EXPERIMENTAL

METHODS OF INVESTIGATION

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Methods of Investigation

The binary systems are studied by the following two methods :

(i) the optical method and

(ii) the thermal method.

Normally, a substance melts to an isotropic liquid at its melting point and this can usually be determined by the common method of melting point determination. However, a mesomorphic substance first melts to an anisotropic liquid at a particular temperature, commonly referred to as the melting point, and this anisotropic liquid transforms to a true isotropic liquid at a definite higher temperature ; the point at which this change takes place is usually called the transition point or transition temperature. It is rather difficult to determine accurately the melting point and the transition point of a liquid crystalline substance by the usual melting point method, but the mesomorphic liquid being birefringent, both its melting point and transition point can very conveniently be determined by the use of polaroids. This is known as the optical method. A two-component system can, thus, be investigated and the equilibrium diagrams can be constructed.

The binary systems under investigation can be divided into three types :

A. Where both the components are liquid crystalline substances,

B. Where one component is a liquid crystal and another a non-liquid crystal and

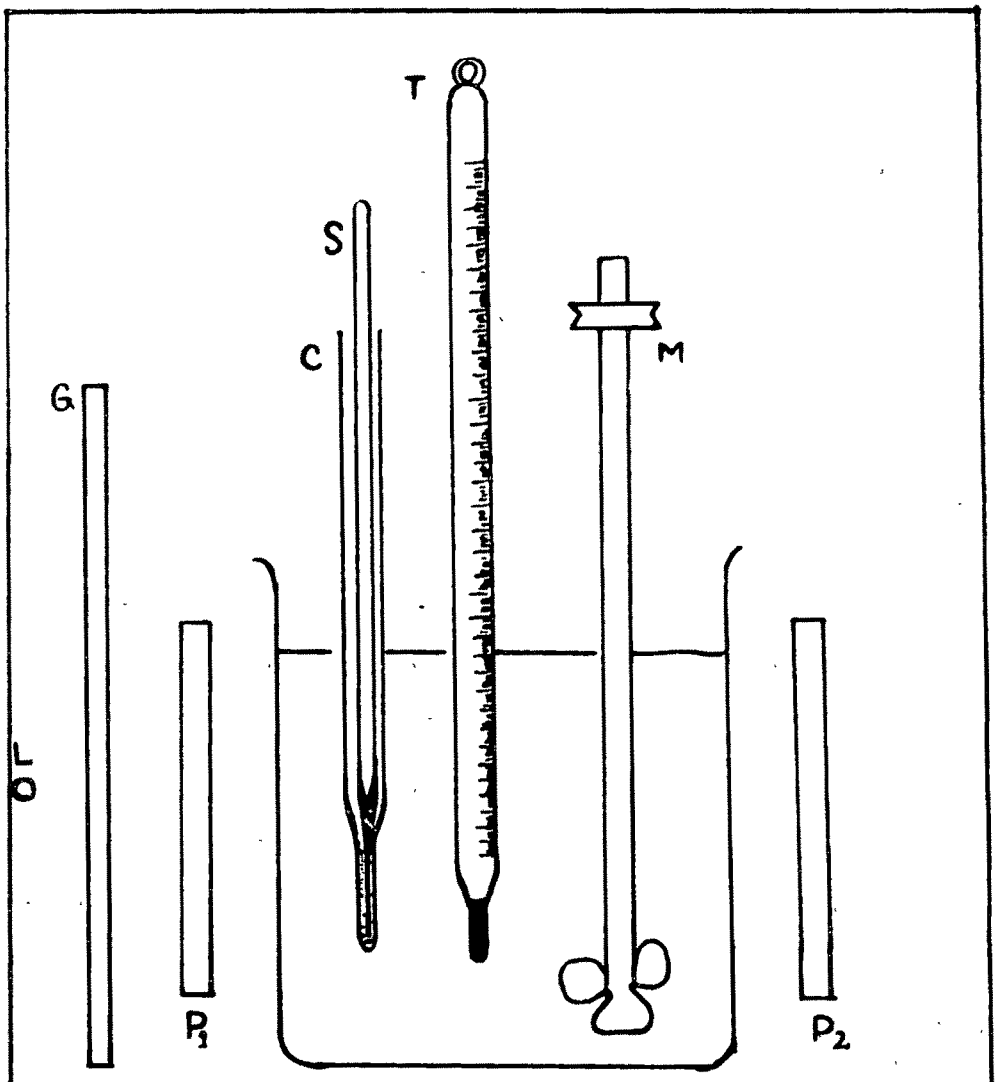
C. Where both the components are non-liquid crystalline substances.

All these three types of binary systems can be investigated by the optical method.

Investigation of the Phase Diagrams by the Optical Method

The Apparatus :

The apparatus used for this method is diagrammatically illustrated in the figure 3. The capillary tube C is made by drawing out an ordinary glass tubing to form a capillary about 2 mm. in diameter. In this capillary tube is taken a small portion of the finely powdered mixture and a thin glass stirrer S, also made by drawing out a glass rod so that it can work easily within the capillary, stirring the mixture well, is provided. This capillary tube is immersed in a liquid bath consisting of one litre beaker containing dibutyl phthalate. The liquid in the bath is continuously and vigorously stirred by means of an electrically run mechanical stirrer M. The beaker is lagged by wrapping asbestos paper round it in order to minimise loss of heat through radiation. The asbestos covering is provided with two windows 1 $^{1}/_{2}$" square opposite one



L - LAMP. T - THERMOMETER.

C - CAPILLARY TUBE. M - MECHANICAL STIRRER.

S - STIRRER (GLASS ROD). P_1, P_2 } POLAROID SQUARES

G - GROUND GLASS SCREEN.

FIG. 3.

another. A standard thermometer T graduated in 1/10th of a degree, which is previously calibrated, is suspended in the liquid bath. The capillary tube C containing the mixture under investigation is held in the bath by the side of the thermometer in such a way that it can be seen through the square windows in the asbestos lagging.

An electric lamp L functions as the source of light. The beam of light passes through a ground glass screen G illuminating the substance in the capillary tube C which is observed by means of a magnifying glass. The two polaroid squares P_1 and P_2 are placed on either side of the beaker containing the liquid, facing the windows in the asbestos lagging so that P_1 stands in between the glass screen and the beaker, while P_2 stands in front of the beaker. Under such an arrangement, the capillary tube C is held between the two polaroid squares. The polaroid squares are held crossed to each other so that the light only passes through when the medium between them is anisotropic and is cut off when the medium transforms to isotropic liquid.

Preparation of a Sample Mixture :

The two substances comprising the mixture are carefully and accurately weighed in known proportions, in a small test tube of 2" x 1/4" size. The total weight of the mixture taken is about 0.2 gms. (accurately weighed). The mixture in the test tube is now heated in an oil bath to a temperature slightly higher than that at which the mixture

melts. After the mixture is melted in the test tube, it is thoroughly stirred by means of a glass rod in order to ensure a thorough and complete mixing of the components. This homogeneous liquid melt is then quickly cooled by quenching the test tube in a beaker containing cold water. The homogeneous liquid solidifies. The solid mixture is removed from the test tube and is then reduced to a fine powder by intimately grinding it in an agate mortar. In this way different mixtures of varying proportions are prepared and their melting points and transition points are determined by heating them in a capillary tube in the liquid bath, as shown in the figure 3. The small test tubes in which the mixture is prepared are thoroughly cleaned with dilute nitric acid, washed with hot distilled water and dried with alcohol and ether.

Observations :

The homogeneous mixture thus prepared is filled in the capillary tube C and pressed down with the narrow glass rod so that the material occupies about 10-15 mm. at the bottom of the capillary tube. The capillary tubes as well as the glass rods are thoroughly cleaned with dilute nitric acid, washed with distilled water and dried in the usual manner. The capillary tube C along with the contents and the glass rod is held by the side of the thermometer in the liquid bath in between the two polaroid squares. The bath is slowly heated at the rate of about 1°C per 5 - 10 minutes by means of a

microburner having a fine control arrangement so that the temperature of the bath can be slowly raised and maintained within 1/10th of a degree as desired. By raising the temperature of the bath slowly and by proper manipulation of heating and stirring and carefully noticing, particularly the outline of the substance against the side of the capillary, it is not difficult to ascertain the point at which the mixture begins to melt. At the point when the mixture begins to melt, it becomes soft enough so as to be easily stirred by means of the thin drawn out glass rod. On carefully observing through a magnifying glass small droplets of the liquid can be seen to form on the side of the capillary tube. This temperature is considered to be the thaw-point or the sintering point corresponding to the eutectic point in the thermal analysis method and is observed without polaroids.

On raising the temperature of the bath slowly, while continuously stirring the mixed melt in the capillary, a definite point is reached when the fused mass gets melted to a homogeneous liquid. The homogeneous melt at this point is anisotropic and shows birefringence. However, it is observed that the determination of the melting point of the mixture when the liquid phase first formed is an anisotropic one, is rather difficult, but with care and experience this can be measured fairly accurately within 0.2°C. For this, certain precautions should be taken. The bath temperature should be allowed to change exceedingly slowly and the solid particles should be allowed to settle down periodically.

On slowly raising the temperature, with continuous stirring, the solid particles are melted to a homogeneous liquid which is birefringent when seen through crossed polaroids. No solid particles will separate when this homogeneous birefringent liquid is allowed to stand at this temperature. This is the melting point or C - M point (solid crystal-mesomorphic point) of the mixture when the liquid phase first formed is anisotropic.

On further heating, the homogeneous birefringent anisotropic mixed melt is transformed at a definite point to an isotropic liquid which appears non-birefringent through crossed polaroids. This is the transition point or the transition temperature or the M - L point (mesomorphic-liquid point). In contrast to the difficulty observed in ascertaining the melting point, this point is easily marked due to the sharp disappearance of birefringence. This transition from anisotropic liquid to isotropic liquid and vice-versa is very sharp and can be reproduced very accurately within 0.1°C, when the bath temperature is slowly raised or lowered. It should be noted that this birefringence is different from the birefringence of the solid particles in the former case. In this latter case the whole melt is birefringent and the birefringence is reproducible on cooling, whereas in the former, the birefringence is due to the unmelted floating solid particles and not reproducible when the temperature of the bath is lowered.

Thus the sintering points, melting points and the

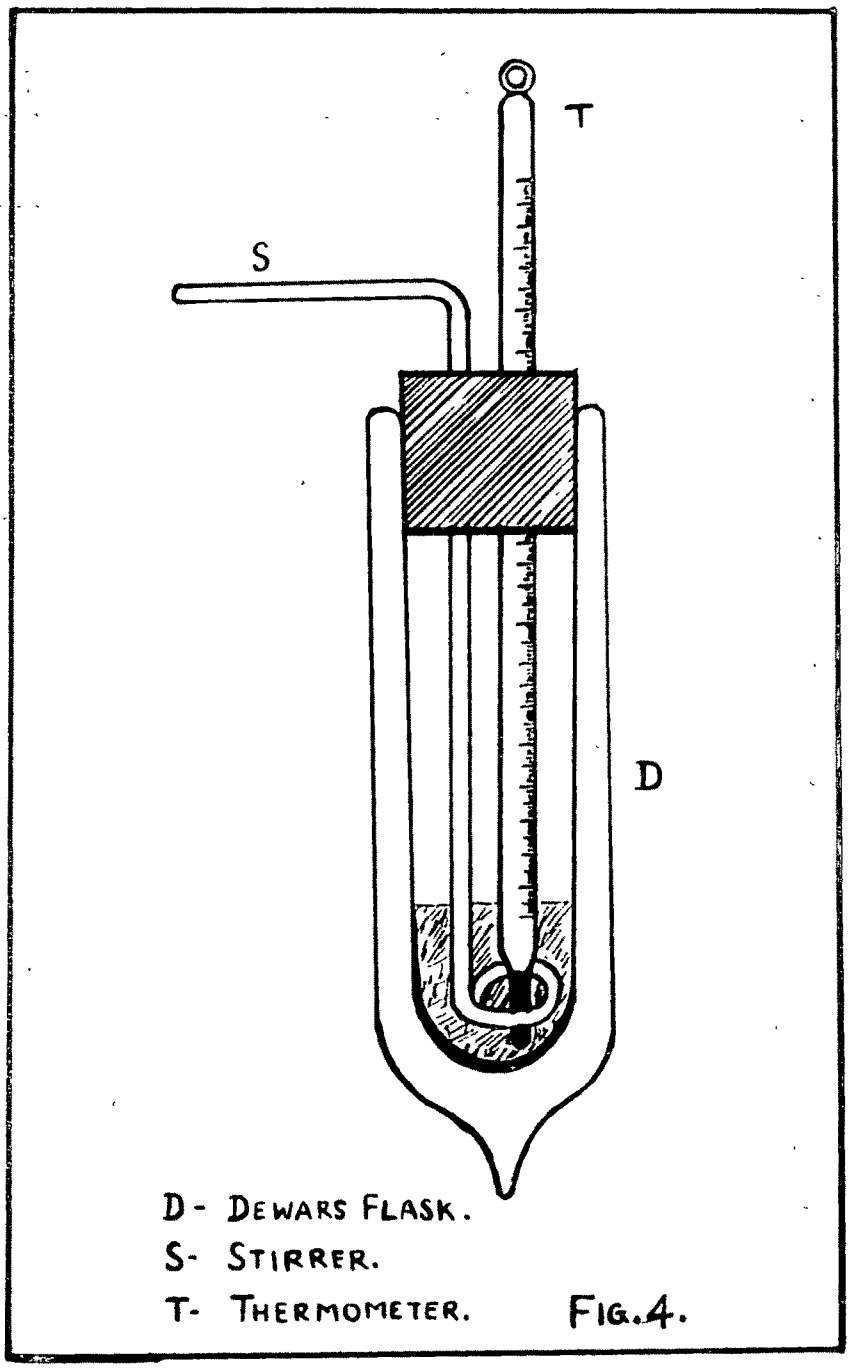
transition points of different compositions of different components are determined, and the phase diagrams are constructed therefrom.

Investigation of the Phase Diagrams by the Thermal Method

The Apparatus :

It has already been mentioned before that determination of melting point of the mixture, when the liquid phase first formed is an anisotropic one is not quite easy. Therefore, the critical regions of the anisotropic liquid phase are examined by the standard thermal i.e. cooling curve method.

As the heats of transition from mesomorphic to isotropic liquid are very small, it is necessary to use very low rates of cooling for the investigation of the phase diagrams of the mixtures forming mesomorphic melts. Therefore, the examination is carried out in a small Dewar flask of 6" x 1" size which is immersed in an oil thermostat bath maintained at a constant temperature. The Dewar flask D is fitted with a cork provided with two holes. A thermometer T is fitted in through one of the holes, which reaches the bottom of the flask. The thermometer used for the measurements is graduated in 1/10th of a degree and previously calibrated against a standard thermometer. A stirrer S passes through the other hole, reaching the bottom of the flask. This stirrer is so constructed as to surround the bulb of the thermometer without hitting it. The stirring



D- DEWARS FLASK.
S- STIRRER.
T- THERMOMETER.

FIG.4.

is done by raising and lowering the stirrer. Fig. 4 represents an illustration of the apparatus.

Observations :

An accurately weighed mixture, weighing roughly about 10 gms. consisting of two components in definite proportions, is carefully transferred to the Dewar flask and the flask is then closed with the cork carrying the thermometer and the stirrer. The mixture is melted by heating the flask in an oil bath and the temperature of the molten mixture is raised to about 10 degrees above the transition temperature to be noted. Now, the flask is removed from the oil bath and immediately immersed in a large thermostat bath maintained at a temperature within 10 degrees below the transition temperature to be observed. The temperature of the thermostat bath is maintained within $\pm$ 0.05°C by means of an electrically controlled thermoregulator. Fig. 5 illustrates the arrangement of the thermostat bath equipment.

A continuous stirring of the mixed melt in the flask is done by raising and lowering the stirrer S. The fall of temperature is noted at every half a minute interval by a chronometer. The readings are plotted as logarithms of the temperature against time. This should give a continuous smooth curve except when there is a transition change when the curve should show a discontinuity. The heat of transition from isotropic to anisotropic is very small and therefore,

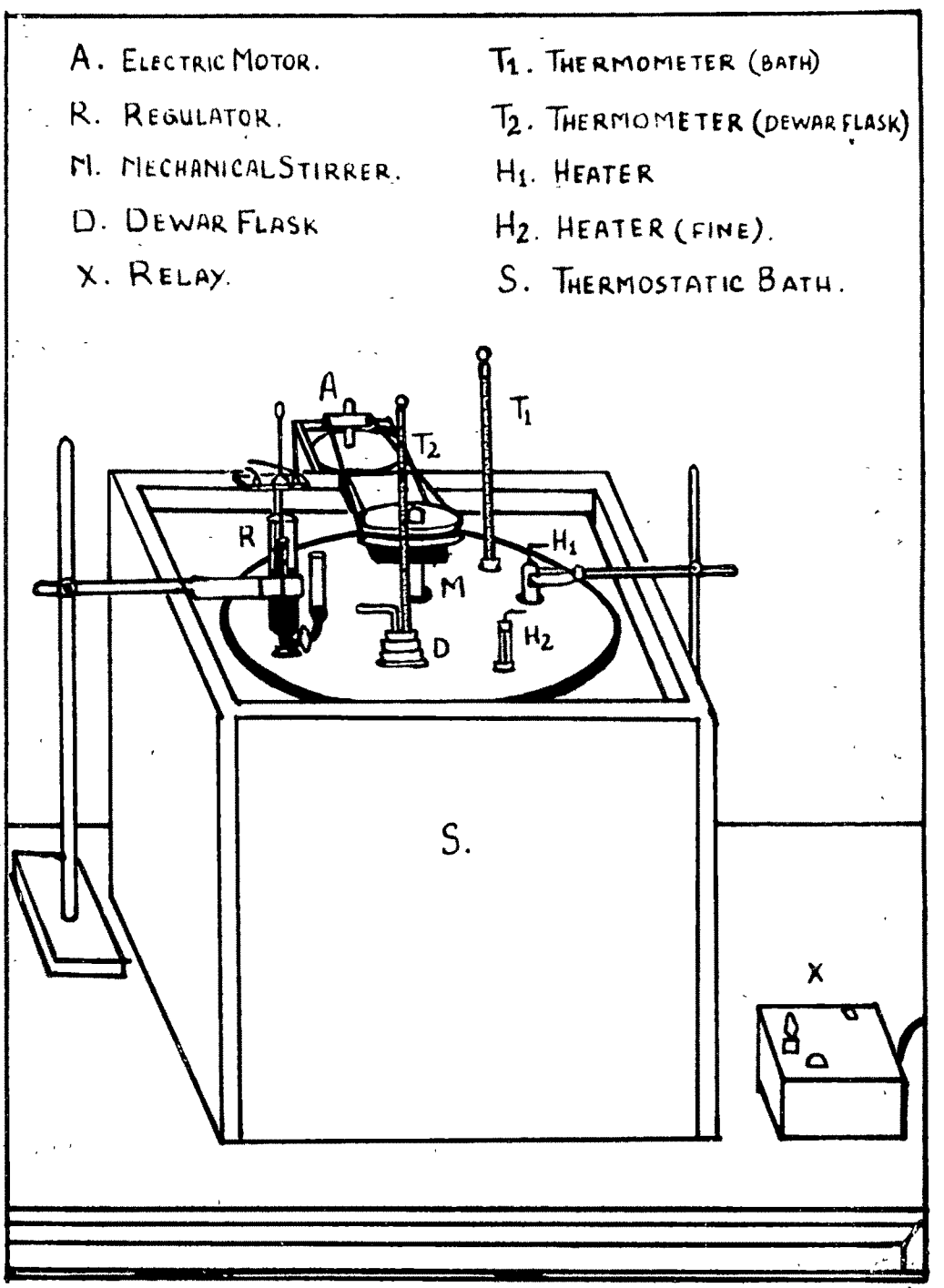

A. Electric Motor.
R. Regulator.
M. Mechanical Stirrer.
D. Dewar Flask
X. Relay.
T_1. Thermometer (bath)
T_2. Thermometer (dewar flask)
H_1. Heater
H_2. Heater (fine).
S. Thermostatic Bath.
A
T_1
T_2
R
H_1
M
D
H_2
S.
X

Fig. 5.

it is not surprising if the observation of the transition break is confronted with a difficulty, which however, can be overcome by using a Dewar flask and maintaining the temperature of the thermostatic bath sufficiently within a small range of the transition temperature to be observed. By this way, the rate of fall of temperature is sufficiently minimised so as to make the transition break appreciable. In fig. 6 is shown a typical cooling curve of the system p-azoxyanisole : p-dimethylaminobenzal-p-nitroaniline containing 93.28 mole % p-azoxyanisole in the mixture. The temperature of the thermostat bath is maintained at 107.0°C. The break at A illustrates, the isotropic liquid-anisotropic liquid transition, which is shown on a magnified scale in the small diagram inset in the top right hand corner in the figure. B is the anisotropic liquid-solid transition break and this represents the freezing point of the mixture corresponding to the normal melting point. At this transition usually supercooling of the mixed melt takes place, and therefore, the melting point is obtained by extrapolation of the cooling curve.

Thus, the critical isotropic-liquid crystalline regions of different mixtures of different components are examined. Different transitions for the same mixture are observed separately in different experiments. For accurate determination, the same transition was observed by separate individual experiments with different bath temperatures, of course, in some cases only, which confirmed the accuracy of the method.

All temperatures are corrected.

o in the phase diagrams represents melting curve points.

x in the phase diagrams represents cooling curve points.

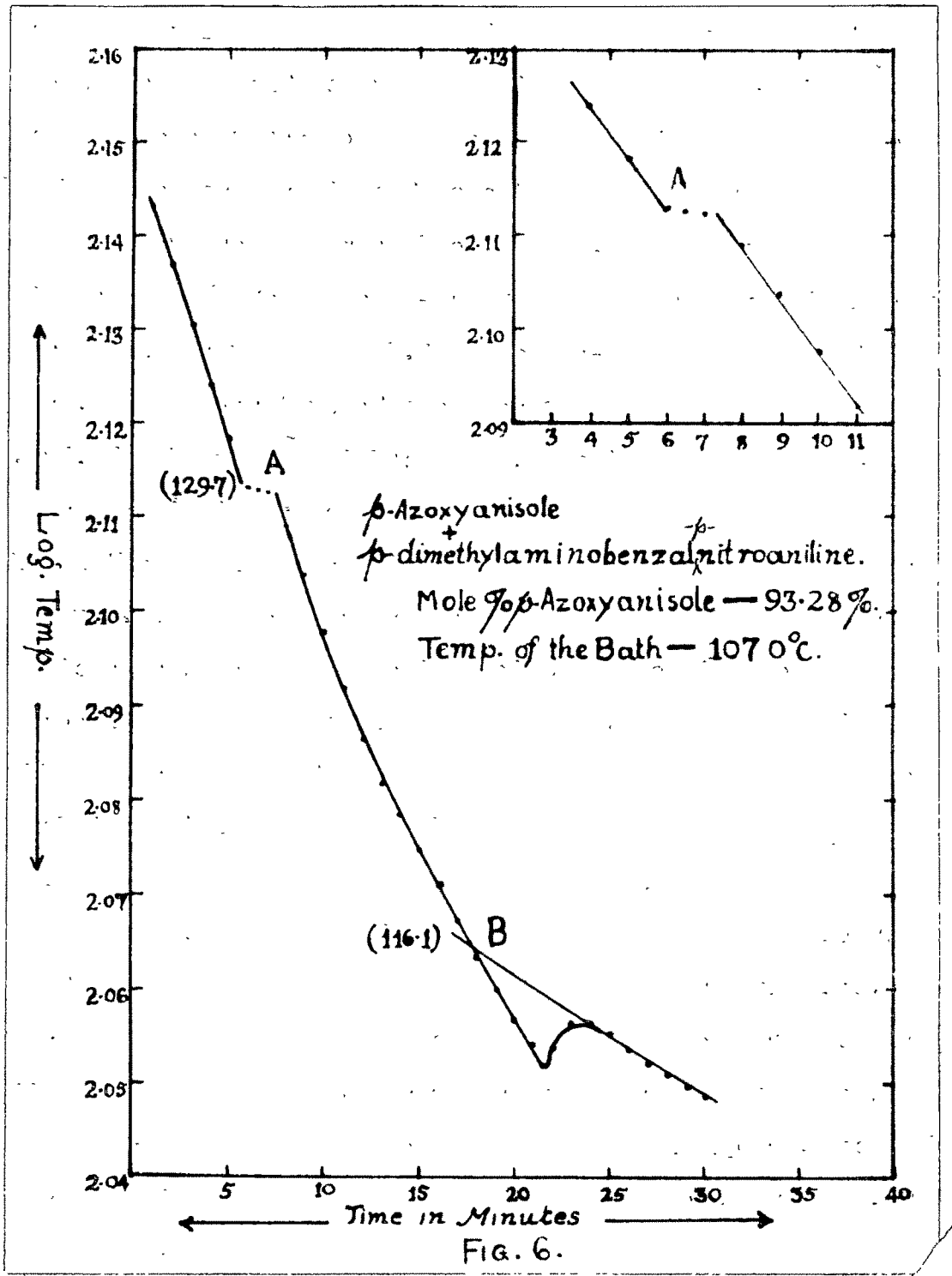

2·16
2·15
2·14
2·13
2·12
2·11
2·10
2·09
2·08
2·07
2·06
2·05
2·04
Log. Temp.
(129·7)
A
B
(116·1)
p-Azoxyanisole
+
p-dimethylaminobenzalnitroaniline.
Mole % p-Azoxyanisole — 93·28 %.
Temp. of the Bath — 107·0°C.
2·13
2·12
2·11
2·10
2·09
3 4 5 6 7 8 9 10 11
A
5 10 15 20 25 30 35 40
Time in Minutes

FIG. 6.

PREPARATION and PURIFICATION of MATERIALS

Preparation and Purification of Materials

A. Preparation of Materials :

I Alkoxy Acids

1. p-Methoxycinnamic acid :

20.4 g. of anisaldehyde and 39 g. of malonic acid were dissolved in 50 c.c. of pyridine to which a few drops of piperidine were added, and heated for one hour under reflux on a water bath. A rapid evolution of CO_2 takes place. The reaction was completed by boiling the solution for five minutes. Then it was cooled and poured into excess of water containing enough HCl to combine with pyridine. The p-methoxycinnamic acid separated was filtered off, washed with water and recrystallised from alcohol several times and dried. The yield is practically quantitative. White shining crystals m.p.172 - 188°C (147).

2. p-Ethoxybenzoic acid :

The acid was prepared by boiling under reflux for 2 - 3 hours 1 mole of p-hydroxybenzoic acid, dissolved in 2 moles of aqueous potassium hydroxide with 1.1 mole of ethyl iodide. Under these conditions little or no esterification takes place ; the free acid liberated by the addition of concentrated hydrochloric acid, was crystallised thrice from small volumes of glacial

acetic acid. The fine crystalline acid was obtained in white prism-like crystals. The yield was practically quantitative. M.P. 197°C (97, 98).

II Aldehydes

1. p-Acetoxybenzaldehyde :

p-Acetoxybenzaldehyde was prepared from p-hydroxybenzaldehyde by condensing with acetic anhydride for three to four hours and distilling the product under vacuum. B.P. 265°C. Richter gives B.P. 266°C (148).

2. p-Propionoxybenzaldehyde :

p-Propionoxybenzaldehyde was similarly prepared from p-hydroxybenzaldehyde by condensing with propionic anhydride for three to four hours and distilling the product under vacuum. B.P. 272°C.

Analysis :

Found : C = 67.51 % ; H = 5.49 %

$C_{10}H_{10}O_3$ Requires : C = 67.41 % ; H = 5.61 %.

III Schiff's Bases

The Schiff's bases were prepared by heating as such or under reflux on water bath an alcoholic solution of the purified appropriate aldehyde and ammine in equimolar proportions until the reaction was complete. The products were isolated by distilling the solvent

and were crystallised from a suitable solvent, e.g. alcohol, benzene, ether etc. The fine crystals melted sharply to constant melting points. The following Schiff's bases were prepared.

1. p-Anisal-aniline : White needles from alcohol, m.p. 63.5°C. Pope and Fleming give m.p. 63.0°C (149).

2. p-Nitrobenzal-aniline : Yellowish little plates from ether, m.p. 91.0°C. Fischer gives m.p. 93.0°C (150).

3. p-Dimethylaminobenzal-aniline : Greenish yellow crystals from alcohol, m.p. 100°C. Sachs and Lewin give m.p. 100°C (151).

4. p-Dimethylaminobenzal-p-toluidine : Yellow needles from alcohol, m.p. 120.2°C. Sachs and Lewin give m.p. 120 - 121°C (151).

5. p-Dimethylaminobenzal-p-anisidine : Yellow plates from alcohol, m.p. 140.$_2$°C. Sachs and Lewin give m.p. 138 - 140°C (151).

6. p-Hydroxybenzal-aniline : Pale yellow crystals from ether, m.p. 189.3°C. Harzfeld gives m.p. 190 - 191°C (152).

7. p-Dimethylaminobenzal-p-phenetidine : Yellow plates from alcohol, m.p. 147.4°C. Sachs and Lewin give m.p. 145 - 146°C (151).

8. p-Hydroxybenzal-p-toluidine : Light orange like plates from ether, m.p. 213.5°C. Herzfeld gives m.p. 213°C (153).

9. p-Anisal-p-phenetidine : White crystals from alcohol, m.p. 128.4°C. Weygand and Gabler give m.p. 128.5°C (154).

10. p-Nitrobenzal-p-phenetidine : Sulphur yellow needles from alcohol, m.p. 123.5°C. Pope and Fleming give m.p. 130.5°C (149)

Analysis :

Found : C = 67.00 % ; H = 4.74 % ; N = 10.12 %.

$C_{15}H_{14}N_2O_3$ Requires : C = 66.66 % ; H = 5.18 % ; N = 10.37 %.

11. p-Nitrobenzal-p-chloroaniline : Yellow needles from alcohol, m.p. 130.7°C. Hantzsch and Schwab give m.p. 128°C (155).

12. p-Dimethylaminobenzal-p-dimethylaminoaniline : Yellow leaflets from alcohol, m.p. 230°C. Bender gives m.p. 229 - 230°C (156).

13. p-Hydroxybenzal-p-chloroaniline : Pale yellow plates from benzene, m.p. 185°C. Senior and Forster give m.p. 184 - 185°C (157).

14. p-Hydroxybenzal-p-bromoaniline : Yellowish plates from alcohol, m.p. 195°C. Senior and Forster give m.p. 193 - 194°C (157).

15. p-Hydroxybenzal-p-anisidine : Bright yellow plates from xylene, m.p. 211.5°C. Senior and Forster give m.p. 211 - 211.5°C (157).

16. p-Chlorobenzal-p-dimethylaminoaniline : Light yellow crystals from alcohol, m.p. 165°C. Fritz Krohnke gives m.p. 165.5°C (158).

17. p-Nitrobenzal-p-dimethylaminoaniline : Dark red with bronze luster plates or needles from alcohol, m.p. 219°C. Sachs and Barschall give m.p. 217°C (159).

18. Benzal-p-phenetidine : Yellowish prisms from alcohol, m.p. 71°C. Phillip gives m.p. 71°C (160).

19. p-Dimethylaminobenzal-p-nitroaniline : Orange coloured plates from toluene, m.p. 199.5°C. Guyot and Granderye give m.p. 198 - 199°C (161).

20. p-Anisal-p-anisidine : White needles from alcohol, m.p. 147°C. Senior and Forster give m.p. 146 - 147°C (162).

21. p-Hydroxybenzal-p-phenetidine : Light yellow leaflets from alcohol, m.p. 201°C.

Analysis :

Found : N = 6.305 %

$C_{15}H_{15}NO_2$ Requires : N = 5.809 %.

22. p-Chlorobenzal-p-phenetidine : Fine white leaflets from alcohol, m.p. 121°C.

Analysis :

Found : N = 5.691 % ; Cl = 13.89 %

$C_{15}H_{14}ClNO$ Requires : N = 5.394 % ; Cl = 13.68 %.

23. p-Dimethylaminobenzal-p-bromoaniline : Fine yellow needles from alcohol, m.p. 158.5°C.

Analysis :

Found : N = 9.533 % ; Br = 26.78 %

$C_{15}H_{15}BrN_2$ Requires : N = 9.243 % ; Br = 26.40 %.

24. p-Anisal-p-iodoaniline : White leaflets from alcohol, m.p. 152.5°C.

Analysis :

Found : N = 4.188 % ; I = 37.41 %

$C_{14}H_{12}INO$ Requires : N = 4.155 % ; I = 37.69 %.

25. p-Dimethylaminobenzal-p-iodoaniline : Brownish yellow fine needles from alcohol, m.p. 159°C.

Analysis :

Found : N = 8.095 % ; I = 36.24 %

$C_{15}H_{15}IN_2$ Requires : N = 8.000 % ; I = 36.28 %.

26. p-Acetoxybenzal-p-toluidine : Fine white plates from alcohol, m.p. 99°C.

Analysis :

Found : N = 5.417 %

$C_{16}H_{15}NO_2$ Requires : N = 5.534 %.

27. p-Acetoxybenzal-p-chloroaniline : Fine white plates from alcohol, m.p. 110.5°C.

Analysis :

Found : N = 4.856 %

$C_{15}H_{12}ClNO_2$ Requires : N = 5.118 %.

28. p-Acetoxybenzal-p-anisidine : Fine white leaflets from alcohol, m.p. 112 - 119°C.

Analysis :

Found : N = 5.295 %

$C_{16}H_{15}NO_3$ Requires : N = 5.204 %.

29. p-Acetoxybenzal-p-phenetidine : White needles from alcohol, m.p. 118.5 - 137.5°C.

Analysis :

Found : N = 5.037 %

$C_{17}H_{17}NO_3$ Requires : N = 4.946 %.

30. p-Propionoxybenzal-p-chloroaniline : Fine white plates from alcohol, m.p. 94.4°C.

Analysis :

Found : N = 4.919 %

$C_{16}H_{14}ClNO_2$ Requires : N = 4.868 %.

31. p-Propionoxybenzal-p-toluidine : Fine white plates from alcohol, m.p. 101.5°C.

Analysis :

Found : N = 5.501 %

$C_{17}H_{17}NO_2$ Requires : N = 5.243 %.

32. p-Propionoxybenzal-p-anisidine : Whitish leaflets from alcohol, m.p. 95.0 - 106.4°C.

Analysis :

Found : N = 5.257 %

$C_{17}H_{17}NO_3$ Requires : N = 4.946 %.

B. Purification of Materials :

The following substances of pure or commercial quality were purchased from B.D.H. and were purified by repeated crystallisation from suitable solvents, till they yielded sharp melting points agreeing with those given in the literature.

1. p-Azoxyanisole : was purified by repeated crystallisation from alcohol to give fine yellow needles, m.p. 118 - 136°C.
2. p-Methoxybenzoic acid : (anisic acid) was purified by repeated crystallisation from water to give fine white needles, m.p. 183.4°C.
3. α-Naphthol : was crystallised from dilute alcohol to give fine light brown needles, m.p. 94°C.
4. β-Naphthol : was crystallised from dilute alcohol to give fine brownish needles, m.p. 123°C.
5. o-Hydroxybenzoic acid : (salicylic acid) was recrystallised from water to give fine white needles, m.p. 159°C.

6. p-Hydroxybenzoic acid : was recrystallised from water to give fine white needles, m.p. 213°C.

7. Succinic acid : was recrystallised from water to white prisms, m.p. 184°C.

8. Benzoic acid : was recrystallised from hot water to fine needles, m.p. 122°C.

9. p-Toluic acid : was recrystallised from hot water to fine long needles, m.p. 179°C.

10. p-Chlorobenzoic acid : was recrystallised from dilute alcohol to fine leaflets, m.p. 236°C.

TABLES and GRAPHS

Table 3

p-Azoxyanisole : p-Acetoxybenzal-p-anisidine

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
89.76	90.14	113.4	129.8
79.56	80.24	109.5	125.8
70.11	70.98	104.5	122.5
59.98	60.98	98.6	119.4
49.57	50.62	92.0	116.6
40.17	41.19	89.1	115.4
29.76	30.65	96.1	114.3
20.25	20.94	101.3	114.8
10.80	11.21	105.8	116.1
00.00	00.00	112.0	119.0

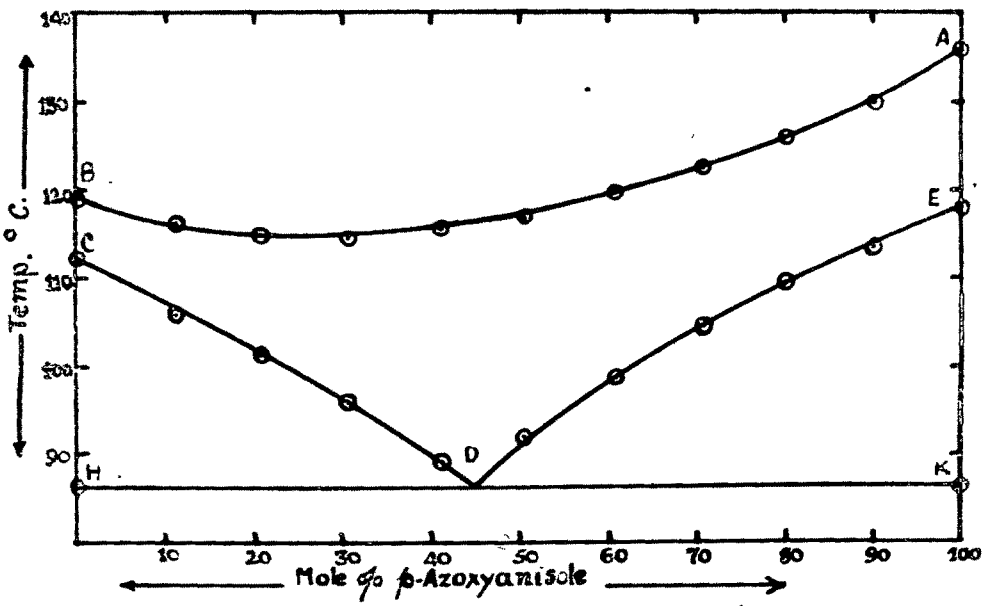
Sintering Point = 86.2°C.

Table 4

p-Azoxyanisole : p-Acetoxybenzal-p-phenetidine

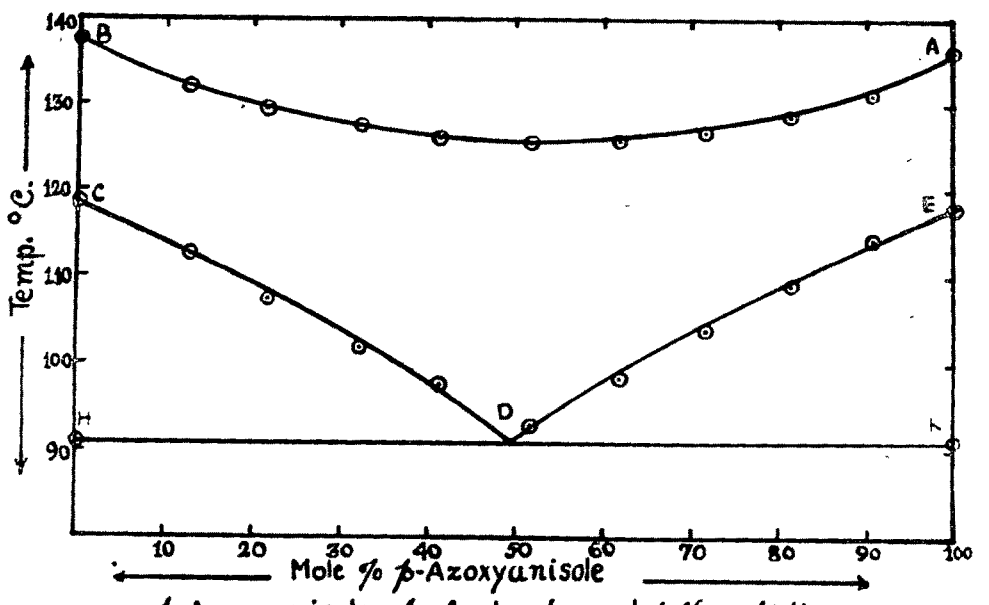
% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
89.77	90.59	114.1	131.1
79.85	81.30	109.1	128.5
69.62	71.55	103.8	126.6
59.57	61.69	98.2	125.5
49.41	51.71	92.7	125.3
39.01	41.24	97.4	126.0
30.35	32.35	101.7	127.3
20.13	21.67	107.3	129.4
11.94	12.93	112.5	132.1
00.00	00.00	118.5	137.5

Sintering Point = 91.0°C.



p-Azoxyanisole : p-Acetoxybenzal-p-anisidine.

Fig.7



p-Azoxyanisole: p-Acetoxybenzal-p-phenetidine.

Fig. 8

Table 5

p-Acetoxybenzal-p-phenetidine : p-Acetoxybenzal-p-anisidine

% of p-acetoxybenzal-p-phenetidine	Mole % of p-acetoxybenzal-p-phenetidine	M.P. in °C	T.P. in °C
100.00	100.00	118.5	137.5
89.52	89.04	113.9	134.4
80.51	79.73	110.8	132.5
70.92	69.87	107.2	130.3
61.56	60.36	104.3	128.8
50.87	49.61	101.5	126.7
40.93	39.72	100.9	125.3
30.32	29.27	102.3	122.4
22.09	21.24	104.5	121.4
10.54	10.08	108.5	119.5
00.00	00.00	112.0	119.0

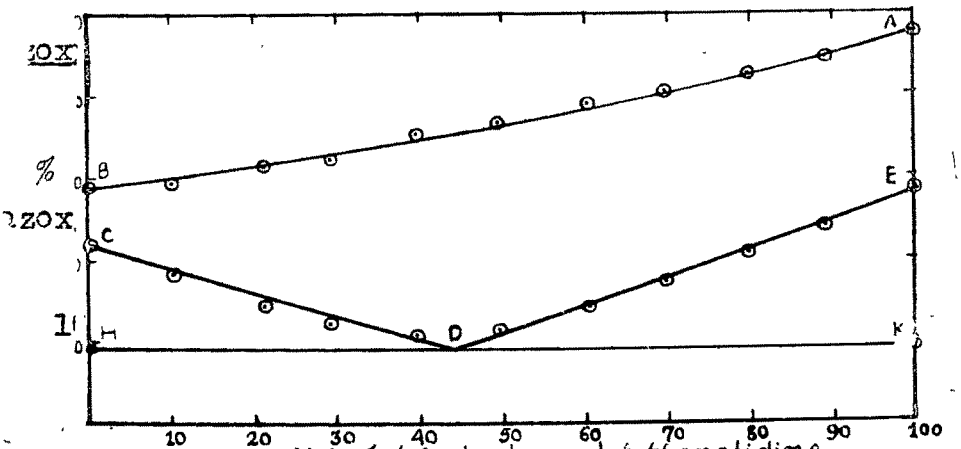
Sintering Point = 99.2°C.

Table 6

p-Azoxyanisole : p-Dimethylaminobenzal-p-anisidine

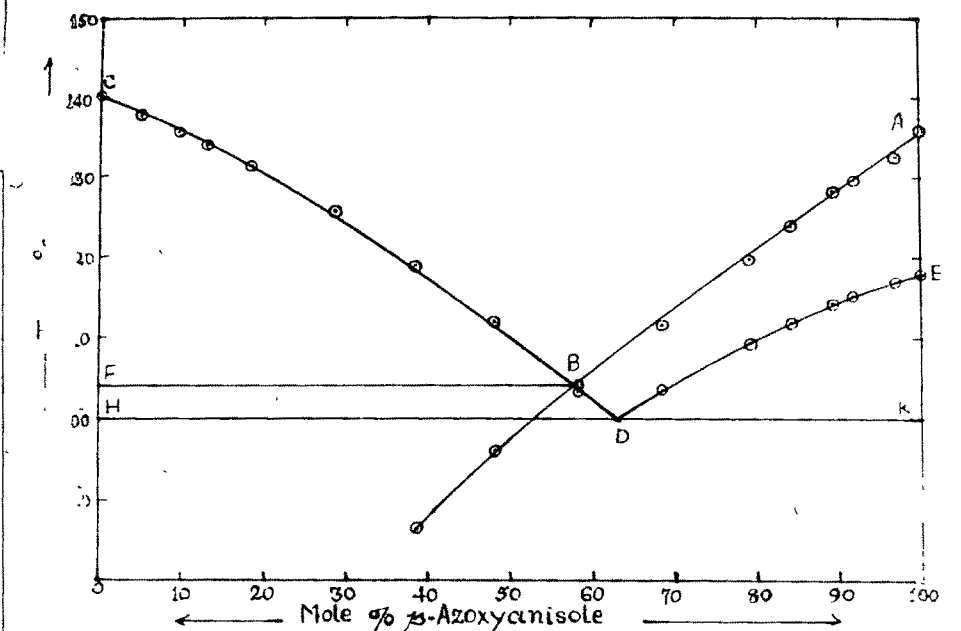
% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
97.26	97.07	117.0	132.6
92.29	91.77	115.3	129.7
89.97	89.32	114.3	128.3
85.12	84.18	111.9	123.9
80.17	79.00	109.4	119.7
70.00	68.45	103.5	111.5
60.08	58.32	103.2	104.1
49.92	48.11	112.0	(96.0)
40.35	38.52	118.9	(86.5)
30.32	28.82	125.5	-
19.71	18.61	131.2	-
14.69	13.08	133.7	-
10.15	9.51	135.4	-
5.36	5.01	137.5	-
00.00	00.00	140.2	-

Sintering Point = 99.8°C.



p-Acetoxybenzal-p-phenetidine : p-Acetoxybenzal-p-anisidine.

Fig. 9



p-Azoxyanisole : p-Dimethylaminobenzal-p-anisidine.

Fig. 10

Table 7

p-Azoxyanisole : p-Chlorobenzal-p-phenetidine

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
94.99	95.01	116.5	131.8
89.80	89.91	113.5	127.8
79.84	79.95	108.7	120.3
69.80	70.01	104.0	113.8
60.06	60.22	98.8	107.3
49.95	50.10	94.6	101.9
40.12	40.28	99.9	(97.1)
20.05	20.14	111.5	-
10.17	10.23	116.0	-
00.00	00.00	121.0	-

Sintering Point = 93.5°C.

Table 7 A

p-Azoxyanisole : p-Chlorobenzal-p-phenetidine

(Cooling Curve)

Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	118.0	136.0
84.89	110.8	125.0
70.31	103.1	112.2
55.84	96.1	104.3
40.25	99.2	96.5
30.24	106.9	96.5
20.65	110.5	96.5
00.00	121.0	-

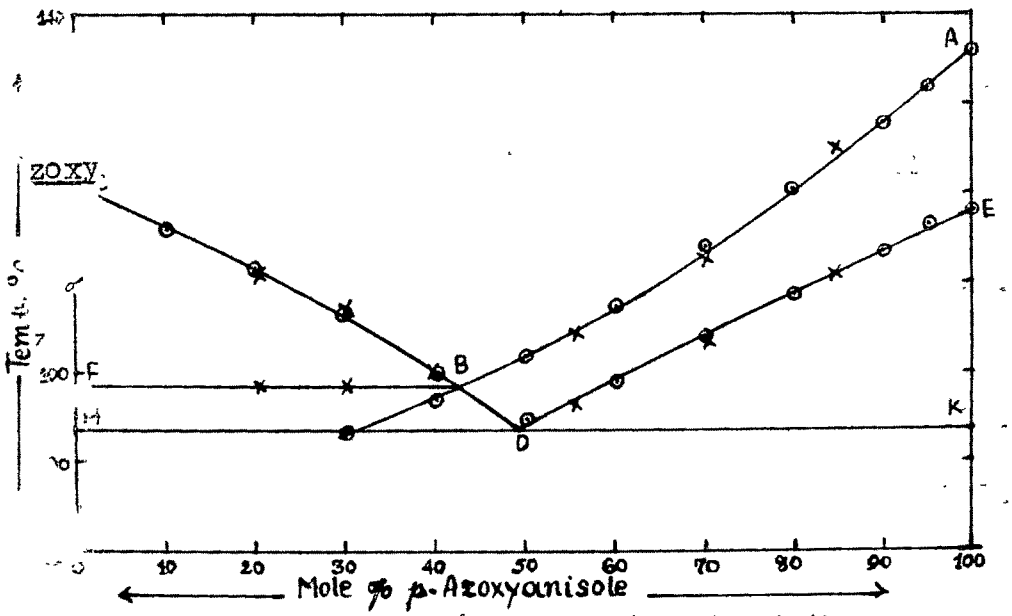
Eutectic Point = 93.7°C.

Table 8

p-Azoxyanisole : p-Dimethylaminobenzal-p-phenetidine

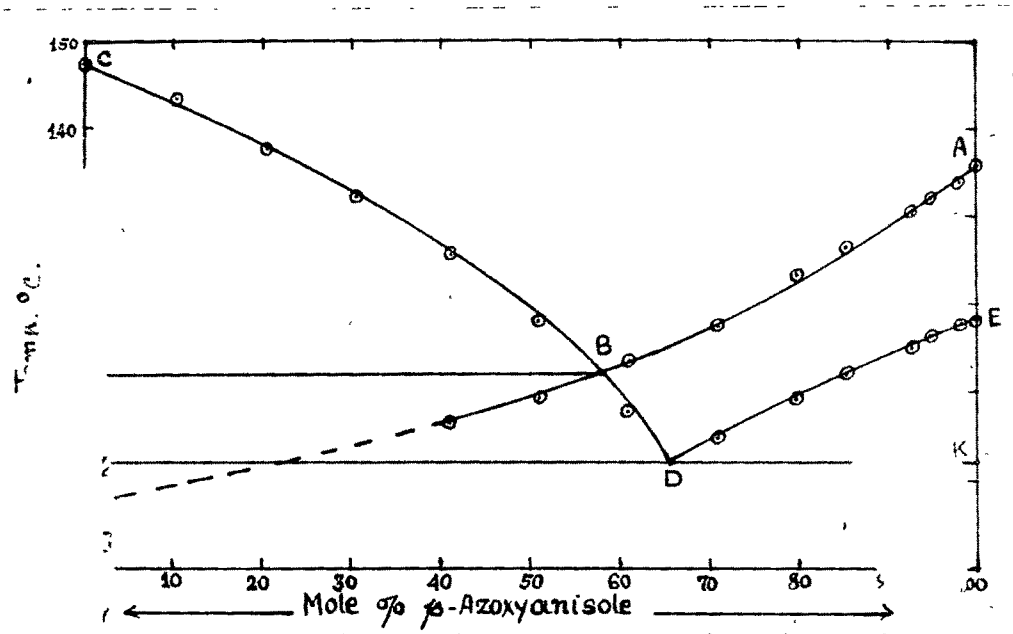
% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
97.94	98.02	117.6	133.9
94.81	94.84	116.4	132.1
92.21	92.51	115.0	130.3
84.51	85.13	112.0	126.4
78.95	79.58	109.1	123.2
70.00	70.79	104.7	117.4
59.97	60.91	107.7	113.4
49.94	50.90	117.8	(109.3)
40.12	41.04	125.5	(106.3)
29.70	30.50	132.1	-
20.07	20.69	137.5	-
10.05	10.40	143.2	-
00.00	00.00	147.4	-

Sintering Point = 102.0°C.



p-Azoxyanisole : p-chlorobenzal-p-phenetidine.

Fig. 11



p-Azoxyanisole : p-Dimethylaminobenzal-p-phenetidin

Fig. 12

Table 9

p-Azoxyanisole : p-Nitrobenzal-p-chloroaniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
95.10	95.23	116.0	131.3
90.10	90.26	113.4	128.1
84.09	84.22	110.6	123.7
79.74	79.89	108.0	120.9
70.12	70.34	102.4	114.0
60.15	60.39	94.0	104.8
50.00	50.24	91.4	93.0
43.76	44.00	98.0	(87.6)
40.10	40.33	101.4	-
29.90	30.11	111.1	-
19.89	20.04	118.4	-
10.13	10.23	124.6	-
5.00	5.05	128.0	-
00.00	00.00	130.7	-

Sintering Point = 87.0°C.

Table 9 A

p-Azoxyanisole : p-Nitrobenzal-p-chloroaniline

(Cooling Curve)

Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	118.0	136.0
90.03	112.8	127.1
75.34	105.6	117.5
62.43	95.8	106.3
45.56	97.3	92.2
40.48	101.2	92.0
00.00	130.7	-

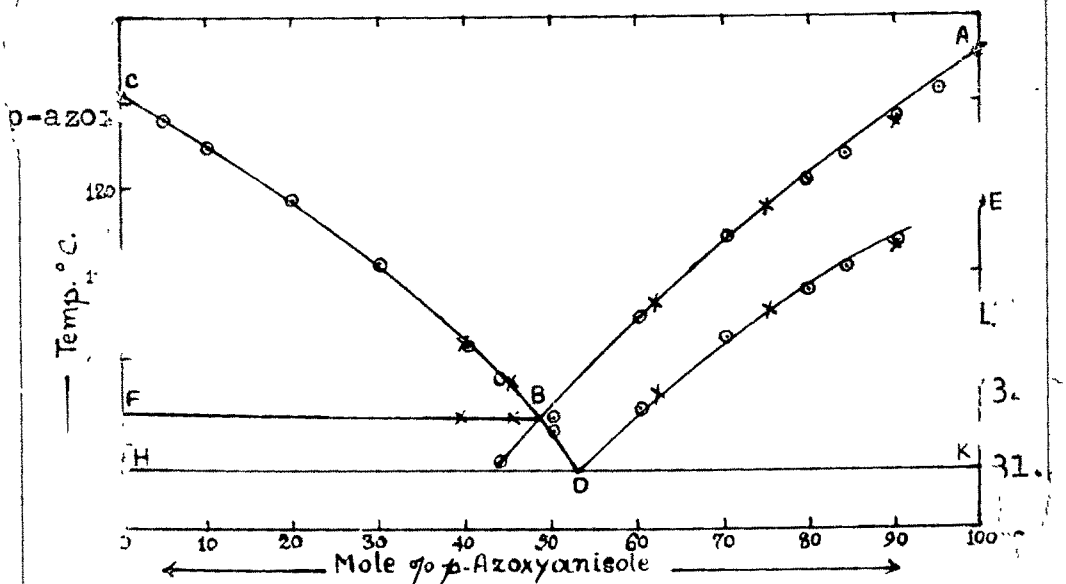
Eutectic Point = 87.2°C.

Table 10

p-Azoxyanisole : p-Anisal-p-phenetidine

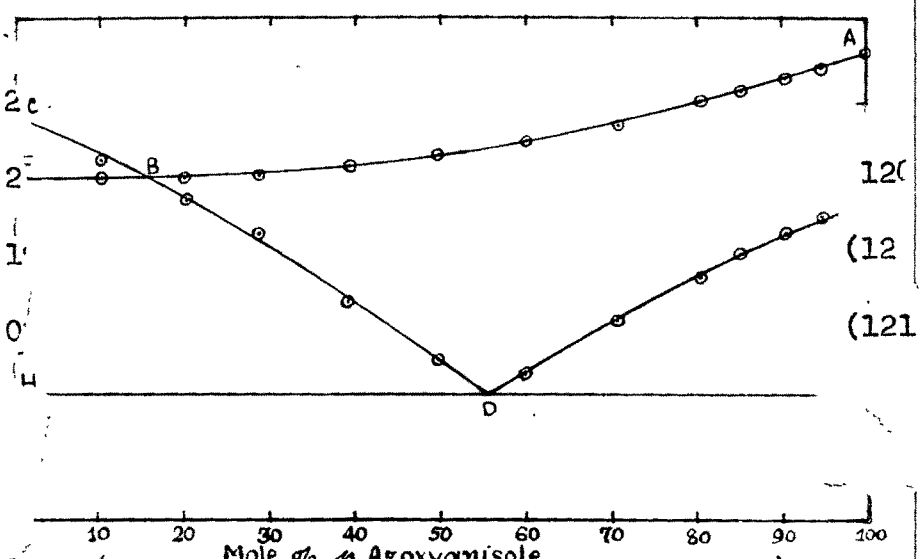
% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
94.80	94.71	116.4	134.0
90.50	90.42	114.3	132.8
85.30	85.04	111.7	131.4
80.51	80.34	108.9	130.0
70.82	70.53	103.8	127.0
60.20	59.92	97.5	125.1
50.00	49.77	99.0	123.3
39.56	39.28	106.0	122.0
29.13	28.89	114.1	121.1
20.31	20.07	118.1	120.7
10.32	10.27	123.0	(120.9)
00.00	00.00	128.4	(121.0)

Sintering Point = 95.0°C.



p-Azoxyanisole: p-Nitrobenzal-p-chloroaniline.

Fig. 13



p-Azoxyanisole: p-Anisal-p-phenetidine

Fig. 14

Table 11

p-Azoxyanisole : p-Nitrobenzal-o-phenetidine

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
90.00	90.40	113.4	134.1
79.94	80.69	107.9	133.0
69.86	70.81	101.6	131.6
59.62	60.71	94.5	129.3
49.58	50.71	95.1	126.1
40.32	41.43	99.5	122.0
30.54	31.52	105.0	116.8
24.89	25.76	109.5	111.8
19.94	20.68	113.5	(107.5)
15.30	15.91	115.5	-
10.21	10.64	118.3	-
00.00	00.00	123.5	-

Sintering Point = 93.0°C.

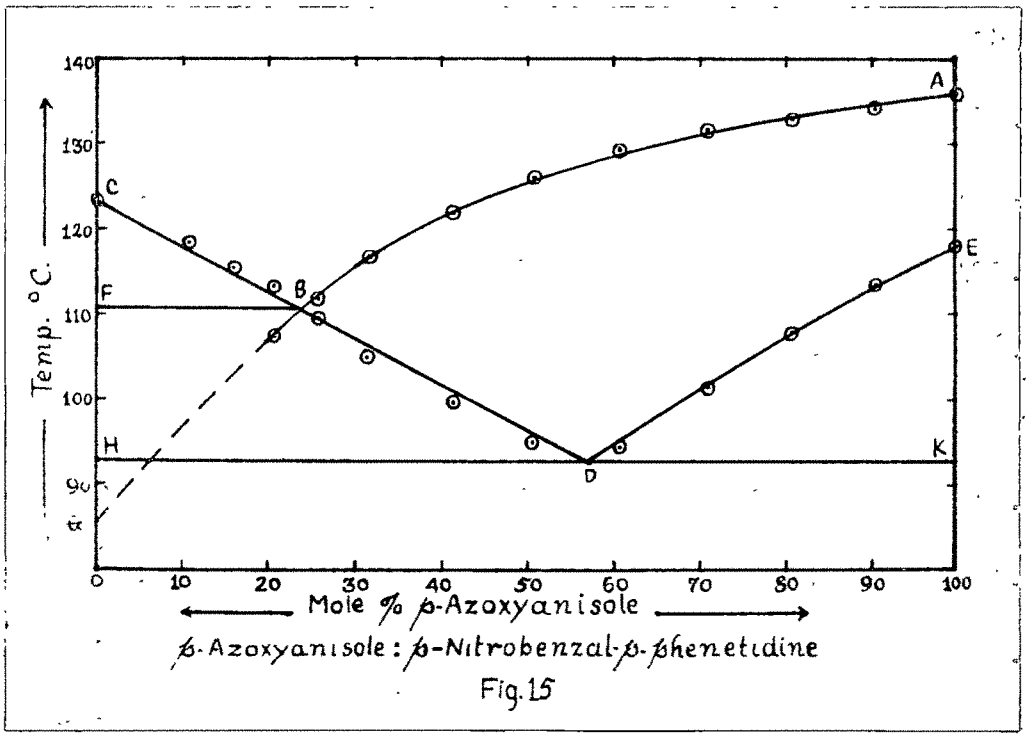

Temp. °C.
140
130
120
110
100
90
A
B
C
D
E
F
H
K
0
10
20
30
40
50
60
70
80
90
100
Mole % p-Azoxyanisole
p-Azoxyanisole : p-Nitrobenzal-p-phenetidine

Fig. 15

Table 12 A

p-Azoxyanisole : p-Nitrobenzal-p-dimethylaminoaniline

(Cooling Curve)

Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	118.0	136.0
95.81	116.0	132.7
90.42	113.6	128.8
85.43	112.7	127.5
80.44	114.2	127.1
75.75	-	127.2
71.12	-	127.1

Eutectic Point = 110.2°C.

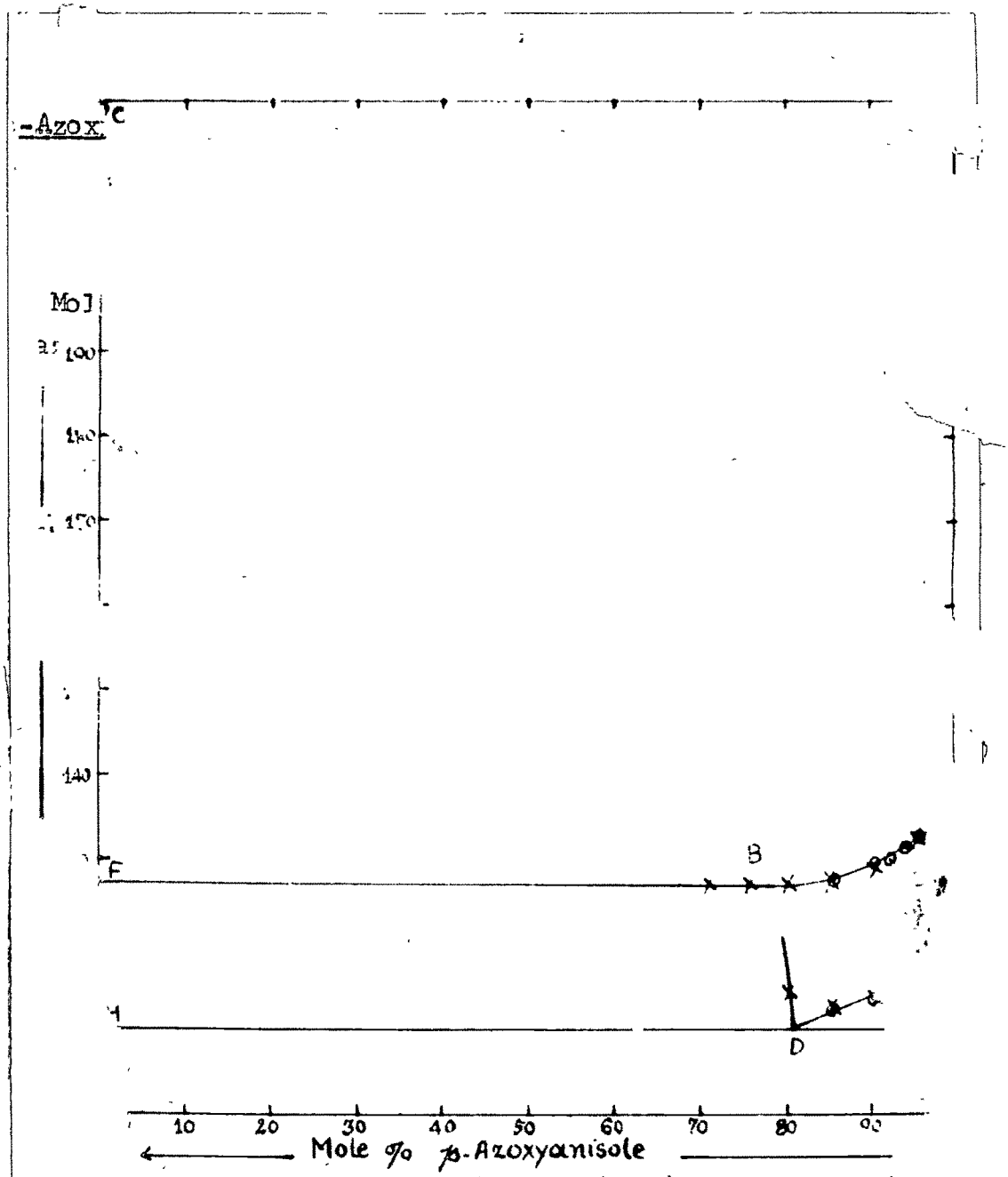

-Azox
C
Mol
100
150
140
F
B
D
10
20
30
40
50
60
70
80
Mole % p-Azoxyanisole
p-Azoxyanisole : p-Nitrobenzal-p-dimethylaminoani

Fig. 16

Table 13

p-Azoxyanisole : p-Dimethylaminobenzal-p-nitroaniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
97.24	97.36	117.4	133.4
95.00	95.19	116.2	131.5
91.61	91.91	115.2	130.0
87.73	88.18	113.8	127.3
83.81	84.39	111.3	125.0
80.08	80.74	116.0	124.0
74.90	75.68	125.7	-
68.84	69.74	139.9	-
60.03	61.03	151.0	-
49.92	50.97	162.1	-
39.80	40.82	172.2	-
29.76	30.66	180.0	-
20.16	20.85	187.1	-
9.98	10.36	193.4	-
00.00	00.00	199.5	-

Sintering Point = 110.0°C.

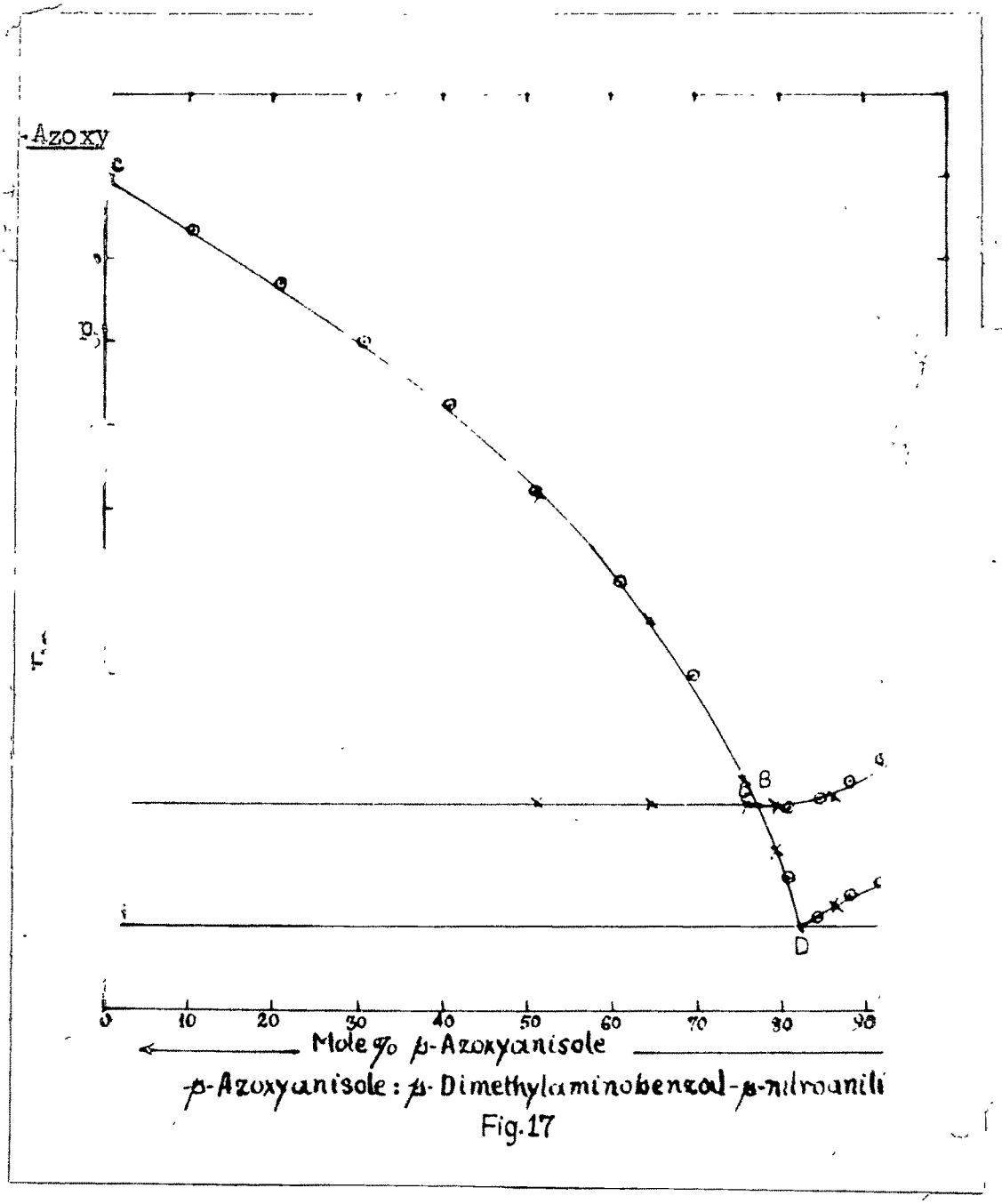
Table 13 A

p-Azoxyanisole : p-Dimethylaminobenzal-p-nitroaniline

(Cooling Curve)

Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	118.0	136.0
93.28	116.1	129.7
86.46	112.5	125.3
79.62	119.0	124.4
75.88	126.9	124.6
64.82	146.5	124.6
51.23	161.5	124.5

Eutectic Point = 110.5°C.



p-Azoxyanisole : p-Dimethylaminobenzal-p-nitroanili

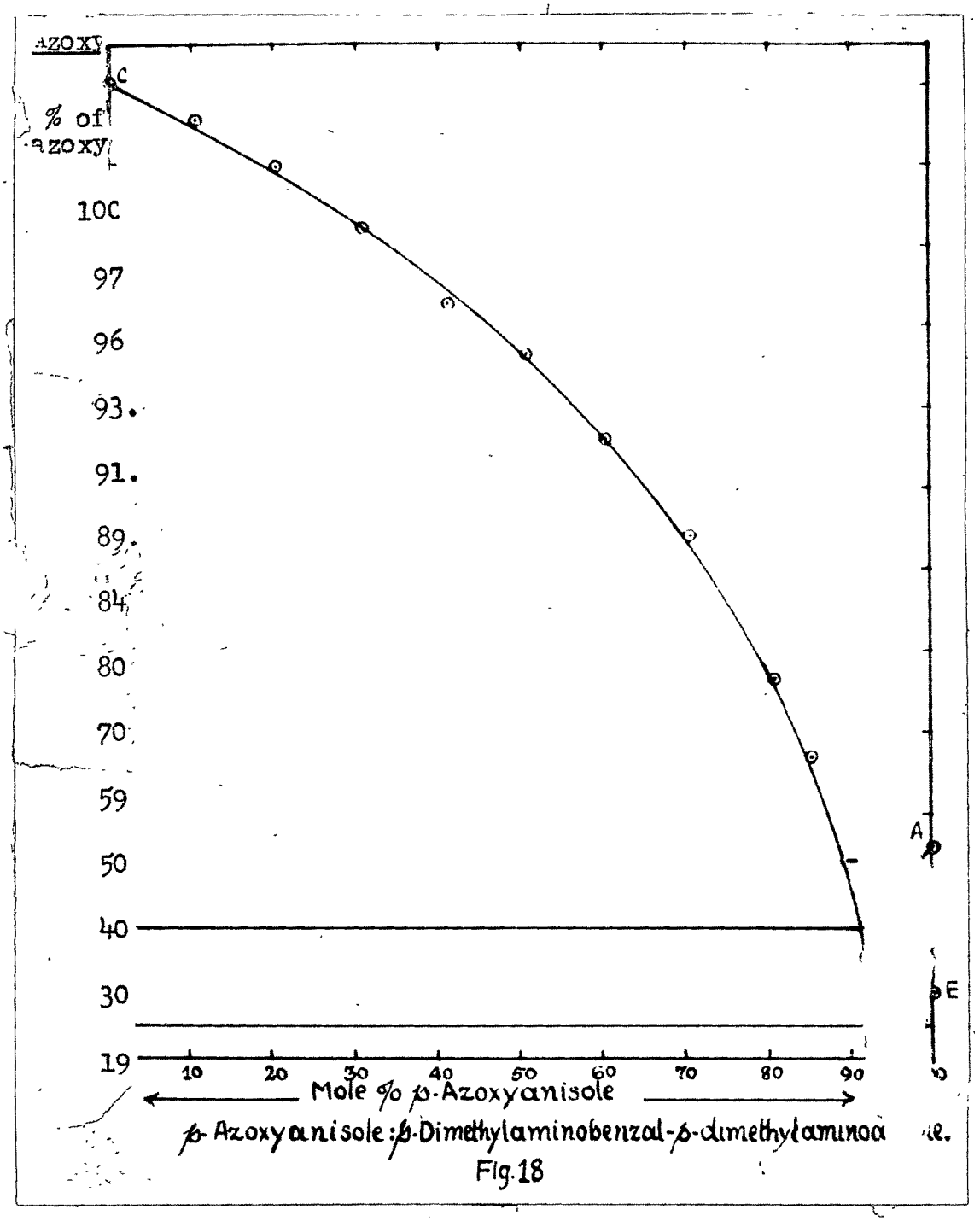
Fig.17

Table 14

p-Azoxyanisole : p-Dimethylaminobenzal-p-dimethylaminoaniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
97.90	97.97	117.8	133.0
96.01	96.14	117.0	131.3
93.97	94.17	116.3	129.5
91.57	91.83	122.5	126.8
89.26	89.60	134.2	-
84.77	85.21	146.9	-
80.31	80.85	156.5	-
70.00	70.63	174.0	-
59.64	60.46	186.0	-
50.12	50.98	196.4	-
40.52	41.35	202.5	-
30.03	30.75	212.0	-
19.88	20.44	219.5	-
10.14	10.46	225.3	-
00.00	00.00	230.0	-

Sintering Point = 114.2°C.



p-Azoxyanisole : p-Dimethylaminobenzal-p-dimethylaminoa ...e.

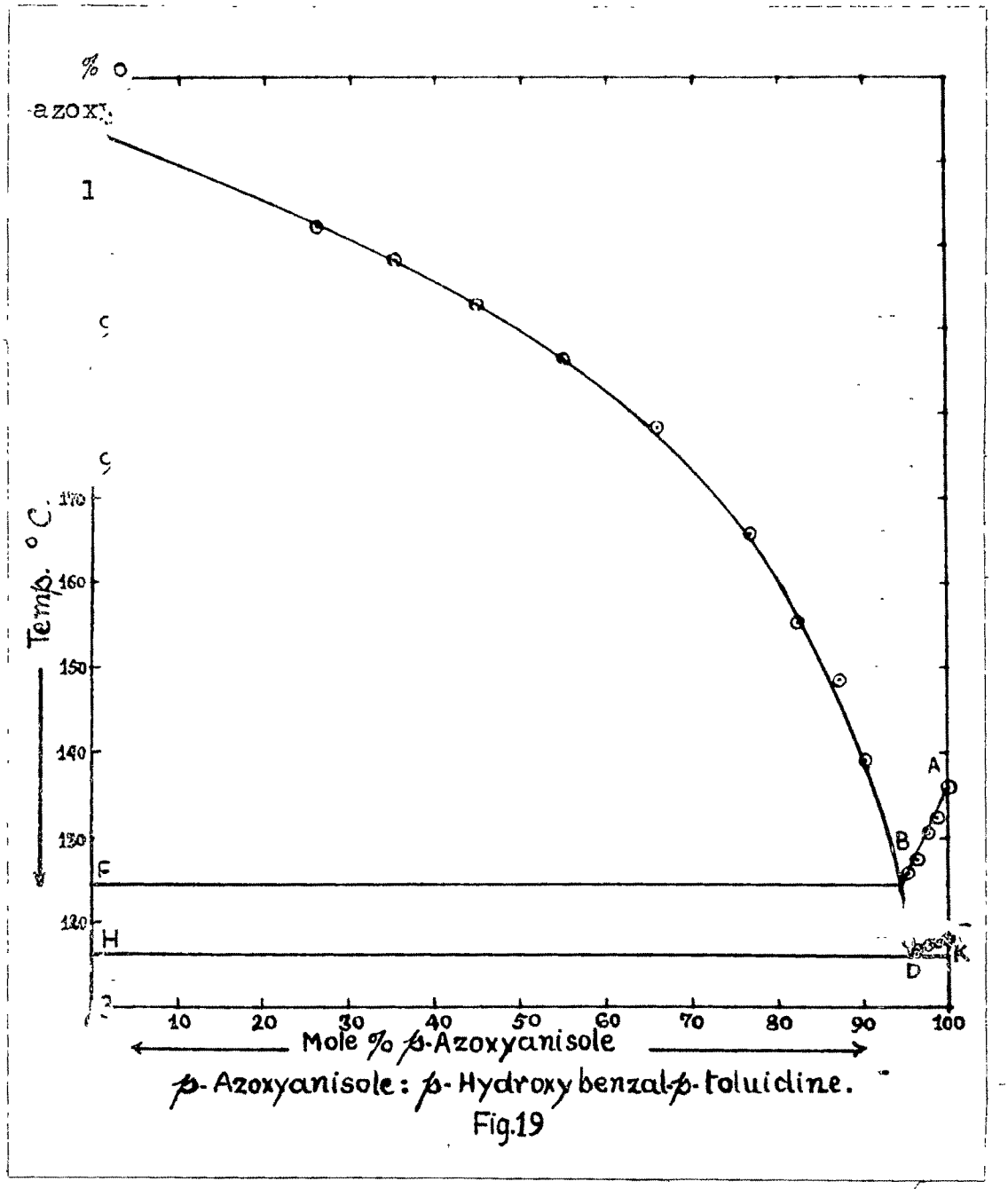
Fig. 18

Table 15

p-Azoxyanisole : p-Hydroxybenzal-p-toluidine

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
99.00	98.77	117.7	132.4
98.11	97.70	117.3	130.4
96.95	96.29	116.8	127.3
96.23	95.45	117.4	125.9
92.15	90.38	139.0	-
89.10	87.02	148.5	-
85.06	82.33	155.2	-
80.19	76.83	165.7	-
70.09	65.72	178.3	-
60.00	55.08	186.4	-
49.92	44.92	192.8	-
39.98	35.27	198.1	-
30.32	26.25	202.1	-
00.00	00.00	213.5	-

Sintering Point = 116.1°C.



p-Azoxyanisole : p-Hydroxybenzal-p-toluidine.

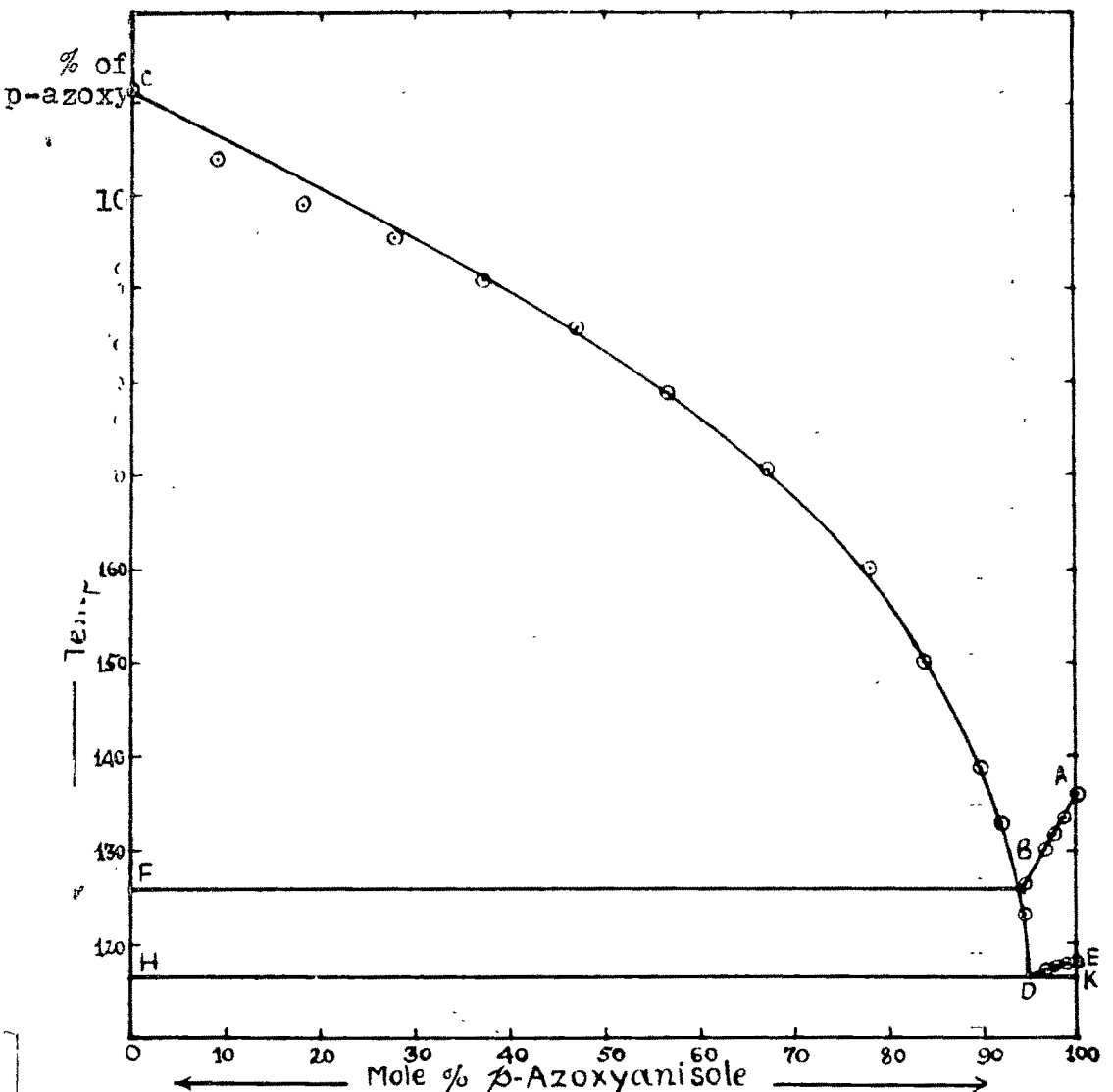
Fig.19

Table 16

p-Azoxyanisole : p-Hydroxybenzal-p-anisidine

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
98.94	98.81	117.9	133.5
97.97	97.70	117.6	131.9
97.00	96.63	117.3	130.2
95.04	94.41	123.4	126.4
92.81	91.91	132.9	-
90.87	89.76	138.8	-
85.26	83.60	150.0	-
80.12	78.00	160.2	-
70.04	67.36	170.6	-
59.79	56.67	178.8	-
50.27	47.08	185.8	-
40.14	37.15	190.7	-
30.38	27.80	195.5	-
20.12	18.14	199.0	-
10.15	9.04	203.8	-
00.00	00.00	211.5	-

Sintering Point = 116.5°C.



p-Azoxyanisole : p-Hydroxybenzal-p-anisidine.

Fig. 20

Table 17

p-Azoxyanisole : p-Hydroxybenzal-p-phenetidine

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
98.90	98.81	117.9	133.4
97.96	97.86	117.6	132.4
96.55	96.34	117.2	130.6
95.40	95.08	119.0	127.5
93.80	93.40	124.0	124.9
90.30	89.73	134.9	-
84.90	84.10	146.1	-
80.16	79.05	152.0	-
70.01	68.57	163.6	-
60.00	58.34	171.8	-
50.40	48.53	179.5	-
39.50	37.93	184.8	-
29.81	28.46	189.8	-
20.31	19.24	193.3	-
10.67	10.05	197.1	-
00.00	00.00	201.0	-

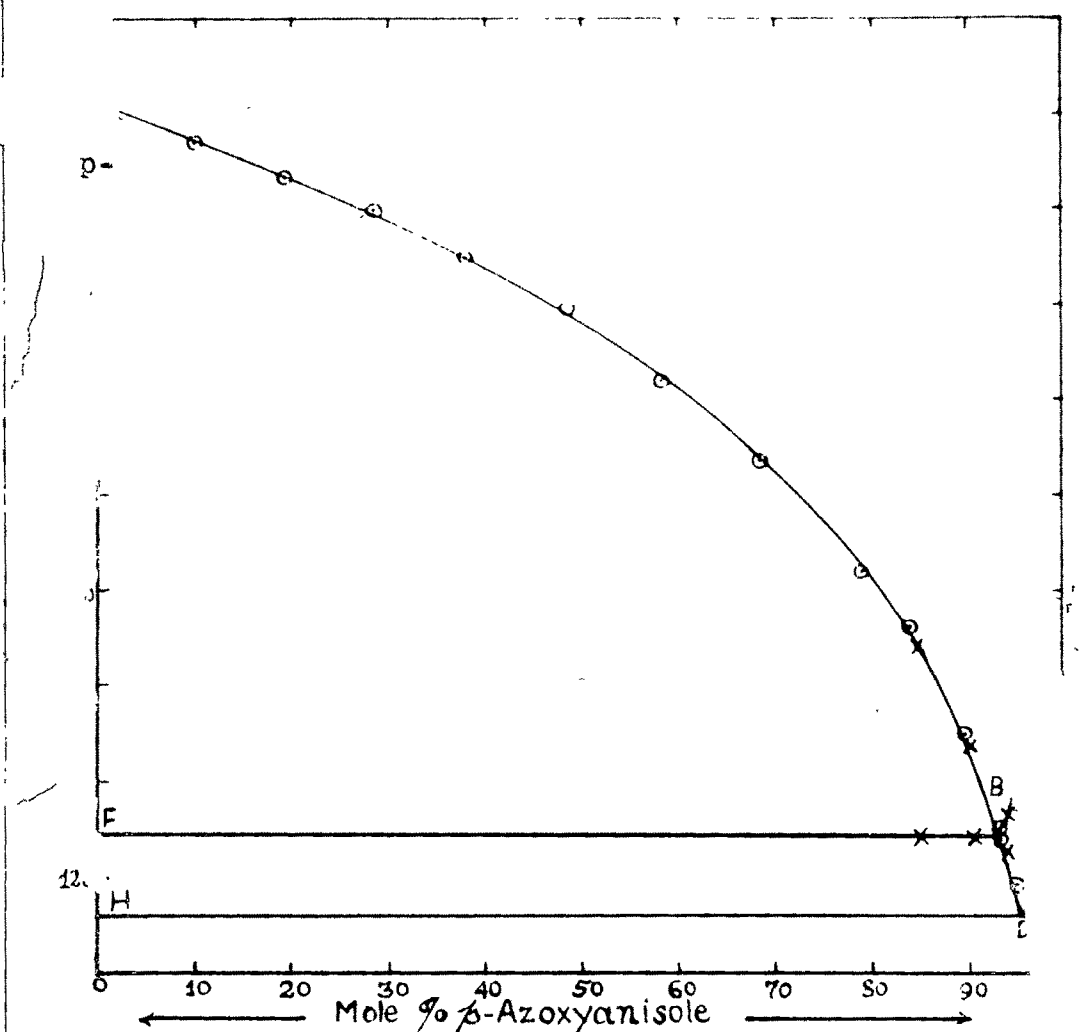
Sintering Point = 116.0°C.

Table 17 A

p-Azoxyanisole : p-Hydroxybenzal-p-phenetidine

(Cooling Curve)

Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	118.0	136.0
96.72	117.0	130.0
95.75	117.5	129.1
94.17	122.6	126.6
90.42	133.4	124.2
85.15	143.9	124.1



p-Azoxyanisole : p-Hydroxybenzal-p-phenetidine

Fig. 21

Table 18

p-Azoxyanisole : p-Dimethylaminobenzal-p-toluidine

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
98.51	98.40	117.7	133.5
96.53	96.25	116.5	130.9
90.14	89.39	114.3	123.3
84.77	83.66	111.7	116.0
79.82	78.48	109.5	110.0
69.31	67.56	104.0	-
59.94	58.01	98.1	-
50.02	48.00	92.0	-
39.95	38.04	98.6	-
30.89	29.20	105.3	-
19.62	18.44	111.3	-
9.86	9.17	116.2	-
7.81	7.26	117.3	-
4.80	4.45	118.6	-
00.00	00.00	120.1	-

Sintering Point = 90.4°C.

Table 18 A

p-Azoxyanisole : p-Dimethylaminobenzal-p-toluidine

(Cooling Curve)

Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	118.0	136.0
95.68	116.4	128.6
89.37	113.3	123.7
84.98	112.3	116.2
73.64	107.5	-

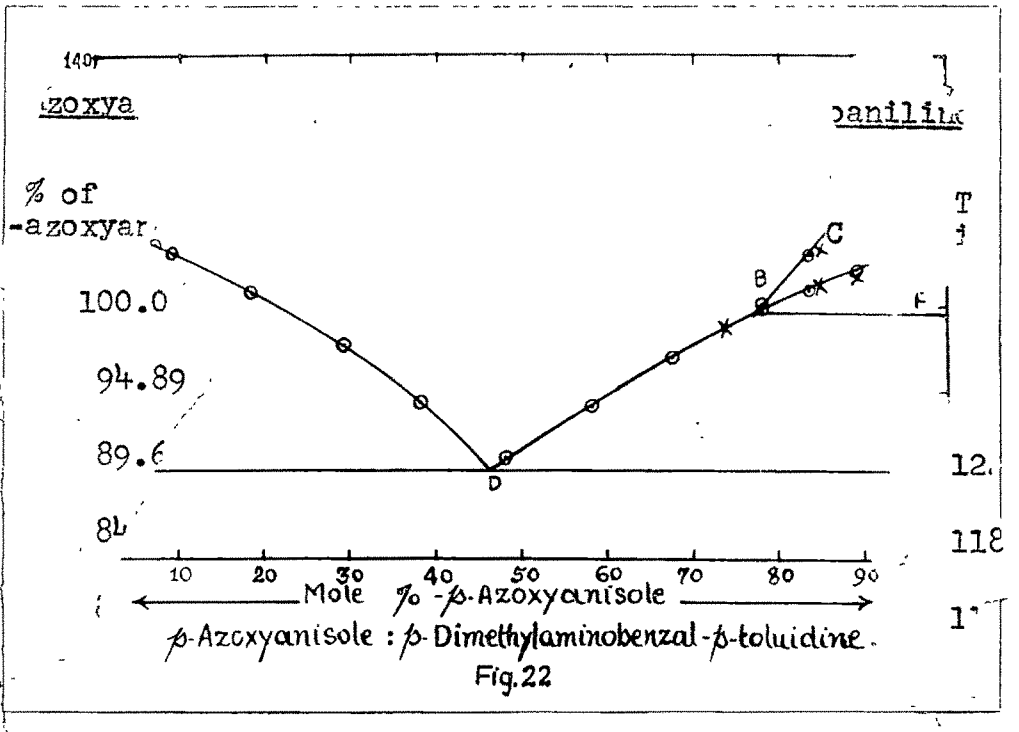
Eutectic Point = 90.5°C.

Table 19

p-Azoxyanisole : p-Dimethylaminobenzal-p-bromoaniline

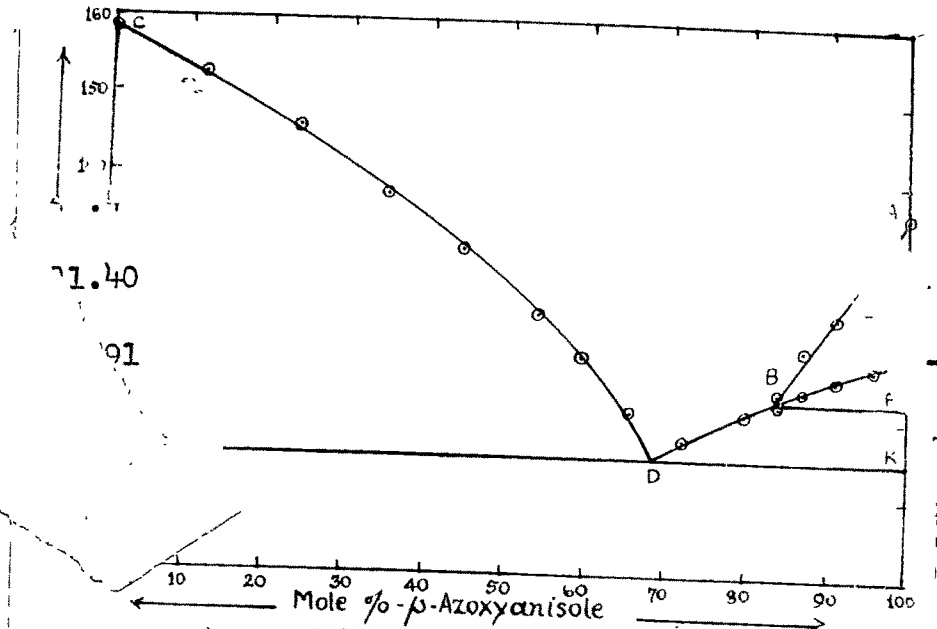
% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
94.89	95.63	116.5	129.3
89.67	91.07	115.0	122.9
84.95	86.88	113.4	118.6
81.54	83.85	111.7	113.0
76.95	79.69	110.4	-
68.68	72.04	107.2	-
61.56	65.38	110.5	-
55.40	59.33	117.5	-
49.70	53.71	122.7	-
40.47	44.39	130.7	-
31.40	34.96	137.5	-
20.91	23.70	145.8	-
9.98	11.53	152.5	-
00.00	00.00	158.5	-

Sintering Point = 104.8°C.



p-Azoxyanisole : p-Dimethylaminobenzal-p-toluidine.

Fig.22



p Azoxyanisole : p-Dimethylaminobenzal-p-bromoaniline

Fig.23

Table 20

p-Azoxyanisole : p-Chlorobenzal-p-dimethylaminoaniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
95.14	95.17	116.3	130.0
89.03	89.06	114.4	123.9
84.78	84.83	112.3	118.5
79.75	79.79	110.3	112.5
69.72	69.77	116.1	-
60.20	60.26	125.3	-
50.30	50.41	134.5	-
40.32	40.37	141.8	-
30.22	30.27	149.5	-
19.80	19.85	155.3	-
10.35	10.37	159.8	-
00.00	00.00	165.0	-

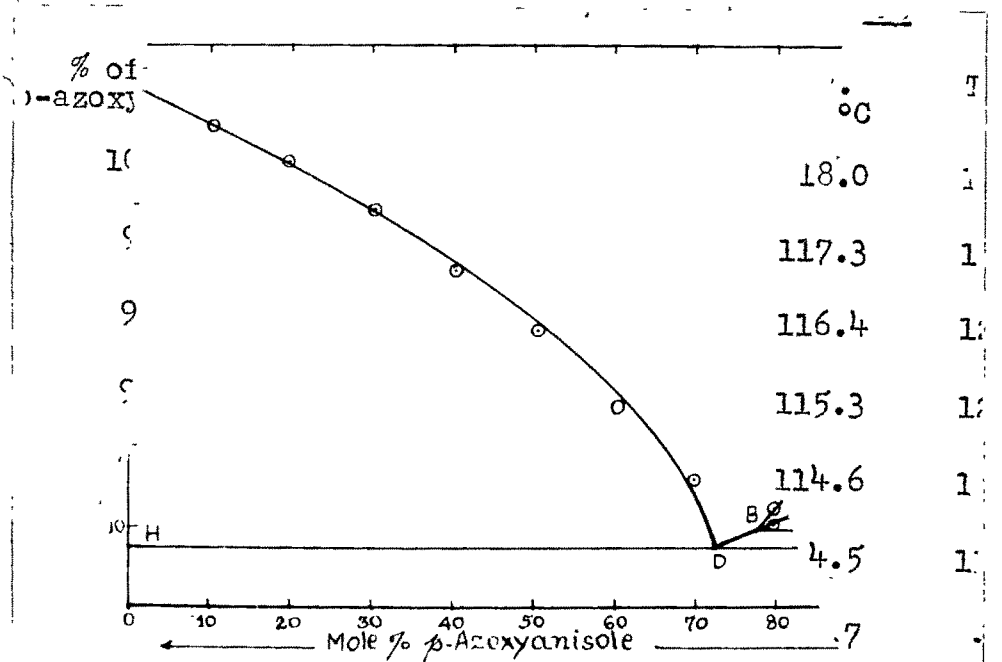
Sintering Point = 107.5°C.

Table 21

p-Azoxyanisole : Benzal-p-phenetidine

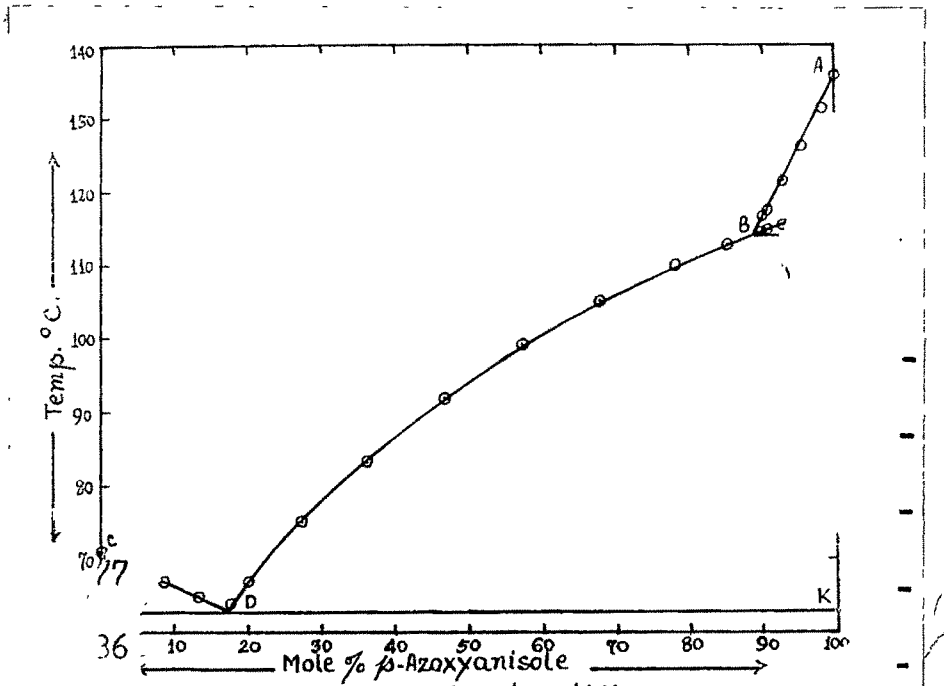
% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
98.05	97.77	117.3	131.2
95.95	95.39	116.4	126.0
93.63	92.76	115.3	121.5
91.70	90.67	114.6	117.2
91.37	90.24	114.5	116.7
86.86	85.21	112.7	-
80.16	77.91	109.8	-
70.55	67.63	105.0	-
60.42	57.12	98.9	-
50.09	46.69	91.8	-
39.57	36.36	83.1	-
30.20	27.40	75.0	-
23.46	21.08	66.9	-
19.97	17.88	63.2	-
14.94	13.29	64.9	-
9.77	8.63	67.1	-
4.86	4.26	68.6	-
00.00	00.00	71.0	-

Sintering Point = 62.7°C.



p-Azoxyanisole : p-Chlorobenzal-p-dimethylaminoa... ne

Fig.24



p-Azoxyanisole : Benzal-p-phenetidine.

Fig.25

Table 22

p-Azoxyanisole : p-Hydroxybenzal-aniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
98.90	98.58	117.8	131.5
97.84	97.23	116.9	126.9
96.62	95.63	116.5	123.1
95.09	93.69	116.0	118.2
93.06	91.09	115.0	-
90.25	87.62	121.0	-
89.65	86.34	122.3	-
84.98	81.21	132.8	-
80.41	75.88	139.9	-
70.10	64.15	153.5	-
59.92	53.32	161.3	-
49.92	43.22	168.2	-
40.15	33.88	172.6	-
20.00	16.03	181.6	-
00.00	00.00	189.3	-

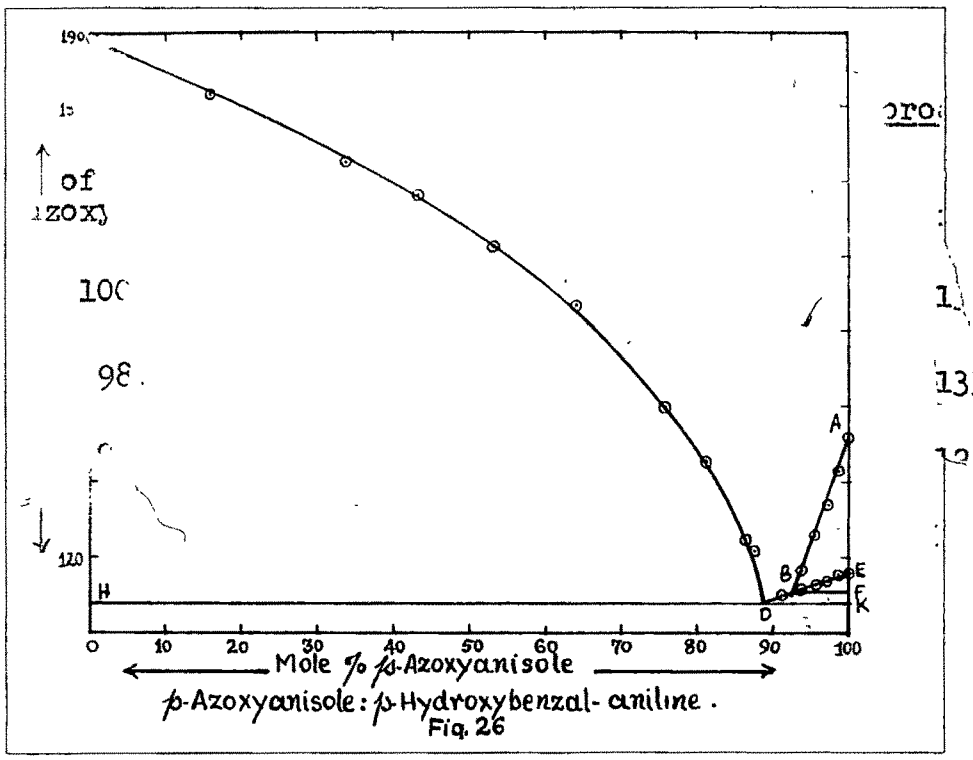
Sintering Point = 114.0°C.

Table 23

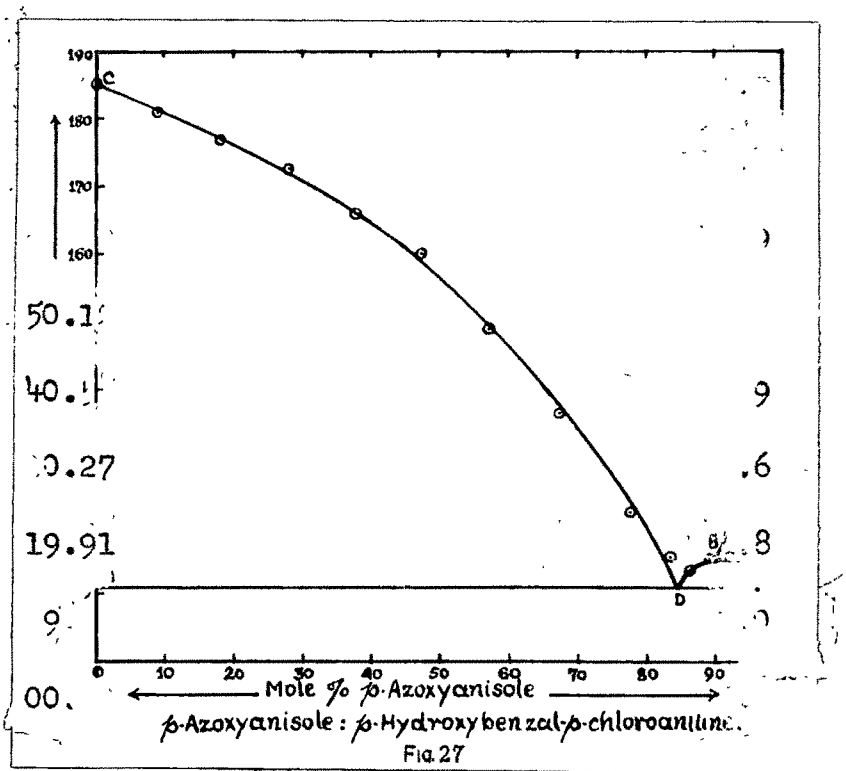
p-Azoxyanisole : p-Hydroxybenzal-p-chloroaniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
98.76	98.60	117.8	133.0
96.88	96.54	116.9	128.3
94.95	94.41	116.0	123.9
92.95	92.19	115.4	118.8
90.07	89.06	115.3	-
87.45	86.24	113.4	-
84.68	83.22	115.2	-
79.41	77.61	121.9	-
69.73	67.41	136.4	-
59.79	57.16	148.9	-
50.12	47.42	160.0	-
40.55	37.96	165.9	-
30.27	28.03	172.6	-
19.91	18.25	176.8	-
9.91	8.99	181.0	-
00.00	00.00	185.0	-

Sintering Point = 111.0°C.



p-Azoxyanisole : p-Hydroxybenzal- aniline .
Fig. 26



p-Azoxyanisole : p-Hydroxybenzal-p-chloroaniline.
Fig. 27

Table 24

p-Azoxyanisole : p-Hydroxybenzal-p-bromoaniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
97.71	97.86	117.7	130.5
95.27	95.57	116.9	127.7
93.82	94.21	116.1	122.7
91.85	92.37	115.4	119.0
90.05	90.63	114.8	115.5
84.70	85.57	115.5	-
79.69	80.76	124.4	-
69.75	71.15	136.0	-
60.12	61.72	148.7	-
50.22	51.90	159.1	-
34.87	36.53	171.5	-
25.16	26.45	180.0	-
10.73	11.40	189.0	-
00.00	00.00	195.0	-

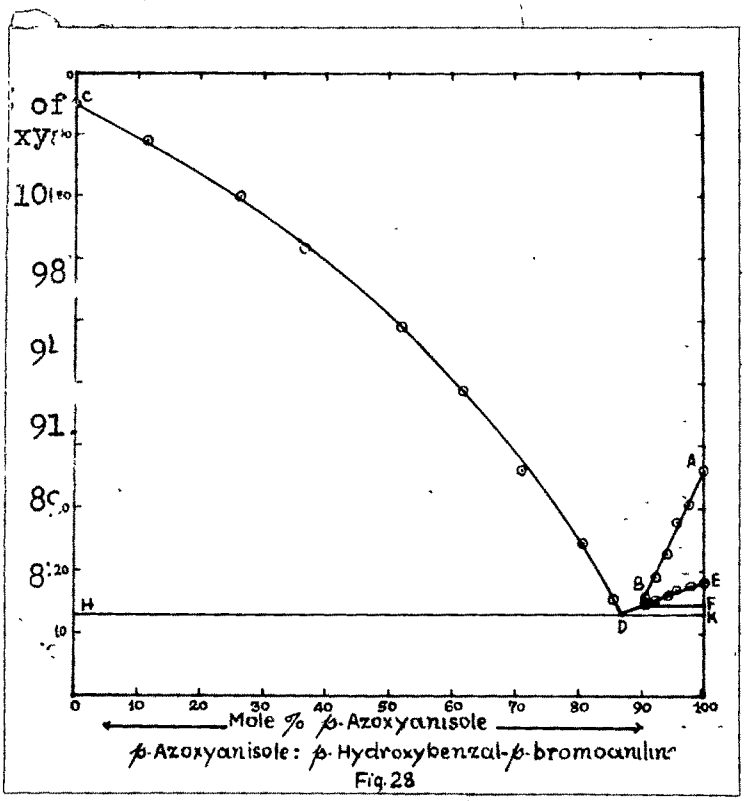
Sintering Point = 113.0°C.

Table 25

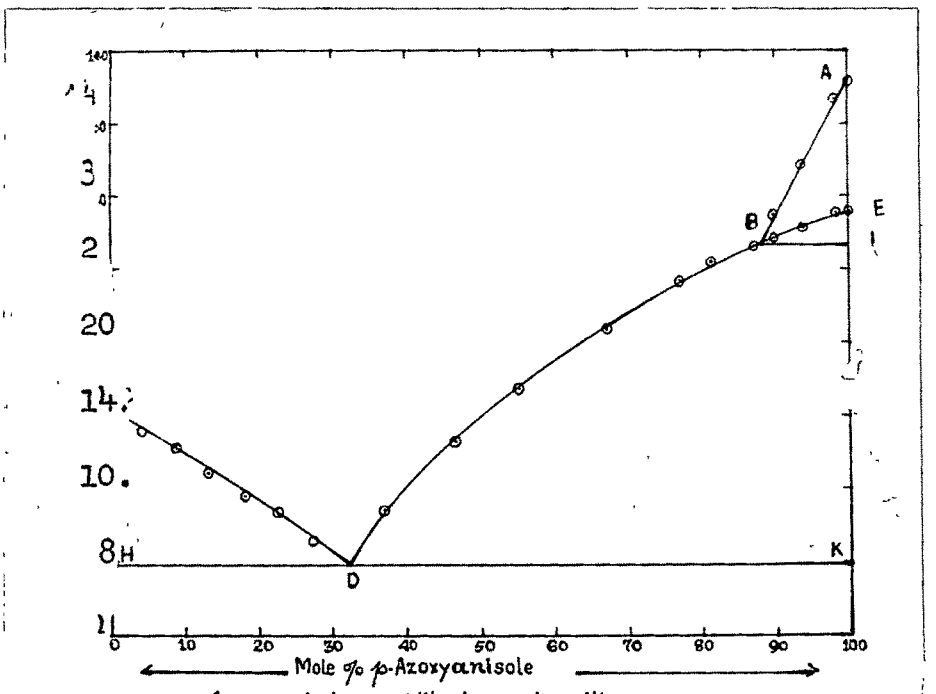
p-Azoxyanisole : p-Nitrobenzal-aniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
98.55	98.35	117.8	133.5
94.48	93.76	115.6	124.3
91.11	89.97	114.3	117.5
89.05	87.14	113.2	-
84.11	81.25	111.0	-
79.36	77.11	108.4	-
69.93	67.07	101.7	-
58.48	55.22	93.7	-
49.95	46.63	86.3	-
40.20	37.07	77.0	-
30.10	27.39	72.8	-
25.08	22.68	76.6	-
20.28	18.23	79.0	-
14.93	13.32	82.1	-
10.04	8.91	85.6	-
8.45	8.08	86.1	-
4.87	4.18	87.9	-
00.00	00.00	91.0	-

Sintering Point = 69.8°C.



p-Azoxyanisole : p-Hydroxybenzal-p-bromoaniline
Fig. 28



p-Azoxyanisole : p-Nitrobenzal-aniline.
Fig. 29

Table 26

p-Azoxyanisole : p-Anisal-aniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
97.98	97.57	117.6	130.8
96.10	95.39	117.1	128.0
94.30	92.64	115.9	122.2
92.00	90.61	114.9	116.8
89.60	87.68	114.0	-
84.60	81.68	111.9	-
80.02	76.61	109.2	-
70.05	65.67	104.0	-
59.85	54.94	96.8	-
49.90	44.93	90.7	-
40.10	35.42	82.2	-
29.85	25.82	72.8	-
21.05	17.91	60.6	-
12.22	9.72	58.8	-
10.00	8.41	59.6	-
5.57	4.61	61.3	-
00.00	00.00	63.5	-

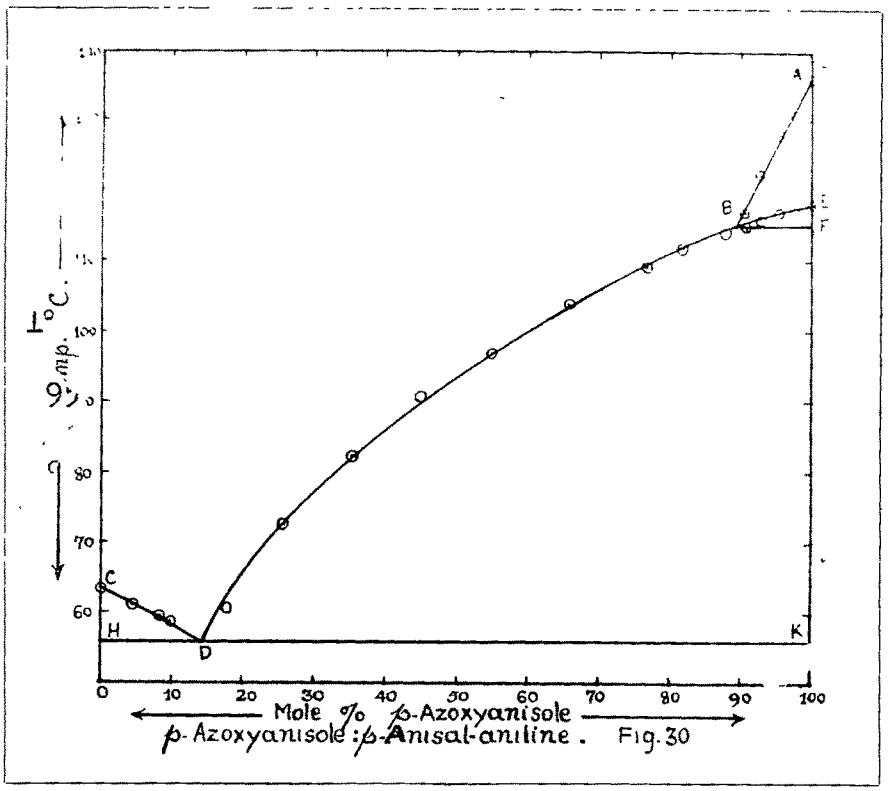
Sintering Point = 56.0°C.

Table 27

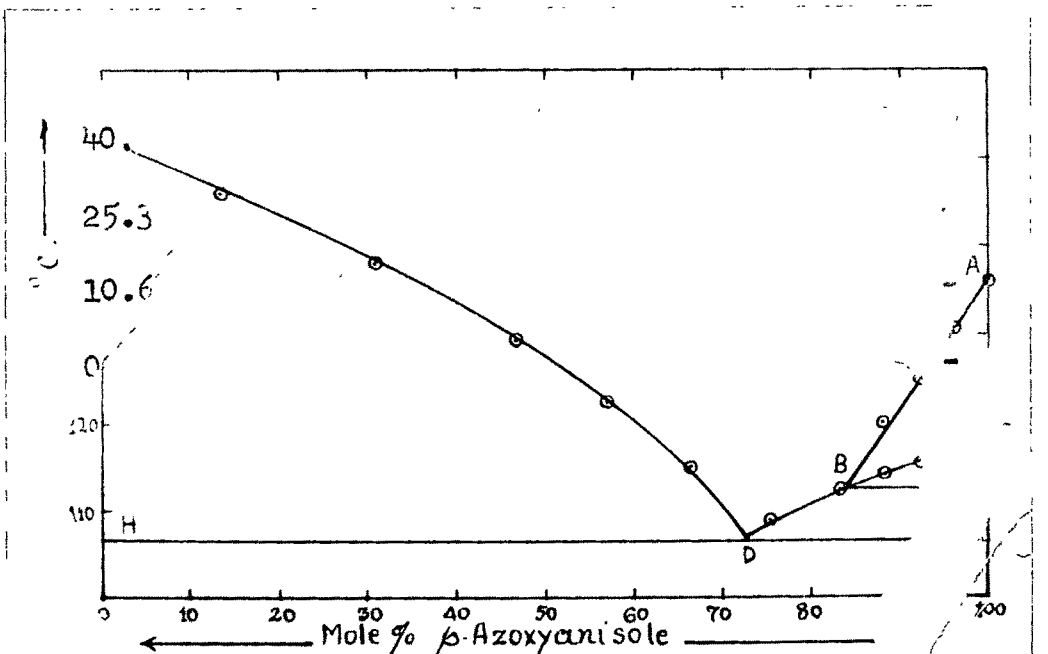
p-Azoxyanisole : p-Anisal-p-iodoaniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
95.19	96.27	117.3	130.6
90.33	92.43	115.3	124.9
85.17	88.24	114.1	120.0
79.31	83.35	112.1	-
70.20	75.46	108.8	-
60.12	66.33	115.0	-
50.29	56.93	122.5	-
40.20	46.76	129.5	-
25.39	30.77	138.2	-
10.69	13.53	146.3	-
00.00	00.00	152.5	-

Sintering Point = 106.5°C.



p-Azoxyanisole : p-Anisal-aniline . Fig. 30



p-Azoxyanisole : p-Anisal-p-iodoaniline .

Fig. 31

Table 28

p-Azoxyanisole : p-Dimethylaminobenzal-p-iodoaniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
96.16	97.09	117.5	129.8
89.05	91.70	115.8	122.1
83.11	86.96	113.9	-
79.26	83.81	112.7	-
70.02	75.91	109.7	-
58.90	66.04	108.5	-
49.44	57.01	117.8	-
40.67	46.22	127.9	-
25.03	30.18	140.4	-
11.15	14.55	150.7	-
00.00	00.00	159.0	-

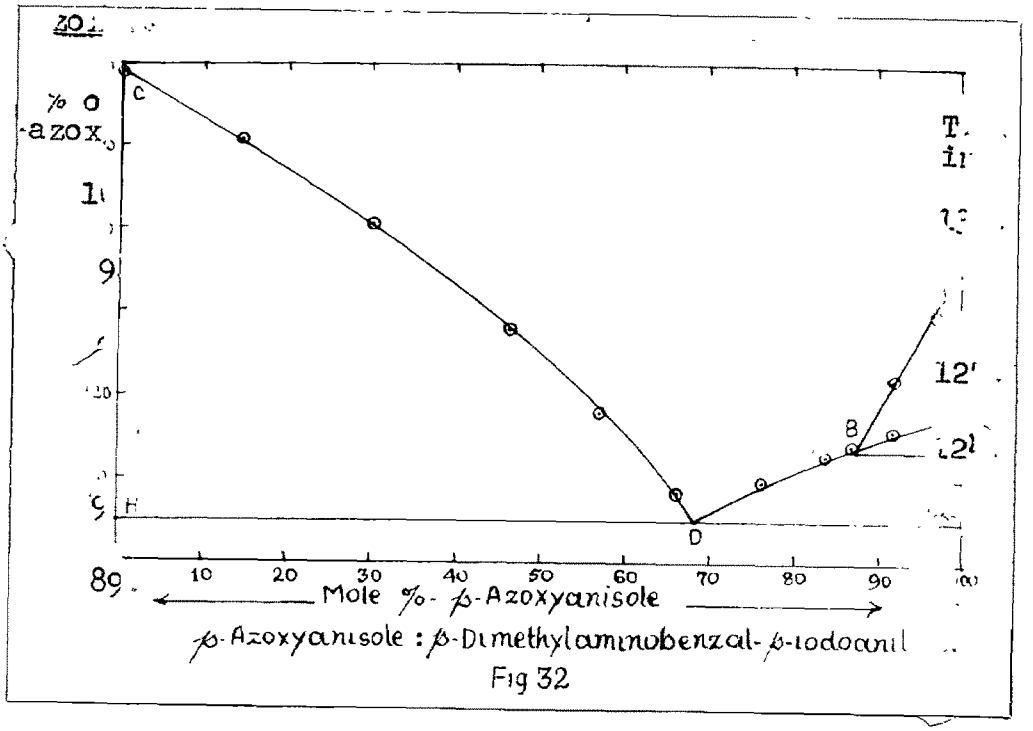
Sintering Point = 105.0°C.

Table 29

p-Azoxyanisole : p-Dimethylaminobenzal-aniline

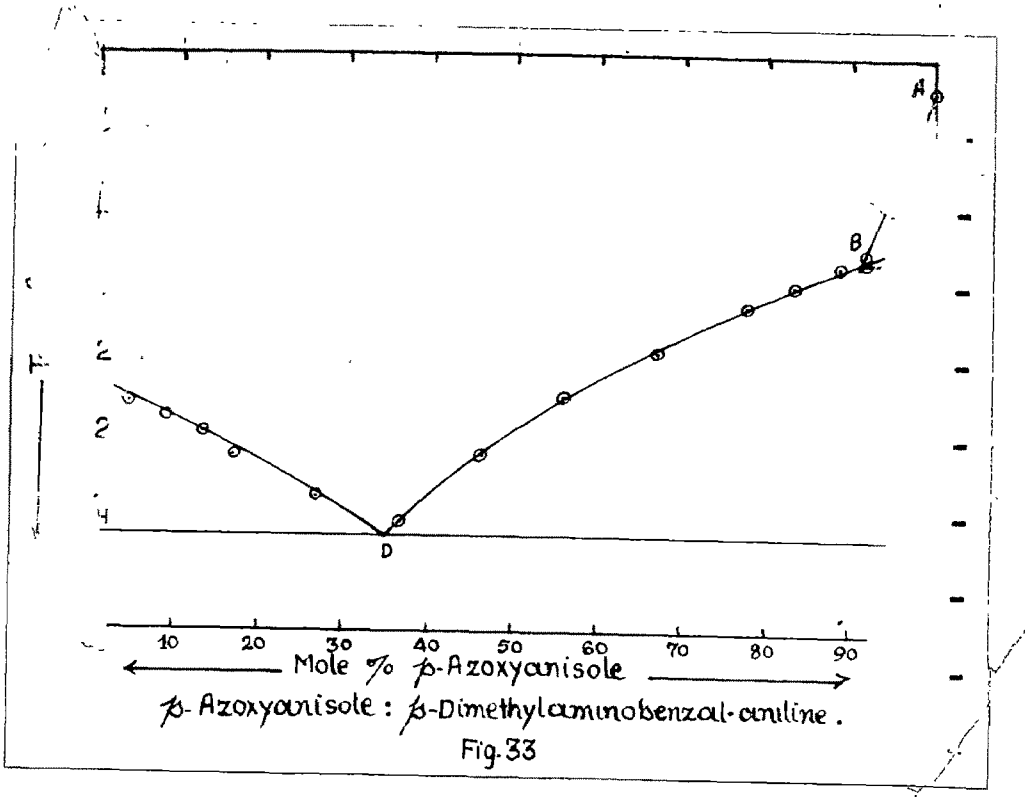
% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
98.75	98.56	117.8	131.4
97.05	96.63	117.0	127.2
95.71	95.08	116.3	124.3
92.95	91.98	115.0	116.0
89.95	88.59	114.4	-
85.10	83.20	111.9	-
79.92	77.56	109.3	-
69.88	66.82	103.6	-
59.41	55.98	98.0	-
49.90	46.37	91.3	-
39.90	36.56	83.2	-
29.62	26.77	86.0	-
20.11	17.05	91.0	-
15.22	13.49	93.6	-
9.99	8.78	95.5	-
4.89	4.28	97.3	-
00.00	00.00	100.0	-

Sintering Point = 81.5°C.



p-Azoxyanisole : p-Dimethylaminobenzal-p-iodoanil

Fig 32



p-Azoxyanisole : p-Dimethylaminobenzal-aniline.

Fig. 33

Table 30

p-Azoxyanisole : p-Acetoxybenzal-p-chloroaniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
94.73	95.04	117.2	130.8
89.80	90.35	115.1	126.1
79.36	80.32	109.8	116.9
69.77	70.99	105.2	108.9
60.06	61.46	99.9	(99.5)
49.87	51.35	92.9	(90.5)
29.78	31.03	94.7	-
20.22	21.18	100.0	-
10.55	11.12	105.3	-
00.00	00.00	110.5	-

Sintering Point = 86.0°C.

Table 31

p-Azoxyanisole : p-Acetoxybenzal-p-toluidine

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
95.02	94.93	116.6	130.3
89.36	89.17	114.1	124.3
79.29	78.98	109.5	114.8
70.18	69.76	105.3	(104.9)
60.05	59.58	99.3	(96.2)
49.85	49.37	92.2	(87.0)
40.03	39.58	84.8	(80.1)
30.08	29.68	84.5	(74.1)
20.72	20.40	89.1	(69.0)
10.24	10.07	94.3	-
00.00	00.00	99.0	-

Sintering Point = 80.8°C.

Table 32

p-Azoxyanisole : p-Propionoxybenzal-p-toluidine

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
89.20	89.52	113.3	124.8
78.46	79.03	108.3	113.3
69.53	70.26	105.2	105.0
59.56	60.39	99.8	(96.2)
49.95	50.81	94.2	(88.5)
39.76	40.59	86.8	(81.2)
29.87	30.61	87.0	(74.8)
19.92	20.47	91.8	(70.8)
10.87	11.21	96.1	(68.2)
00.00	00.00	101.5	(66.4)

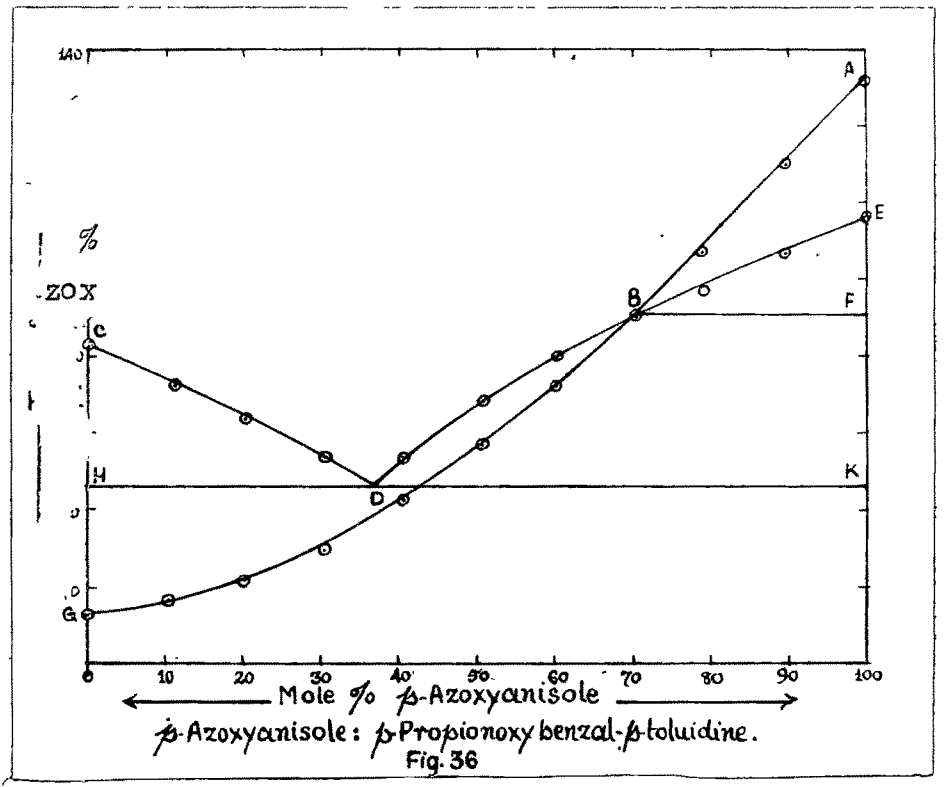
Sintering Point = 83.0°C.

Table 33

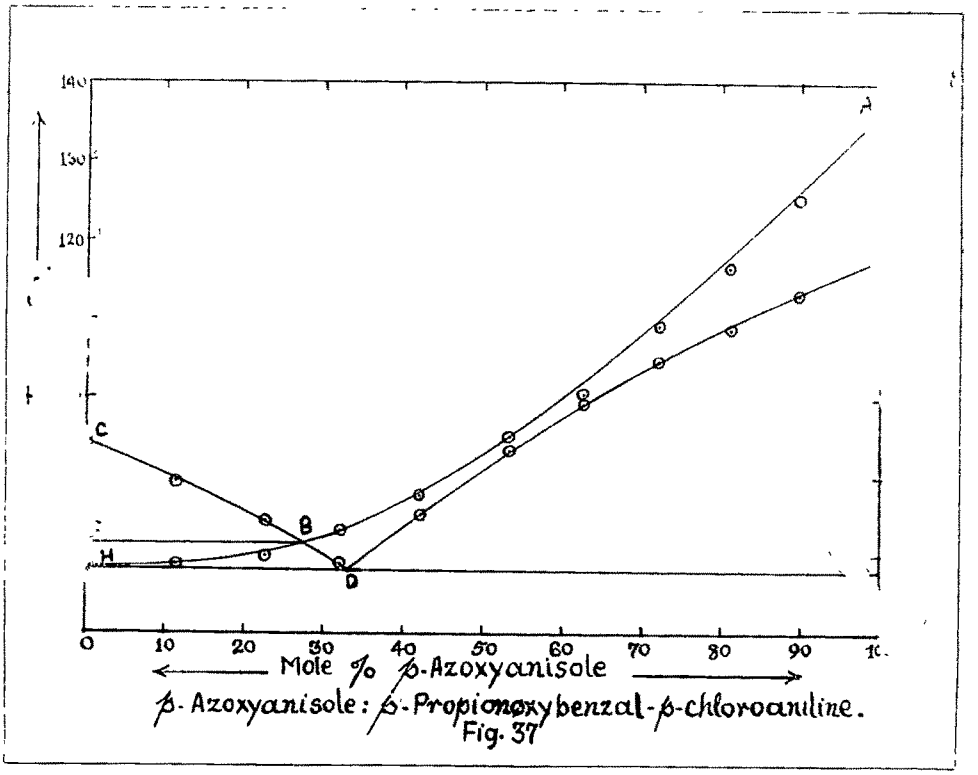
p-Azoxyanisole : p-Propionoxybenzal-p-chloroaniline

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
88.82	89.89	113.1	125.1
79.47	81.17	108.6	116.5
69.85	72.09	104.7	109.0
59.98	62.56	99.3	100.5
50.62	53.32	93.2	95.1
39.62	42.25	85.2	87.6
29.82	32.15	78.8	83.0
20.99	22.85	84.3	(79.9)
10.38	11.44	89.4	(78.7)
00.00	00.00	94.4	(78.3)

Sintering Point = 77.8°C.



p-Azoxyanisole : p-Propionoxy benzal-p-toluidine.
Fig. 36



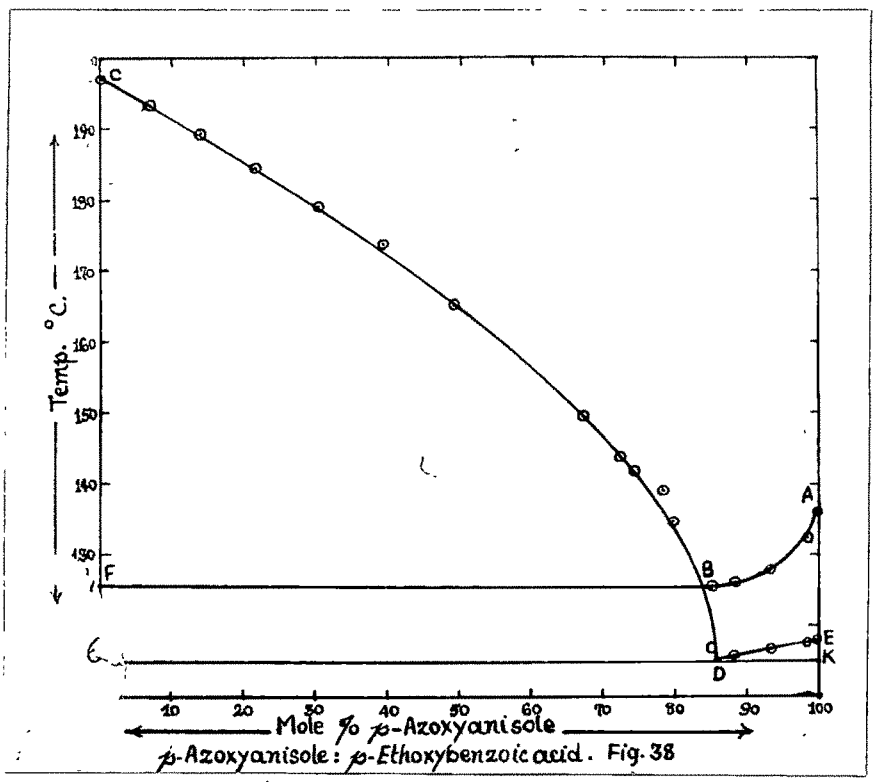
p-Azoxyanisole : p-Propionoxybenzal-p-chloroaniline.
Fig. 37

Table 34

p-Azoxyanisole : p-Ethoxybenzoic acid

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
99.05	98.54	117.7	132.4
95.55	93.26	116.6	127.7
92.09	88.24	115.8	126.1
89.87	85.11	117.0	125.6
	79.82	135.0	-
84.93	78.36	139.0	-
81.87	74.40	141.8	-
80.23	72.44	143.8	-
	67.25	149.5	-
.00	49.04	165.2	-
50.07	39.22	173.9	-
40.03	30.07	179.0	-
30.34	21.62	184.5	-
20.08	13.93	189.2	-
10.16	6.79	193.3	-
00.00	00.00	197.0	-

Sintering Point = 115.0°C.



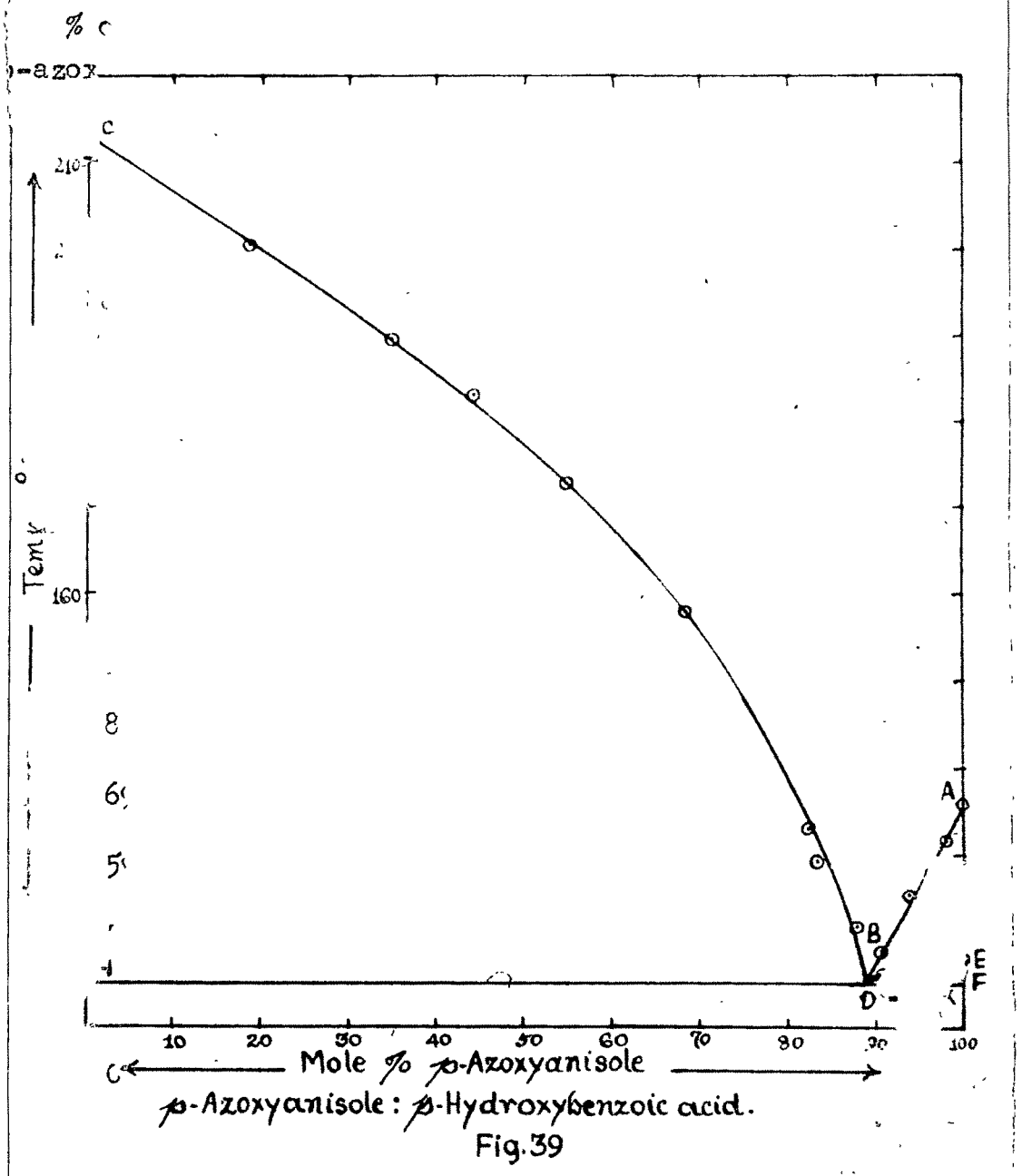
p-Azoxyanisole : p-Ethoxybenzoic acid. Fig. 38

Table 35

p-Azoxyanisole : p-Hydroxybenzoic acid

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
98.91	98.00	117.8	131.7
98.15	96.42	117.3	127.8
96.56	93.78	116.8	125.5
94.78	90.65	116.2	118.8
93.17	87.96	121.8	-
90.40	83.45	129.2	-
89.77	82.43	133.1	-
80.17	68.39	158.0	-
69.35	54.75	172.7	-
59.82	44.34	183.0	-
50.06	34.90	189.5	-
29.89	18.57	200.2	-
00.00	00.00	213.0	-

Sintering Point = 115.0°C.



p-Azoxyanisole : p-Hydroxybenzoic acid.

Fig. 39

Table 36

p-Azoxyanisole : o-Hydroxybenzoic acid

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
98.99	98.22	117.8	128.9
97.62	95.66	117.0	125.0
95.02	91.07	115.9	-
90.30	83.28	113.7	-
80.40	68.71	107.2	-
70.53	56.15	115.2	-
60.11	44.55	125.4	-
50.63	35.42	133.7	-
39.84	26.16	141.3	-
30.59	19.09	145.8	-
20.89	12.39	150.4	-
10.01	5.61	154.9	-
00.00	00.00	159.0	-

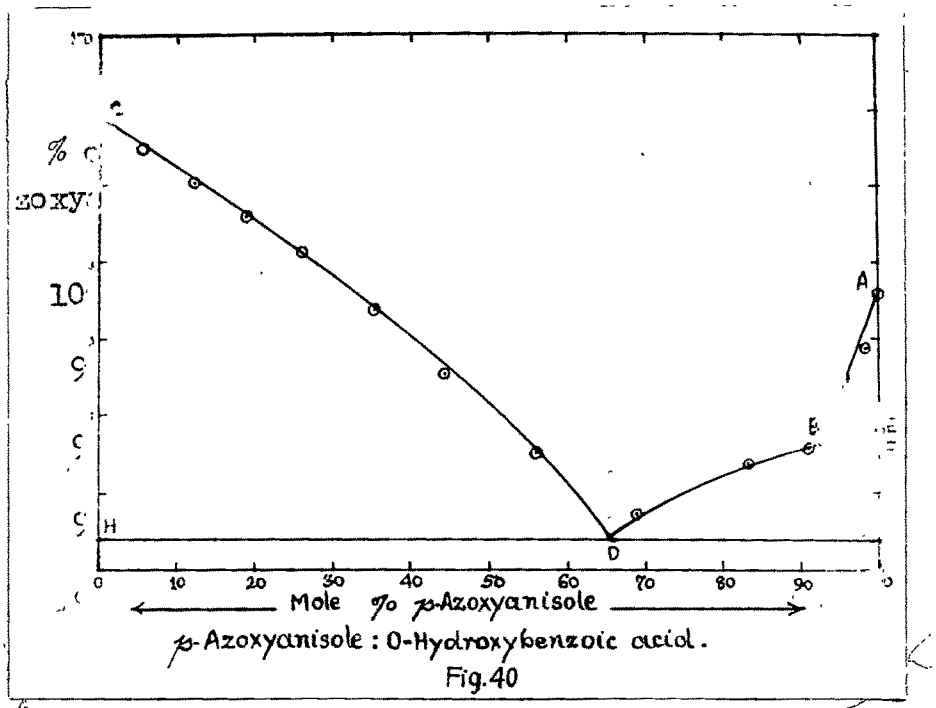
Sintering Point = 104.0°C.

Table 37

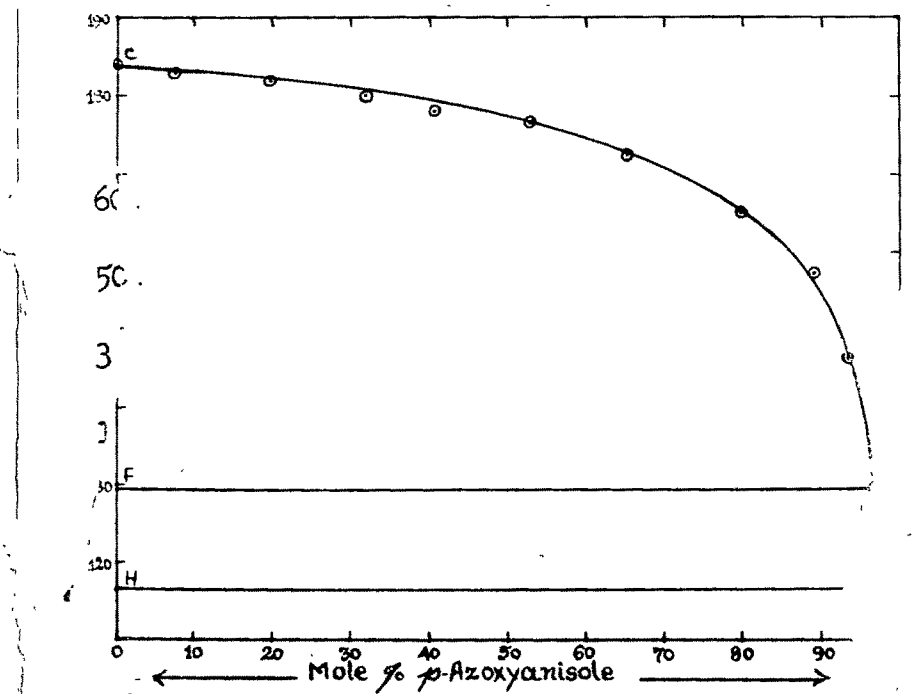
p-Azoxyanisole : Succinic acid

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
99.55	99.04	117.8	133.5
99.19	98.26	117.5	132.4
98.70	97.21	118.1	129.6
96.95	93.58	146.5	-
94.72	89.15	157.2	-
89.53	79.66	165.3	-
80.41	65.21	172.5	-
70.06	52.81	176.7	-
60.46	40.65	178.0	-
50.42	31.77	180.0	-
35.00	19.76	182.0	-
15.05	7.49	183.0	-
00.00	00.00	184.0	-

Sintering Point = 116.5°C.



p-Azoxyanisole : O-Hydroxybenzoic acid.
Fig.40



p-Azoxyanisole : Succinic acid. Fig.41

Table 38

p-Azoxyanisole : α-Naphthol

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100,00	118.0	136.0
98.85	97.97	117.8	130.5
97.79	96.12	117.1	125.4
96.17	93.01	116.6	-
90.00	83.39	112.5	-
80.09	69.20	103.5	-
71.00	57.76	94.5	-
59.82	45.38	81.8	-
50.16	35.98	66.4	-
35.09	23.19	74.4	-
16.56	9.98	87.5	-
00.00	00.00	94.0	-

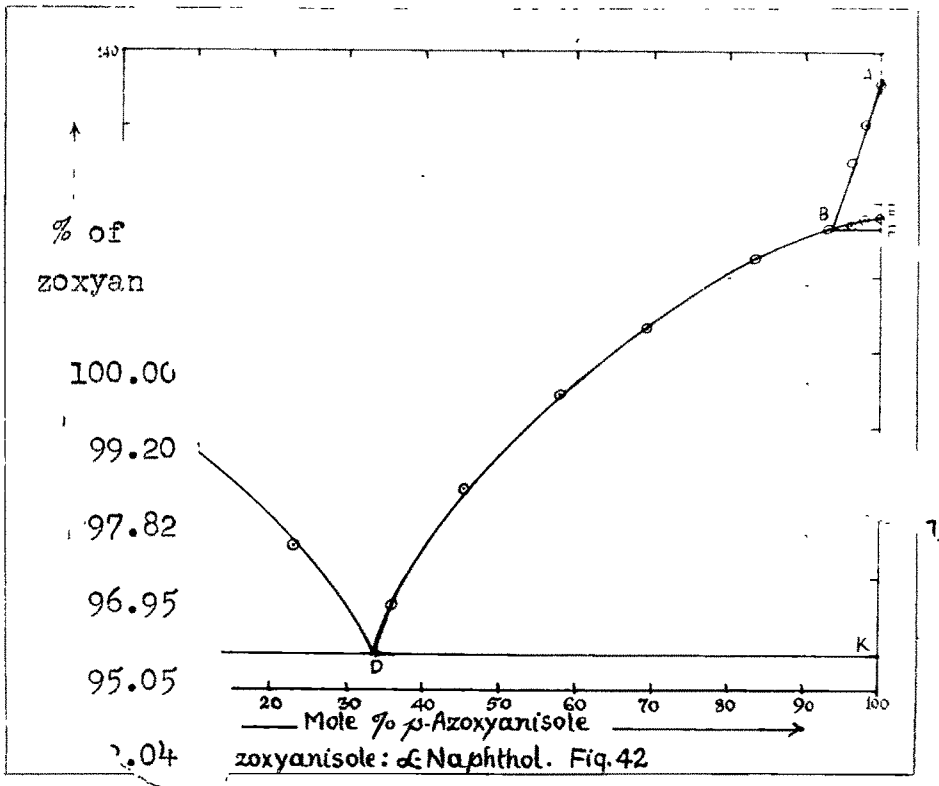
Sintering Point = 60.0°C.

Table 39

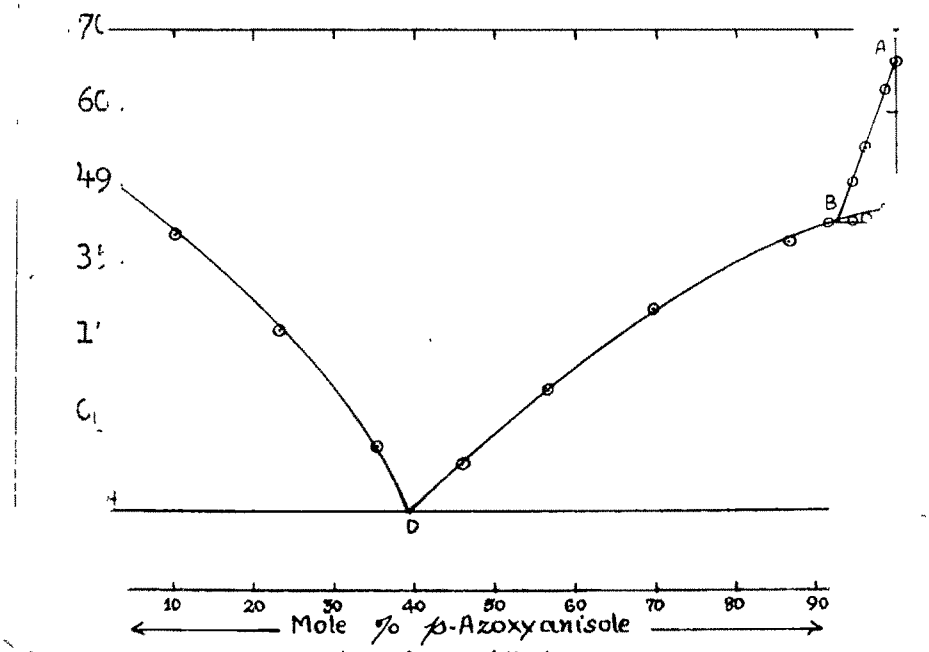
p-Azoxyanisole : β-Naphthol

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
99.20	98.58	117.9	132.6
97.82	96.16	116.5	125.4
96.95	94.66	116.1	121.1
95.05	91.47	115.8	-
92.04	86.62	113.6	-
80.36	69.56	105.2	-
70.09	56.66	95.2	-
60.25	45.85	86.0	-
49.46	35.34	88.1	-
35.24	23.31	102.6	-
17.03	10.28	114.6	-
00.00	00.00	123.0	-

Sintering Point = 79.8°C.



zoxyanisole : α-Naphthol. Fig. 42



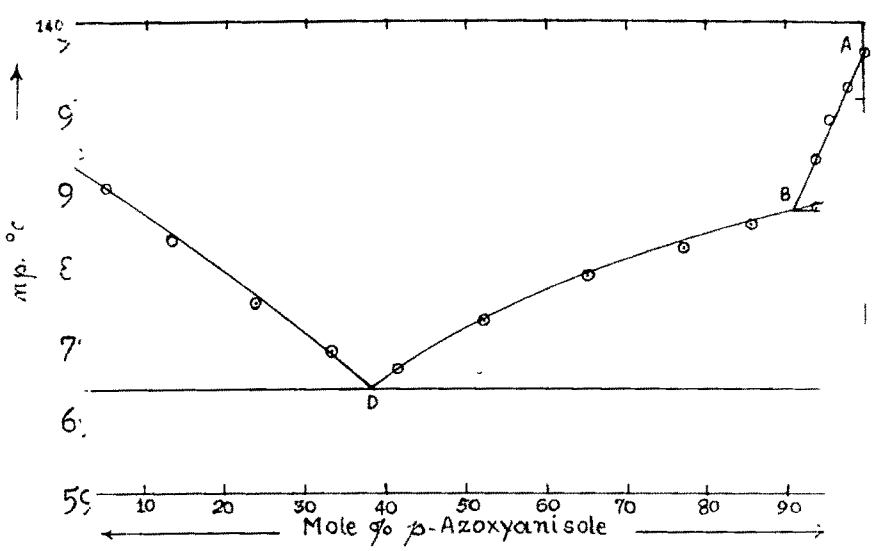
p-Azoxyanisole : β-Naphthol.
Fig. 43

Table 40

p-Azoxyanisole : Benzoic acid

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
99.00	97.90	117.5	131.5
97.77	95.35	117.0	127.2
96.98	93.83	116.0	122.0
92.61	85.56	113.7	-
87.69	77.13	110.8	-
79.81	65.15	107.2	-
69.76	52.20	101.5	-
59.94	41.45	95.5	-
49.91	33.34	97.8	-
39.88	23.89	103.8	-
24.58	13.36	111.7	-
9.90	4.95	118.4	-
00.00	00.00	122.0	-

Sintering Point = 93.1°C.



p-Azoxyanisole : Benzoic Acid.

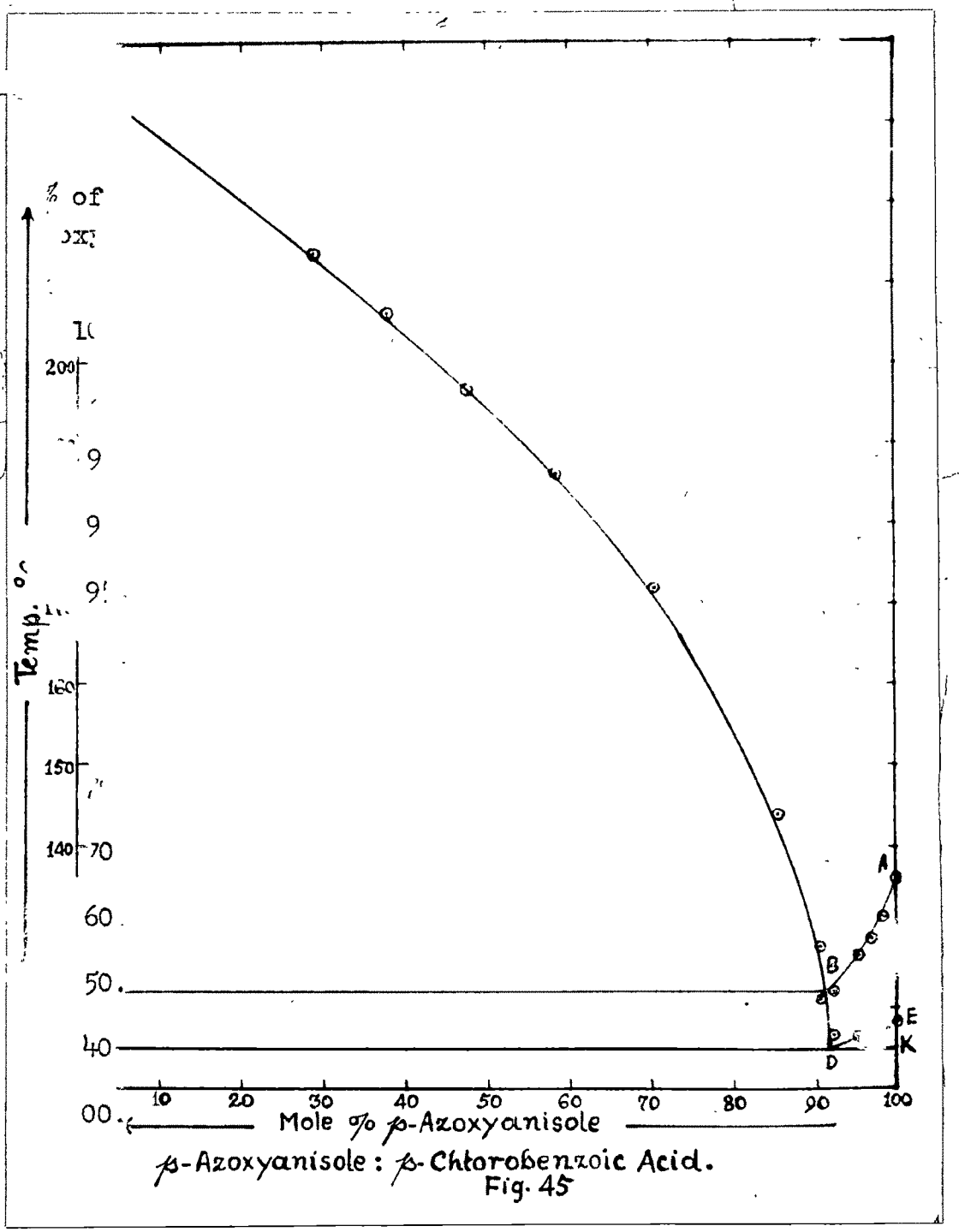
Fig. 44

Table 41

p-Azoxyanisole : p-Chlorobenzoic acid

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
99.00	98.33	117.6	131.3
98.00	96.77	117.1	128.6
97.00	95.17	116.4	126.5
95.01	92.02	116.5	122.1
94.02	90.53	127.5	(121.0)
90.00	84.53	143.8	-
79.95	70.76	171.8	-
70.01	58.61	186.0	-
60.12	47.77	196.5	-
50.12	37.88	206.0	-
40.00	28.79	213.0	-
00.00	00.00	236.0	-

Sintering Point = 115.0°C.



p-Azoxyanisole : p-Chlorobenzoic Acid.
Fig. 45

Table 42

p-Azoxyanisole : p-Toluic acid

% of p-azoxyanisole	Mole % of p-azoxyanisole	M.P. in °C	T.P. in °C
100.00	100.00	118.0	136.0
99.00	98.13	117.5	130.9
97.60	95.54	116.6	126.9
95.52	91.83	115.5	122.2
93.04	87.58	114.0	118.1
91.00	83.83	112.7	115.7
89.00	81.02	111.7	113.5
84.76	74.56	110.5	111.5
83.87	73.28	110.3	110.5
74.88	61.10	125.5	-
59.80	43.93	142.6	-
40.46	26.39	157.5	-
19.89	11.57	169.5	-
00.00	00.00	179.0	-

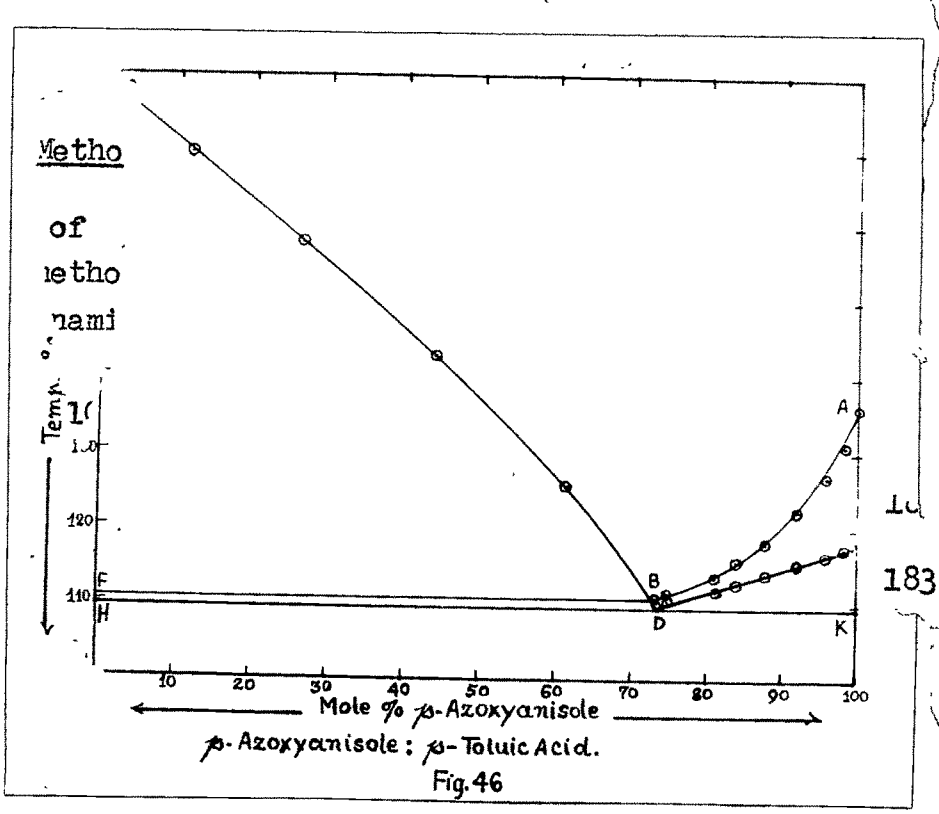
Sintering Point = 109.5°C.

Table 43

p-Methoxycinnamic acid : p-Methoxybenzoic acid

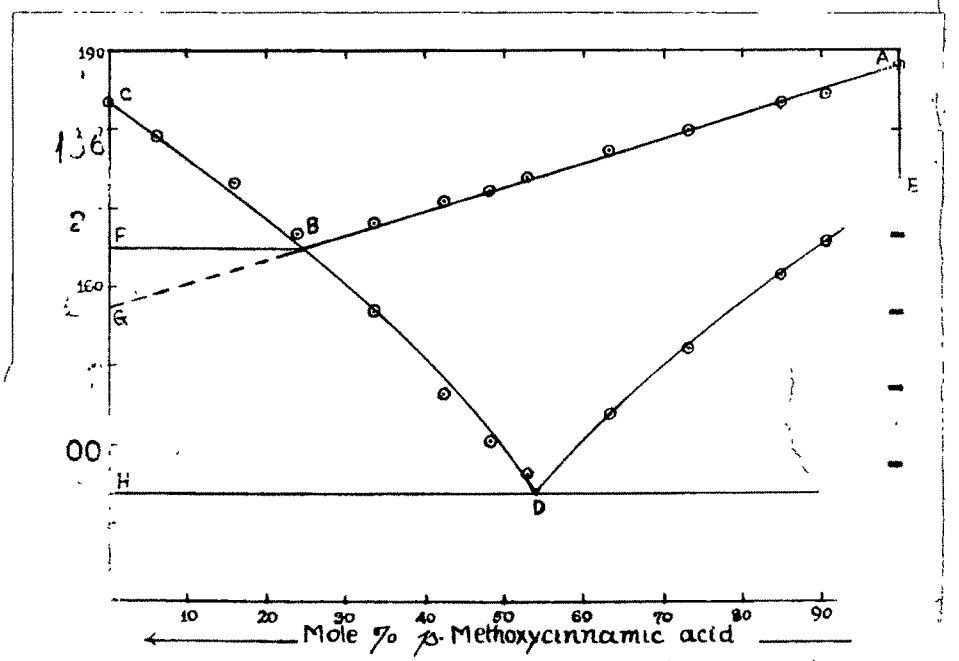
% of p-methoxy-cinnamic acid	Mole % of p-methoxy-cinnamic acid	M.P. in °C	T.P. in °C
100.00	100.00	172.0	188.0
91.90	90.72	165.7	184.5
86.67	85.00	161.5	183.2
76.00	73.03	152.1	179.8
66.70	63.20	144.0	177.5
56.80	52.97	136.2	174.0
52.20	48.33	140.5	172.3
46.30	42.48	146.5	171.1
36.60	33.57	157.0	168.2
26.80	23.89	166.8	-
16.90	15.99	173.5	-
7.06	6.09	179.3	-
00.00	00.00	183.4	-

Sintering Point = 133.8°C.



p-Azoxyanisole : p-Toluic Acid.

Fig. 46



p-Methoxycinnamic acid : p-Methoxybenzoic acid.

Fig. 47

Table 44

p-Methoxycinnamic acid : p-Ethoxybenzoic acid

% of p-methoxy-cinnamic acid	Mole % of p-methoxy-cinnamic acid	M.P. in °C	T.P. in °C
100.00	100.00	172.0	188.0
92.30	91.03	166.5	185.4
86.30	85.55	162.6	184.0
81.90	80.89	158.1	183.1
78.00	76.74	155.2	182.7
72.90	71.52	151.8	181.8
68.40	66.94	146.4	181.1
60.80	59.21	145.9	179.5
55.50	53.79	153.6	178.1
47.80	46.04	162.2	177.2
39.20	37.55	172.3	176.5
31.20	29.80	179.5	-
22.20	21.07	184.7	-
12.70	11.99	191.0	-
00.00	00.00	197.0	-

Sintering Point = 142.5°C.