3. *The Systems Acetone–Sodium Hydroxide–Water and Acetone–Potassium Hydroxide–Water at 0°.*

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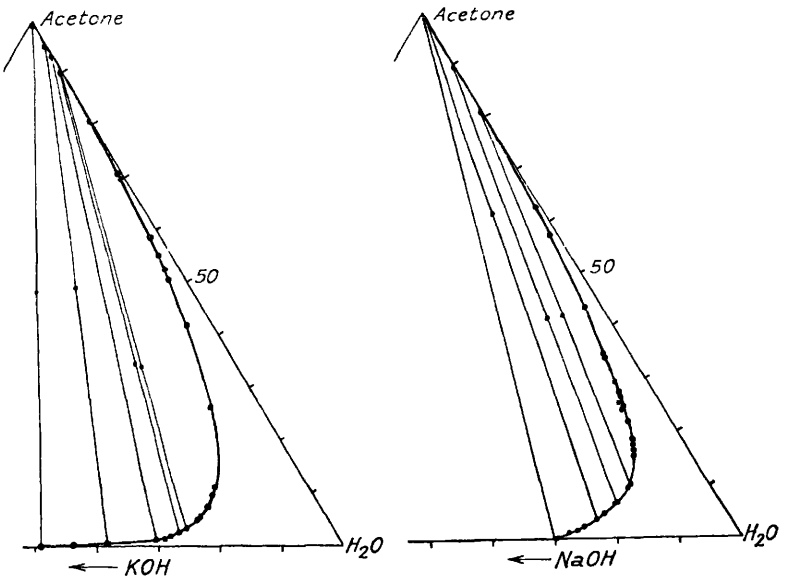
SEVERAL systems containing acetone, water, and an inorganic salt give rise to two liquid layers (compare Roozeboom, "Heterogene Gleichgewichte," III). In the two now described, partial miscibility can be obtained with almost all ratios of acetone to water.

Materials.—Acetone A.R. was tested and found to be free from impurity. Distilled water was boiled before use to remove carbon dioxide. Sodium hydroxide solution, free from carbonate, prepared by Cornog's method (*J. Amer. Chem. Soc.*, **1921**, **43**, **2573**), was stored in a silver bottle. No difference could be detected between results obtained with this solution and with one prepared by dissolving freshly washed pellets of A.R. sodium hydroxide in water. Neither the latter solution nor the similarly prepared potassium hydroxide solution gave a precipitate with barium hydroxide solution; both solutions were standardised by titration against hydrochloric acid previously standardised by calc spar.



Procedure.—On account of the volatility of acetone, all experiments were carried out at 0°. The shapes of the binodal curves were established by titration of acetone into alkali hydroxide solutions of various concentrations, cooled in melting ice, until a permanent separation into two layers was observed. The positions of the tie-lines were determined by shaking suitable mixtures of known composition until equilibrium was reached, and titrating the alkali in samples of the two layers, the compositions of which could then be found by reference to the binodal curve. During the time required to attain equilibrium, only a very slight discoloration of the acetone was observed. In some cases the amount of alkali in the acetone-rich layer was too small to be titrated.

The solubilities of the two hydroxides in anhydrous acetone were negligibly small, and their solubilities in water at 0° (found to be in agreement with the values given in the International Critical Tables) were not appreciably affected by addition of acetone.

Results.—The following results are represented graphically in the figures, and are in weight percentages.

System : Acetone–Sodium Hydroxide–Water.

Binodal curve.

NaOH, %	C_3H_6O, %	H_2O, %	NaOH, %	C_3H_6O, %	H_2O, %	NaOH, %	C_3H_6O, %	H_2O, %	NaOH, %	C_3H_6O, %	H_2O, %
0·3	73·3	26·4	5·9	26·7	67·4	8·4	17·3	74·3	13·3	9·9	76·8
0·7	62·9	36·4	6·4	27·1	66·5	9·1	16·3	74·6	17·2	6·4	76·4
1·1	57·4	41·5	6·7	24·8	68·5	9·2	16·1	74·7	19·6	4·9	75·5
2·6	43·7	53·7	6·9	25·2	67·9	9·4	15·2	75·4	24·3	2·3	73·4
4·3	34·8	60·9	7·0	24·0	69·0	12·2	9·6	78·2	25·6	1·4	73·0
4·5	34·0	61·5	7·9	22·0	70·1	13·1	9·8	77·1	27·2	1·1	71·7
5·3	29·2	65·5	8·0	18·3	73·7						

Tie-lines.

Synthetic mixture.			NaOH, %, found in		Synthetic mixture.			NaOH, %, found in	
NaOH, %	C_3H_6O, %	H_2O, %	aqueous layer.	acetone layer.	NaOH, %	C_3H_6O, %	H_2O, %	aqueous layer.	acetone layer.
7·1	42·0	59·0	12·74	0·5	8·5	61·5	30·0	21·1	0·06
7·5	58·3	34·2	19·4	0·1	9·8	41·6	48·6	16·7	0·1

System : Acetone–Potassium Hydroxide–Water.

Binodal curve.

KOH, %	C_3H_6O, %	H_2O, %	KOH, %	C_3H_6O, %	H_2O, %	KOH, %	C_3H_6O, %	H_2O, %	KOH, %	C_3H_6O, %	H_2O, %
0·4	80·1	19·5	2·2	55·1	42·7	15·1	11·1	73·8	21·3	5·2	73·5
0·6	70·1	29·3	3·0	50·4	46·6	16·2	9·8	74·0	27·2	2·0	70·8
0·7	70·5	28·8	4·4	41·7	53·9	17·9	7·8	74·3	28·4	1·3	70·3
1·7	58·6	39·7	4·8	41·1	54·1	20·7	5·5	73·8	43·8	0·4	55·8
2·0	52·7	45·3	8·2	26·6	65·2						

Tie-lines.

Synthetic mixture.			KOH, %, found in		Synthetic mixture.			KOH, %, found in	
KOH, %	C_3H_6O, %	H_2O, %	aqueous layer.	acetone layer.	KOH, %	C_3H_6O, %	H_2O, %	aqueous layer.	acetone layer.
16·1	33·3	50·6	25·0	0·0	18·7	36·8	44·5	29·8	0·0
16·5	33·8	49·7	24·1	0·0	19·5	48·3	32·2	37·9	0·0

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