

THE PROPANE-PENTANE SYSTEM AT HIGH PRESSURES*

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Vapour-liquid equilibrium data were measured in the propane-pentane system on seven isotherms within the temperature range from 63.41 to 110.00°C and at pressures up to critical using a static semimicrostill.

The separation processes are now carried out at conditions remarkably differing from those considered until recently as normal. Still increasing interest in high

TABLE I
Liquid-Vapour Equilibrium in the Propane(1)-Pentane(2) System

63.41°C			71.11°C			87.77°C			92.55°C		
x_1	y_1	$P, \text{ atm}$	x_1	y_1	$P, \text{ atm}$	x_1	y_1	$P, \text{ atm}$	x_1	y_1	$P, \text{ atm}$
0.055	0.299	3.30	0.054	0.281	3.95	0.051	0.230	5.74	0.050	0.208	6.34
0.142	0.526	4.88	0.140	0.508	5.73	0.138	0.455	7.94	0.135	0.435	8.66
0.186	0.590	5.66	0.263	0.682	8.32	0.258	0.640	11.18	0.261	0.614	12.17
0.270	0.696	7.16	0.306	0.709	9.03	0.292	0.669	12.10	0.352	0.697	14.80
0.303	0.724	7.83	0.367	0.767	10.30	0.346	0.722	13.60	0.392	0.732	15.95
0.358	0.765	8.82	0.506	0.842	13.42	0.390	0.752	14.77	0.488	0.790	18.76
0.396	0.792	9.54	0.549	0.861	14.25	0.536	0.831	18.97	0.667	0.872	24.90
0.546	0.864	12.40	0.676	0.905	17.31	0.689	0.896	23.54	0.777	0.916	29.07
0.695	0.919	15.32	0.684	0.911	17.68	0.788	0.924	26.96	0.840	0.938	31.54
0.788	0.946	17.44	0.854	0.957	21.84	0.846	0.946	29.29	0.904	0.957	34.19
0.849	0.962	18.85	0.886	0.968	22.99	0.886	0.957	30.76	0.924	0.965	35.02
0.890	0.972	19.92	0.928	0.980	23.97	0.918	0.970	32.35	0.961	0.982	36.96
0.924	0.982	20.67	0.964	0.990	25.26	0.962	0.985	34.09	0.981	0.991	37.83
0.963	0.991	21.65	0.982	0.995	25.66	0.981	0.993	34.82	—	—	—
0.982	0.996	22.06	—	—	—	—	—	—	—	—	—

* Part LXV in the series Liquid-Vapour Equilibrium; Part LXIV: This Journal 39, 695 (1974).

pressure vapour-liquid equilibrium data is more than obvious especially with regard to petrochemical industry. This was one of the reasons why the propane-pentane system was chosen. Another one was that this system was originally used for testing a static semimicrostill described in previous paper¹ and also for sufficient data available in literature for comparison.

EXPERIMENTAL

Material used. Propane was research grade gas supplied by Fluka A. G. (Switzerland) with certified purity better than 99.9%, (density d_4^{20} 0.5005). Pentane was research grade supplied by Fluka A. G. with certified 99.98% (d_4^{20} 0.6262, n_D^{20} 1.3588). Both chemicals were used without further purification.

Apparatus and procedure. The static semimicrostill used in this work was checked and described in previous paper¹. At first the individual components were degasified in adjacent glass equipment and after that condensed in the equilibrium cell occasionally cooled by means of liquid nitrogen. The temperature of the system was maintained and measured with accuracy $\pm 0.01^\circ\text{C}$ using calibrated platinum resistance thermometer (Heraeus). The pressure was measured by means of precise Heise pressure gauge having an accuracy 0.1% of the full scale value. When the equilibrium

TABLE I
(continued)

94.52°C			100.00°C			110.00°C		
x_1	y_1	P , atm	x_1	y_1	P , atm	x_1	y_1	P , atm
0.047	0.202	6.59	0.251	0.576	13.66	0.251	0.552	16.00
0.133	0.431	8.95	0.350	0.678	16.60	0.343	0.644	19.36
0.396	0.724	16.46	0.465	0.762	20.80	0.466	0.736	24.10
0.478	0.781	19.21	0.664	0.857	27.78	0.658	0.833	32.24
0.665	0.868	25.66	0.794	0.911	33.08	0.792	0.881	38.32
0.800	0.918	30.45	0.858	0.928	36.24	—	—	—
0.843	0.934	32.53	0.902	0.945	38.58	—	—	—
0.857	0.939	33.26	0.932	0.960	40.23	—	—	—
0.903	0.955	35.29	—	—	—	—	—	—
0.923	0.964	36.15	—	—	—	—	—	—
0.938	0.970	37.17	—	—	—	—	—	—

was attained the samples were withdrawn for gas chromatographic analysis. The chromatographic column was 1.5 m long filled with 20% hexadecane on Chezasorb and operated at 60°C . Indication was realized using thermal conductivity detector. The chromatographic analyses were believed to be determined with accuracy of 1%.

RESULTS

The isothermal measurements were carried out for temperatures 63·41, 71·11, 87·77, 92·55, 94·52, 100·00, and 110·00°C. The experimental liquid (x) and vapour (y) compositions given in mole fractions together with equilibrium pressures (atm) are presented in the Table I.

REFERENCES

1. Vejrosta J., Wichterle I., Wičar S.: *This Journal* 39, 206 (1974).

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