CCXX. A SIMPLE METHOD FOR THE DETERMINATION OF THE MELTING POINT OF FATS AND ALLIED SUBSTANCES.

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IN the method to be described, use is made of the fact that fats and similar substances are, as a rule, bad conductors of electricity. A thin film of the substance whose M.P. is to be determined is interposed in the path of an electric current. Heat is then gently applied, and when the substance melts, the circuit is immediately completed and a bell is rung.

As seen from Fig. 1, the apparatus required is quite simple. The only part that needs description is the film-terminal (A). This is made by sealing the end of a piece of glass tubing, 0.5 cm. in diameter and about 20 cm. long, round a short length of platinum wire, the outer end of which should be filed flush with the surface of the sealed end. If allowed to protrude much beyond the outer surface, a large quantity of material would be required to coat the wire efficiently, with the result that the insulating film would be unduly thick. The flat cork (C) clamped to a retort stand, carries two holes to accommodate the film-terminal and the thermometer. The other parts of the apparatus comprise a Leclanché cell (D) or some other suitable source of current, an electric bell, a tall pyrex beaker three-quarters full of clean mercury, a tripod and a micro-burner.

Fig. 1.

To carry out a determination, the substance whose melting-point is to be determined, is just melted in a clean dry test-tube and the clean dry bottom end of the film-terminal is dipped in the molten mass and quickly removed. The resulting film which need not cover more than the exposed end of the platinum wire and a small area of the glass surface round it, is then allowed

to solidify completely. The film-terminal is fixed in the cork in such a way that the end carrying the film stands close to, and level with the bulb of the thermometer. Both are then dipped in the cold mercury in the beaker to about 4 cm. from the surface and about this distance from the bottom. Clean mercury is now poured inside the film-terminal, and the wires from the cell (*W.* and *W.I.*) are brought into contact with the mercury in the film-terminal and that in the beaker as shown in the diagram. The beaker can now be heated slowly and the temperature at which the bell commences ringing is noted. This temperature represents the m.p. of the material for it is assumed that immediately melting takes place, the upthrust of the mercury pushes the molten mass up to the surface and contact is at once made between the mercury in the beaker and that in the film-terminal through the exposed platinum wire.

To ascertain the exact m.p., the experiment should be repeated at least twice, taking the usual precaution of heating slowly before the expected m.p. is reached. After each determination the end of the terminal is wiped with a soft cloth moistened with a proper solvent and then dried in alcohol followed by ether. It is advisable to have many such terminals ready for use in a clean covered jar.

The melting-points of a large number of suitable substances were repeatedly determined with encouraging results and the method was then compared with some of the methods already in use. The following table gives the melting-points of six samples of paraffin obtained by the present method (I) and by the help of Mason's melting-point apparatus (II).

Substance	I. M.P.	II. M.P.
A	55.4°	55.1°
B	59.3	59.3
C	47.9	47.8
D	43.9	43.9
E	48.7	47.8
F	51.5	51.1

Each result is the mean of at least three determinations and it will be seen that the figures in the two columns agree fairly closely.

This method is decidedly less laborious and certainly much cleaner than most of the methods in general use. The use of a stirrer is unnecessary because mercury is a very good conductor of heat, and tests have shown that, with slow heating, the temperatures taken at different places in the mercury-bath, are fairly even. The application of the method is naturally limited to substances capable of forming a thin compact non-conducting film, such as the fats, waxes, paraffin *etc.*

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