Partial Pressures of Hydrogen Sulfide over Aqueous Diethanolamine Solutions

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The solubility of hydrogen sulfide in aqueous solutions of diethanolamine was determined at temperatures between 25° and 120°C in two solutions, 0.5*N* and 5*N* DEA. Partial pressures of H_2S ranged from 0.1 to 258 psia. The results were combined with earlier data, and smoothed values are presented.

As an extension of our previous work (*1*), the partial pressures of H_2S over 0.5*N* and 5*N* diethanolamine solutions have been measured at temperatures of 25°, 50°, 75°, 100°, and 120°C and at partial pressures from 0.1 to 258 psia. The data are given in Tables I and II (deposited with the ACS Microfilm Depository Service). These data have been combined with our previous results and those of Leibush and Shneerson (*2*) for smoothing purposes. The smoothed results are presented in Table III and cover the temperature range 25–140°C, the partial pressure range 0.01–300 psia, and solutions of normality ranging from 0.5*N* to 5*N* DEA. These results include the conditions of operation of most industrial gas treating units.

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Table III. Smoothed Data for Solubility of H_2S in DEA Solutions

DEA soln, *N*	H_2S partial press, psia	α, mole ratio in liquid, H_2S/DEA Temp, °C 25	50	75	100	120	140
0.5	0.01	0.188	0.083	0.010[a]	...	...	...
	0.03	0.247	0.121	0.042[a]	...	...	...
	0.06	0.294	0.159	0.070	...	...	...
	0.1	0.333	0.193	0.091	0.032[a]	...	...
	0.3	0.432	0.285	0.170	0.088	0.042[a]	0.020[a]
	0.6	0.502	0.355	0.231	0.137	0.083	0.048[a]
	1.0	0.559	0.414	0.286	0.180	0.122	0.071[a]
	3.0	0.685	0.557	0.423	0.295	0.221	0.160[a]
	6.0	0.780	0.658	0.522	0.394	0.310	0.238[a]
	10.0	0.861	0.740	0.613	0.480	0.391	0.317[a]
	30.0	1.094	0.966	0.850	0.722	0.616	0.520[a]
	60.0	1.446	1.200	1.066	0.950	0.815	0.705[a]
	100	1.921	1.500	1.278	1.175	1.020	0.900[a]
	200	3.040	2.255	1.765	1.600	1.509	1.390[a]
	300	...	...	2.250	1.970	1.853	1.780[a]
2.0	0.01	0.068	0.028	0.005[a]	...	...	...
	0.03	0.111	0.066	0.020[a]	...	...	...
	0.06	0.168	0.100	0.036[a]	...	...	...
	0.1	0.229	0.136	0.055[a]	0.023[a]	...	...
	0.3	0.396	0.222	0.119	0.054[a]	0.020[a]	...
	0.6	0.508	0.310	0.178	0.090[a]	0.048[a]	0.028[a]
	1.0	0.587	0.382	0.230	0.120	0.079[a]	0.046[a]
	3.0	0.738	0.552	0.370	0.202	0.140	0.100[a]
	6.0	0.812	0.660	0.469	0.280	0.199	0.150[a]
	10.0	0.865	0.730	0.546	0.348	0.248	0.190[a]
	30.0	0.950	0.870	0.733	0.533	0.413	0.326[a]
	60.0	1.030	0.936	0.850	0.683	0.560	0.441[a]
	100	1.190	1.002	0.945	0.808	0.680	0.555[a]
	200	1.473	1.215	1.107	1.030	0.927	0.808[a]
	300	1.760	1.400	1.280	1.178	1.102	1.012[a]
3.5	0.01	0.040[a]	0.012[a]	...	...	...	...
	0.03	0.081[a]	0.038[a]	...	...	...	...
	0.06	0.130	0.070	0.020[a]	...	...	...
	0.1	0.194	0.087	0.040[a]	0.020[a]	...	...
	0.3	0.279	0.154	0.070	0.036[a]	0.014[a]	...
	0.6	0.361	0.226	0.109	0.057	0.031[a]	...
	1.0	0.452	0.278	0.146	0.078	0.050	0.029[a]
	3.0	0.630	0.417	0.252	0.148	0.092	0.055[a]
	6.0	0.707	0.522	0.338	0.220	0.134	0.086[a]
	10.0	0.755	0.620	0.423	0.282	0.175	0.122[a]
	30.0	0.849	0.773	0.652	0.465	0.332	0.246[a]
	60.0	0.940	0.851	0.765	0.615	0.479	0.365[a]
	100	1.020	0.920	0.830	0.712	0.600	0.482[a]
	200	1.155	1.040	0.945	0.840	0.747	0.653[a]
	300	1.278	1.138	1.040	0.926	0.846	0.762[a]
5.0	0.01	0.020[a]	...	...	...	...	...
	0.03	0.062[a]	0.027[a]	...	...	...	...
	0.06	0.108	0.050	0.017	...	...	...
	0.1	0.152	0.072	0.028	0.010[a]	...	...
	0.3	0.281	0.143	0.061	0.024[a]	...	...
	0.6	0.373	0.203	0.087	0.040	0.017[a]	...
	1.0	0.444	0.251	0.114	0.055	0.027	...
	3.0	0.609	0.381	0.211	0.112	0.061	0.031[a]
	6.0	0.716	0.490	0.298	0.171	0.099	0.054[a]
	10.0	0.779	0.580	0.379	0.227	0.138	0.080[a]
	30.0	0.870	0.780	0.595	0.415	0.283	0.180[a]
	60.0	0.918	0.848	0.738	0.600	0.453	0.287[a]
	100	0.988	0.890	0.805	0.702	0.560	0.431[a]
	200	1.140	1.002	0.940	0.811	0.692	0.606[a]
	300	1.300	1.110	1.010	0.891	0.771	0.694[a]

[a] Extrapolated values.

Literature Cited

(1) Lee, J. I., Otto, F. D., Mather, A. E., *J. Chem. Eng. Data*, **18**, 71 (1973).
(2) Leibush, A. G., Shneerson, A. L., *Zh. Prik. Khim.*, **23**, 145 (1950).

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