> H <sub>9</sub> N in solution/ mol dm <sup>-3</sup>	p <sub>C<sub>3</sub>H<sub>9</sub>N</sub> /mmHg	Concentration of C <sub>3</sub> H <sub>9</sub> N in solution/ concentration in gas phase	Mole fraction in solution* x <sub>C<sub>3</sub>H<sub>9</sub>N</sub>
298.2	0.1206	47.7	47.0	0.0166
	0.1456	60.0	45.1	0.0199
	0.201	84.0	44.4	0.0273
<p>* 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.</p>				
AUXILIARY INFORMATION				
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:		
<p>The partial pressures of trimethylamine above solutions of concentrations determined by titration, were measured by a dynamic method (refs. (2) &amp; (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.</p>		1. Hydrated chloride from Kahlbaum; reacted with KOH; gas dried with NaOH.  2. From Kahlbaum; distilled under vacuum; b.p. 145-146°C (16 mmHg).		
		ESTIMATED ERROR:		
		REFERENCES:		
		1. Lange's Handbook of Chemistry, (12th edition), McGraw-Hill, New York, 1979. 2. Gaus, Z. Anorg. Chem. 1900, 25, 236. 3. Abegg, R.; Riesenfeld, H. Z. Phys. Chem. 1902, 40, 84.		

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VARIABLES:			PREPARED BY:
Pressure			C. L. Young
EXPERIMENTAL VALUES:			
T/K	P/mmHg	P/10 <sup>5</sup> Pa	Mole fraction of trimethylamine in liquid, x (CH <sub>3</sub> ) <sub>3</sub> N
298.15	100	0.133	0.050
	200	0.267	0.096
	300	0.400	0.141
	400	0.533	0.192
	500	0.667	0.240
	600	0.800	0.293
	700	0.933	0.345
	760	1.013	0.380
AUXILIARY INFORMATION			
METHOD/APPARATUS/PROCEDURE:		SOURCE AND PURITY OF MATERIALS:	
<p>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].</p>		1. British Drug Houses or Cambrian Gases sample. 2. Purified and attested by conventional procedures.	
		ESTIMATED ERROR:	
		$\delta T/K = \pm 0.1$ ; $\delta x/x = \pm 3\%$ (estimated by compiler)	
		REFERENCES:	
		1. Gerrard, W. <i>J. Appl. Chem. Biotechnol.</i> <u>1972</u> , 22 623-650 2. Gerrard, W. <i>Solubility of Gases and Liquids</i> . <i>Plenum Press, New York.</i> <u>1976</u> . Chapter 1.	

EXPERIMENTAL VALUES:			
T/K	P/mmHg	P/10 <sup>5</sup> Pa	Mole fraction of trimethylamine in liquid, $x(\text{CH}_3)_3\text{N}$
293.15	100	0.133	0.043
	200	0.267	0.090
	300	0.400	0.132
	400	0.533	0.178
	500	0.667	0.228
	600	0.800	0.278
	700	0.933	0.332
	760	1.013	0.365

COMPONENTS:

1. N,N-Dimethylmethanamine (trimethylamine); C<sub>3</sub>H<sub>9</sub>N; [75-50-3]
2. 1-Chloronaphthalene; C<sub>10</sub>H<sub>7</sub>Cl; [90-13-1]

ORIGINAL MEASUREMENTS:

Gerrard, W.  
*Solubility of Gases and Liquids*,  
Plenum, 1976, Chapter 10.

VARIABLES:

Pressure

PREPARED BY:

C. L. Young

## AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

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(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.