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PROCEEDINGS OF THE MEETING

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The following papers were read:

Chemistry. — "*On the system: water, phenol, acetone.*" By Dr. F. A. H. SCHREINEMAKERS. (Communicated by Prof. J. M. VAN BEMMELEN.)

Two cases may, in general, be distinguished in which plaitpoints appear or disappear on the ζ-surface (by the ζ-surface without further qualification, is meant, both here and in what follows, that area of the ζ-surface which relates to the liquid state).

1. The plaitpoint appears at the margin of the ζ-surface.
2. The plaitpoint appears, on the ζ-surface itself and not at its margin.

Mr. SCHREINEMAKERS has already found experimentally various examples of the first case; for example, in the equilibria between water, succinonitrile and sodium chloride salt or ethylic-alcohol and

also in the systems formed from water, and phenol with common salt or aniline or ethylic-alcohol.

The second case, viz. the appearance or disappearance of a plaitpoint on the area of the ζ-surface itself and not on its border, may arise in different ways.

It occurs, for example, when a plait divides into two other plaits so that it also occurs with the connodal line which represents the equilibrium between the two liquid phases. According to the researches of Mr. SCHREINEMAKERS this case occurs, most probably, in the system: [water – alcohol – succinonitrile] at about 4°.

There is however, another case which Mr. SCHREINEMAKERS has now discovered experimentally. Let us suppose that at a certain temperature T the ζ surface is at every point convex from below. On changing the temperature a plaitpoint may now appear on the ζ-surface, which, on a further change of temperature, may develop into a plait in such a way that connodal lines with two plaitpoints are produced. We then have the case that at this temperature the three components, taken in pairs, are completely miscible, but that ternary mixtures exist for which this is not the case.

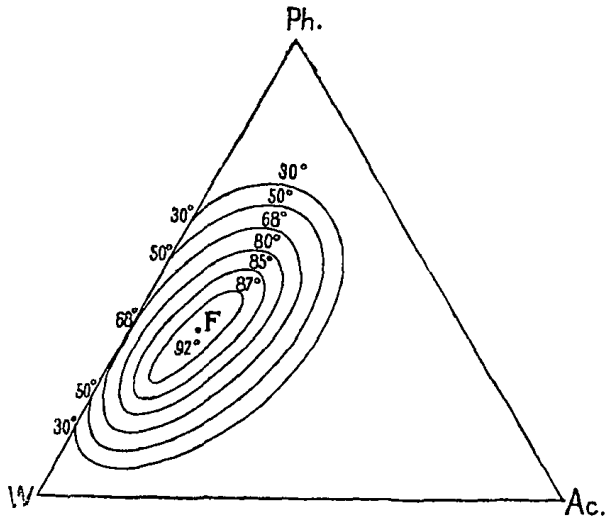

Fig. 1

Mr. SCHREINEMAKERS has realised this in the system: [water (W) – phenol (Ph) – acetone (Ac)] for which the connodal lines for 30°, 50°, 68°, 80°, 85° and 87° are diagrammatically represented in figure 1. Their exact positions can be found by means of the following tables.

Composition of the solutions on the connodal line at 30°.

% W	92	92.3	91	88.4	81	70.9	62.1	51.6	39.8	28.9	21.8
% Ac	0	1.7	4	7.6	15	23 1	28 9	34.9	40.2	43.1	40.2
% Ph	8	6	5	4	4	6	9	13.5	20	28	38
% W	18 4	17.2	17.9	19.1	21.1	22.6	25.2	27.1	28.7	30	31
% Ac	34.1	25.8	81.1	12.9	9.9	7.4	4.6	2.3	1.3	0.5	0
% Ph	47.5	57	64	68	69	70	70.2	70.6	70	69.5	69

Composition of the solutions on the connodal line at 50°.

% W	89	90.3	90	87.5	83.8	69.4	60	49.3	37.8	23.3
% Ac	0	1.7	4	7.5	10.7	22.6	28	33.2	38.2	34.7
% Ph	11	8	6	5	5.5	8	12	17.5	24	42

% W	20.9	22.7	24.6	26.4	29.1	32.2	34.4	36.3	38
% Ac	21.1	15.3	11.4	8.6	5.4	2.8	1.6	0.7	0
% Ph	58	62	64	65	65.5	65	64	63	62

Composition of the solutions on the connodal line at 68°.

% W	66	50.1	45	39.6	34.6	31	28.6	26.9	26.4
% Ac	0	0.9	2	3.4	6.4	10	13.4	18.1	26.6
% Ph	34	49	53	57	59	59	58	55	47

% W	33 9	46	56.6	66.5	77.6	84 7	87.6	86.4	66
% Ac	34 1	31	26.4	21.5	14.4	7.3	3.9	1.6	0
% Ph	32	23	17	12	8	8	8.5	12	34

Composition of the solutions on the connodal line at 80°.

% W	83.3	82.9	74.7	61.8	52 5	40.6	32.2	33.4	35.4
% Ac	3.7	7.1	13.8	20 2	24 5	27.4	21.8	15.6	11.6
% Ph	13	10	11 5	18	23	32	46	51	53

% W	40.5	49.7	62.7
% Ac	7.5	4.3	2.8
% Ph	52	46	34.5

Composition of the solutions on the connodal line at 85°.

% W	80.1	71.7	58.4	49.1	37.2	39 2	44.3	58.9
% Ac	9.9	13.3	19.1	22.9	17.3	12.8	8.2	5.1
% Ph	13	15	22.5	28	45.5	48	47.5	36

Composition of the solutions on the connodal line at 87°.

% W	78.3	70.1	56.5	44.3	41.5	46.4	64.5
% Ac	6.7	12.9	18.5	20.7	13 5	8.6	5.5
% Ph	15	17	25	35	45	45	30

The preceding tables are obtained by interpolation. Varying quantities of phenol are added to mixtures of water and acetone containing 1.83, 4.24, 7.94, 15.6, 24.6, 31.8, 40.4, 50.2, 59.9 and 64.9 percent of acetone, and the temperature was determined at which the two liquid phases which form are converted into a single phase.

Let us now examine the different connodal lines in figure 1. Below 68° they terminate in two points on the side W–Ph. of the triangle; these two points represent two binary solutions which are in equilibrium with each other. The positions of the conjugate points on the connodal line itself is still unknown. At 68° the connodal line touches the side W. Ph. in a point, at which the two liquid phases of the binary system W. Ph. become identical. As is shown in the figure at 80°, 85° and 87°, the connodal lines at higher temperatures lie wholly within the triangle and approach each other as the temperature rises, disappearing finally at about 92° in the point F. The composition at the point F is approximately 59 % of water, 12 % of acetone and 29 % of phenol.

Above 92° the ζ-surface is convex at every point when regarded from below; as the temperature falls a double plaitpoint therefore appears at the point F, when this temperature of 92° is reached. On further depression of the temperature the point F develops into a plait with two plaitpoints, of which one moves towards the side W. Ph. where it disappears at 68° in the point at which the connodal line of 68° touches the side W. Ph.; at still lower temperatures therefore one point of folding alone remains.

A further investigation will show whether it is possible in some measure te learn the course of the plaitpointcurve.

Mr. SCHREINEMAKERS has thus shown experimentally that connodal lines with two, one or no plaitpoints may appear on the ζ-surface. The first example with two plaitpoints has been communicated in the preceding paper; in previous investigations connodal lines with one and with no plaitpoint were referred to.

Chemistry. — "*On the nitration of benzoic acid and its methylic and ethylic salts.*" By Prof. A. F. HOLLEMAN. (Communicated by Prof. C. A. LOBRY DE BRUYN.)

Some time ago (Recueil 17.335) I described a process for the quantitative determination of the three isomeric mononitrobenzoic acids in mixtures of them. This process has been simplified and improved so that the results obtained by it now attain an accuracy