Experiment No. (2) Determination of Melting Point

- *The temperature at which a solid melts and becomes a liquid is the* **melting point**.

نقطة الانصهار : هي درجة الحرارة التي تذوب فيها المادة الصلبة و تتحول الى الحالة السائلة

- Melting requires that the *intermolecular forces* that hold the solid together have to be overcome, the temperature at which melting occurs will depend on the structure of the molecule involved. Hence, different compounds tend to have different melting points.

ان عملية الانصهار تتطلب التغلب على القوى الرابطة بين الجزيئات التي تربط بين جزيئات المادة في حالتها الصلبة. ان درجة الحرارة التي يحدث فيها الانصهار تعتمد على الهيكل البنائي للجزيئات و لذلك فان لكل مادة درجة انصهار خاصة بها.

- A mixture of very small amounts of impurities will produce changes in the melting point. Consequently, the melting point of a compound is a criterion for purity as well as for identification.

تعتبر درجة الانصهار مقياس لمدى نقاوة المادة و تستخدم بذلك للتعرف على المواد المختلفة. ان وجود و لو كمية قليلة من الملوثات في المادة سوف يؤدي الى تغير في درجة انصهارها.

Instrument:

1. Capillary tube
2. Test tube
3. Mercury thermometer
4. Burner
5. Wire gauze
6. Iron stand
7. Clamp
8. Rubber band
9. Mortar and pestle
10. Glass watch

Procedure:

Note: *the (unknown) material that is going to be tested for determination of melting point should have the following characteristics:*

1. **It should be completely dry**. Any moisture will result in errors in melting point determination. (يجب ان تكون العينة جافة تماما)
2. **It should be homogenous**. Non-homogenous mass will result in un- even distribution of heat throughout the sample. يجب ان تكون) العينة متجانسة)

In order to have dry, homogenous sample, the material should be placed in hot air oven for sufficient period of time, and it should be crushed into a fine powder using mortar and pestle (Figure 1).

Figure.1 Mortar and Pestle

1. The dry and homogenous sample is placed on glass watch. To fill a capillary tube with a sample, the open end of the capillary is pressed gently into the substance several times. The powder is then pushed to the bottom of the tube by repeatedly pounding the bottom of the capillary against a hard surface. The substrate material should fill 3mm of the capillary tube.
2. The capillary tube is fixed to the thermometer using rubber band (Figure 2).

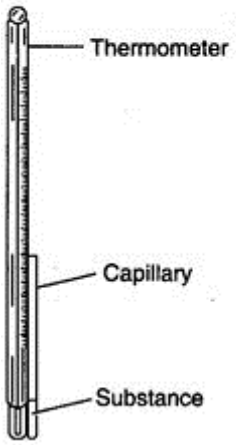

Figure.2 Capillary tube and Thermometer

3. The thermometer and substrate containing capillary tube are placed together into a beaker containing oil, which is fixed with clamp over a burner (Figure 3).
4. When heating the beaker it should constantly moving over the burner, this to ensure:
    a. Uniform distribution of heat to the oil in beaker.
    b. The rise in temperature will be small about 2 °C/min.
5. Observe the substrate and record in paper the temperature when the material starts melting and the temperature when the entire sample melt, so that you will have a melting range.

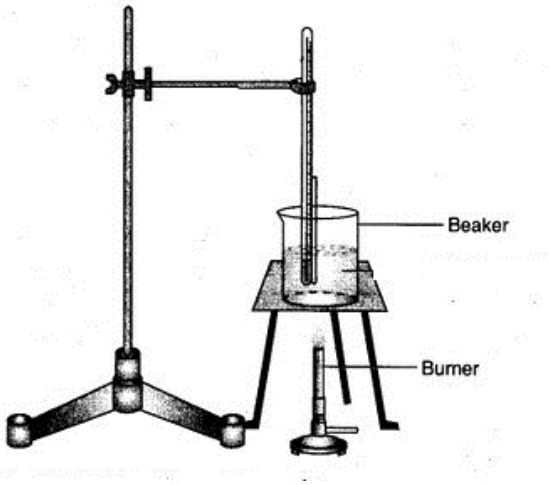

Figure.3

6. Compare your results to the table of melting points to identify the substrate material.
7. Materials with wide range of melting points contain impurities, while materials with small melting range are pure one.