

COMPONENTS: 1. Hydrogen sulfide; H ₂ S; [7783-06-4] 2. Esters of phosphoric acid	ORIGINAL MEASUREMENTS: Lenoir, J-Y.; Renault, P.; Renon, H. <i>J. Chem. Eng. Data</i> , <u>1971</u> , <i>16</i> , 340-2.																																							
VARIABLES: Temperature	PREPARED BY: C. L. Young																																							
EXPERIMENTAL VALUES: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">T/K</th> <th style="text-align: center;">Henry's constant $H_{\text{H}_2\text{S}}/\text{atm}$</th> <th style="text-align: center;">Mole fraction at 1 atm* $x_{\text{H}_2\text{S}}$</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;">Phosphoric acid, trimethyl ester; C₃H₉O₄P; [512-56-1]</td> </tr> <tr> <td style="text-align: center;">325.2</td> <td style="text-align: center;">18.4</td> <td style="text-align: center;">0.0543</td> </tr> <tr> <td colspan="3" style="text-align: center;">Phosphoric acid, triethyl ester; C₆H₁₅O₄P; [78-40-0]</td> </tr> <tr> <td style="text-align: center;">325.2</td> <td style="text-align: center;">28.6</td> <td style="text-align: center;">0.0350</td> </tr> <tr> <td colspan="3" style="text-align: center;">Phosphoric acid, tripropyl ester; C₉H₂₁O₄P; [513-08-6]</td> </tr> <tr> <td style="text-align: center;">298.2</td> <td style="text-align: center;">4.19</td> <td style="text-align: center;">0.2387</td> </tr> <tr> <td style="text-align: center;">323.2</td> <td style="text-align: center;">7.96</td> <td style="text-align: center;">0.1256</td> </tr> <tr> <td style="text-align: center;">343.2</td> <td style="text-align: center;">12.6</td> <td style="text-align: center;">0.0794</td> </tr> <tr> <td colspan="3" style="text-align: center;">Phosphoric acid, tributyl ester; C₁₂H₂₇O₄P; [126-73-8]</td> </tr> <tr> <td style="text-align: center;">325.2</td> <td style="text-align: center;">9.07</td> <td style="text-align: center;">0.1103</td> </tr> <tr> <td colspan="3" style="text-align: center;">Phosphoric acid, tris(2-methylpropyl) ester; C₁₂H₂₇O₄P; [126-71-6]</td> </tr> <tr> <td style="text-align: center;">325.2</td> <td style="text-align: center;">8.89</td> <td style="text-align: center;">0.1125</td> </tr> </tbody> </table> <p>* Calculated by compiler assuming a linear function of $P_{\text{H}_2\text{S}}$ vs $x_{\text{H}_2\text{S}}$, i.e., $x_{\text{H}_2\text{S}}(1 \text{ atm}) = 1/H_{\text{H}_2\text{S}}$</p>		T/K	Henry's constant $H_{\text{H}_2\text{S}}/\text{atm}$	Mole fraction at 1 atm* $x_{\text{H}_2\text{S}}$	Phosphoric acid, trimethyl ester; C ₃ H ₉ O ₄ P; [512-56-1]			325.2	18.4	0.0543	Phosphoric acid, triethyl ester; C ₆ H ₁₅ O ₄ P; [78-40-0]			325.2	28.6	0.0350	Phosphoric acid, tripropyl ester; C ₉ H ₂₁ O ₄ P; [513-08-6]			298.2	4.19	0.2387	323.2	7.96	0.1256	343.2	12.6	0.0794	Phosphoric acid, tributyl ester; C ₁₂ H ₂₇ O ₄ P; [126-73-8]			325.2	9.07	0.1103	Phosphoric acid, tris(2-methylpropyl) ester; C ₁₂ H ₂₇ O ₄ P; [126-71-6]			325.2	8.89	0.1125
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METHOD/APPARATUS/PROCEDURE: A conventional gas-liquid chromatographic unit fitted with a thermal conductivity detector was used. The carrier gas was helium. The value of Henry's law constant was calculated from the retention time. The value applies to very low partial pressures of gas and there may be a substantial difference from that measured at 1 atm. pressure. There is also considerable uncertainty in the value of Henry's constant since surface adsorption was not allowed for although its possible existence was noted.	SOURCE AND PURITY OF MATERIALS: (1) L'Air Liquide sample, minimum purity 99.9 mole per cent. (2) Touzart and Matignon or Serlabo sample, purity 99 mole per cent. ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta H/\text{atm} = \pm 6\%$ (estimated by compiler). REFERENCES:																																							

COMPONENTS: 1. Hydrogen sulfide; H ₂ S; [7783-06-4] 2. Tributyl phosphate, (<i>phosphoric acid, tributyl ester</i>); C ₁₂ H ₂₇ O ₄ P; [126-73-8]	ORIGINAL MEASUREMENTS: Sergienko, I.D.; Kosyakov, N.E.; Yushko, V.L.; Khokhlov, S.F.; Pushkin, A.G. <i>Vop.Khim.Tekhnol.</i> <u>1973</u> , 29, 57 - 60																																																																																																
VARIABLES: Temperature, pressure	PREPARED BY: P.G.T. Fogg																																																																																																
EXPERIMENTAL VALUES: The authors have given a small (3.3 cm x 3.8 cm) graph showing mole fraction solubilities of H ₂ S as a function of partial pressure of H ₂ S. The compiler has calculated approximate values of mole fractions and the corresponding partial pressures from co-ordinates of experimental points. <table border="1" data-bbox="105 621 1226 1218"> <thead> <tr> <th>T/K</th> <th>P_{H₂S}/mmHg</th> <th>Mole fraction solubility, x_{H₂S}</th> <th>T/K</th> <th>P_{H₂S}/mmHg</th> <th>Mole fraction solubility, x_{H₂S}</th> </tr> </thead> <tbody> <tr> <td>313.15</td> <td>121</td> <td>0.029</td> <td>253.15</td> <td>56</td> <td>0.063</td> </tr> <tr> <td></td> <td>362</td> <td>0.075</td> <td></td> <td>87</td> <td>0.108</td> </tr> <tr> <td></td> <td>495</td> <td>0.101</td> <td></td> <td>169</td> <td>0.186</td> </tr> <tr> <td></td> <td>591</td> <td>0.113</td> <td></td> <td>273</td> <td>0.264</td> </tr> <tr> <td></td> <td>644</td> <td>0.128</td> <td></td> <td>321</td> <td>0.296</td> </tr> <tr> <td>293.15</td> <td>106</td> <td>0.041</td> <td>233.15</td> <td>48</td> <td>0.118</td> </tr> <tr> <td></td> <td>253</td> <td>0.094</td> <td></td> <td>106</td> <td>0.203</td> </tr> <tr> <td></td> <td>386</td> <td>0.130</td> <td></td> <td>169</td> <td>0.304</td> </tr> <tr> <td></td> <td>495</td> <td>0.163</td> <td></td> <td>193</td> <td>0.336</td> </tr> <tr> <td></td> <td>543</td> <td>0.175</td> <td></td> <td></td> <td></td> </tr> <tr> <td>273.15</td> <td>84</td> <td>0.051</td> <td>223.15</td> <td>72</td> <td>0.211</td> </tr> <tr> <td></td> <td>159</td> <td>0.101</td> <td></td> <td>145</td> <td>0.310</td> </tr> <tr> <td></td> <td>275</td> <td>0.162</td> <td></td> <td>181</td> <td>0.344</td> </tr> <tr> <td></td> <td>398</td> <td>0.219</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>442</td> <td>0.240</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		T/K	P _{H₂S} /mmHg	Mole fraction solubility, x _{H₂S}	T/K	P _{H₂S} /mmHg	Mole fraction solubility, x _{H₂S}	313.15	121	0.029	253.15	56	0.063		362	0.075		87	0.108		495	0.101		169	0.186		591	0.113		273	0.264		644	0.128		321	0.296	293.15	106	0.041	233.15	48	0.118		253	0.094		106	0.203		386	0.130		169	0.304		495	0.163		193	0.336		543	0.175				273.15	84	0.051	223.15	72	0.211		159	0.101		145	0.310		275	0.162		181	0.344		398	0.219					442	0.240			
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METHOD/APPARATUS/PROCEDURE: A static method described in ref.1 was used.	SOURCE AND PURITY OF MATERIALS: 1. purity found by chromatographic analysis to be at least 99.9% 2. 'pure' grade material used. <table border="1" data-bbox="673 1612 1226 1742"> <tbody> <tr> <td>ESTIMATED ERROR:</td> </tr> </tbody> </table> <table border="1" data-bbox="673 1748 1226 1953"> <tbody> <tr> <td>REFERENCES: 1. Braude, G.E.; Shakhova, S.F. <i>Khim. prom.</i> <u>1961</u>, 3, 29. </td> </tr> </tbody> </table>	ESTIMATED ERROR:	REFERENCES: 1. Braude, G.E.; Shakhova, S.F. <i>Khim. prom.</i> <u>1961</u> , 3, 29.																																																																																														
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VARIABLES: Temperature; pressure				PREPARED BY: P.G.T. Fogg				
EXPERIMENTAL VALUES: The authors obtained Henry's law constants, K, at infinite dilution from experimental data by use of the Krichevskii-Il'inskaya equation i.e.								
$\log_{10} \left[\frac{P_2/\text{mmHg}}{x_2} \right] = \log_{10}(K/\text{mmHg}) - \beta (1 - x_1^2)$								
where x ₁ and x ₂ are the mole fractions of solvent and gas respectively, P ₂ is the partial pressure of the gas and β is related to a coefficient A by the equation:								
$\beta = A/(2.303 RT)$								
T/K		Henry's Law constant K/mmHg		T/K		Henry's Law constant K/mmHg		
298.15		3020		343.15		11176		
313.15		4677		363.15		15510		
328.15		7413		383.15		20850		
The authors have given a small scale graph showing variations of α, the volume of gas absorbed per unit volume of solvent, corrected to 273.15 K and 1.013 bar, with partial pressure of H ₂ S. The compiler has calculated approximate values of α from the smooth curves which the authors drew through experimental points and has estimated corresponding mole fraction solubilities.								
T/K	P/mmHg	α	Mole fraction solubility x _{H₂S} *	T/K	P/mmHg	α	Mole fraction solubility x _{H₂S} *	
298.15	200	5.56	0.064	343.15	200	1.76	0.022	
	400	9.80	0.108		400	3.01	0.037	
	600	13.02	0.139		600	4.24	0.052	
313.15	200	3.66	0.044	363.15	750	5.27	0.064	
	400	6.56	0.061		200	1.26	0.016	
	600	9.07	0.102		400	2.20	0.028	
328.15	750	10.68	0.118	383.15	600	3.04	0.038	
	200	2.75	0.034		750	3.66	0.046	
	400	4.68	0.056		200	0.79	0.010	
	600	6.41	0.075		400	1.46	0.019	
	750	7.46	0.087		600	2.05	0.027	
						750	2.63	0.034
* estimated by compiler using densities from 298 K to 338 K given in ref. 2.								
AUXILIARY INFORMATION								
METHOD/APPARATUS/PROCEDURE: A static method was used. The compiler was not able to consult the original Russian paper. Literature references could not be included in the English translation from which the compilation was prepared. (1)				SOURCE AND PURITY OF MATERIALS: No information.				
				ESTIMATED ERROR:				
				REFERENCES 1. <i>British Gas Corporation Translations, T5408/BG/LRS/LRST492/80</i> 2. J. Timmermans, "Physico-Chemical Constants of Pure Organic Compounds", Vol. 2, Elsevier, London. 1965.				

COMPONENTS: 1. Hydrogen sulfide; H ₂ S; [7783-06-4] 2. Phosphoric acid, tributyl ester (tributyl phosphate); C ₁₂ H ₂₇ PO ₄ ; [126-73-8]	ORIGINAL MEASUREMENTS: Härtel, G.H. <i>J.Chem.Eng.Data</i> <u>1985</u> , 30, 57-61.																		
VARIABLES: Temperature	PREPARED BY: P.G.T. Fogg																		
EXPERIMENTAL VALUES: <table border="1" data-bbox="107 513 1200 745"> <thead> <tr> <th>T/K</th> <th>Henry's constant H_{H_2S}/bar</th> <th>Mole fraction solubility x_{H_2S} (1.013 bar)*</th> </tr> </thead> <tbody> <tr> <td>293.15</td> <td>3.540</td> <td>0.286</td> </tr> <tr> <td>313.15</td> <td>5.429</td> <td>0.187</td> </tr> <tr> <td>333.15</td> <td>8.571</td> <td>0.118</td> </tr> <tr> <td>353.15</td> <td>10.084</td> <td>0.100</td> </tr> <tr> <td>373.15</td> <td>16.304</td> <td>0.062</td> </tr> </tbody> </table> <p>Henry's constant is defined as :</p> $H_{H_2S} = \frac{\text{pressure}}{\text{mole fraction solubility}}$ <p>Solubilities were measured at concentrations not greater than $x_{H_2S} = 0.16$. The variation of mole fraction solubility with pressure was found to be almost linear with a correlation coefficient of better than 0.99.</p> <p>* Calculated by the compiler assuming that the variation of mole fraction solubility with variation of pressure was linear to 1.013 bar. (Values for 293.15 K and 313.15 K lie outside the range for which linearity was experimentally demonstrated by the author.)</p>		T/K	Henry's constant H_{H_2S} /bar	Mole fraction solubility x_{H_2S} (1.013 bar)*	293.15	3.540	0.286	313.15	5.429	0.187	333.15	8.571	0.118	353.15	10.084	0.100	373.15	16.304	0.062
T/K	Henry's constant H_{H_2S} /bar	Mole fraction solubility x_{H_2S} (1.013 bar)*																	
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AUXILIARY INFORMATION																			
METHOD/APPARATUS/PROCEDURE: Absorption was found from the decrease in pressure when a known volume of gas came into contact with a known mass of degassed solvent. Pressure changes were found by use of a transducer with a mercury manometer to provide a reference pressure.	SOURCE AND PURITY OF MATERIALS: 1. From Matheson, Heusenstamm, FRG; minimum purity 99.5%.																		
ESTIMATED ERROR: $\delta P/\text{mbar} = \pm 0.25$ (author)																			
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METHOD/APPARATUS/PROCEDURE: A conventional gas-liquid chromatographic unit fitted with a thermal conductivity detector was used. The carrier gas was helium. The value of Henry's law constant was calculated from the retention time. The value applies to very low partial pressures of gas and there may be a substantial difference from that measured at 1 atm. pressure. There is also considerable uncertainty in the value of Henry's constant since surface adsorption was not allowed for although its possible existence was noted.	SOURCE AND PURITY OF MATERIALS: (1) L'Air Liquide sample, minimum purity 99.9 mole per cent. (2) Touzart and Matignon or Serlabo sample, purity 99 mole per cent. ESTIMATED ERROR: $\delta T/K = \pm 0.1$; $\delta H/atm = \pm 6\%$ (estimated by compiler). REFERENCES:				