The Islamic University

Department of Clinical Laboratory Sciences

Title of the course: *Practical Biochemistry* I

Level: 3rd Class, 1st Semester

Determination of boiling point

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Experiment 2 : Determination of boiling point

The boiling point of a compound is the temperature at which it changes from a liquid to a gas. Boiling point are approximately related to their molecular weight , the higher the molecular weight, the higher the boiling point.

The purpose of the experime

1. Discovery of unknown compound.

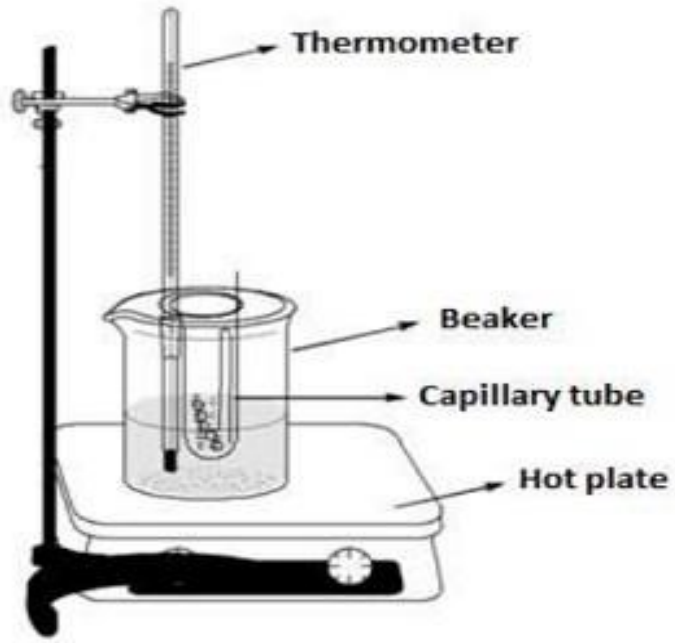
Factors Influencing Boiling Point

A) ***Polarity*** : Increased H-bonds, polar covalent bonds changes in a molecules tend to increase the boiling point. More polar elements in a molecule increase the total number of dipole-dipole, ion-dipole and Hbonding interactions. **More energy (higher boiling point temperature)**

B) ***Molecular weight*** : Increased molecular weight increases boiling point. A higher molecular weight compound has more atoms that can be involved in non-covalent interactions. The greater the number of noncovalent interactions, **the more energy (higher boiling point temperature)**

C) ***Branching :*** Branching decreases boiling point. Branching blocks molecules from packing together too closely. The closer molecules are, the stronger the non-covalent interactions. Thus molecules that are forced to be

farther away from each other due to branching have weaker non-covalent interactions. **Less energy (lower temperatures)** .



Boiling point apparatus

Procedure

Immerse the assembly in a water bath (or and oil bath for samples with boiling point higher than 100oC) (Fig. 1). As the temperature is slowly increased, a rapid evolution of bubbles from the end of the tube begins. Continue heating for about 5-10 seconds to be sure that all of the air has been expelled from the capillary, and the vapors of the liquid remains in the capillary. When the heat is removed but do not take the assembly out of water bath (or oil bath), carefully watch the capillary. Bubbles seen until the pressure exerted by the vapor of the continue to be

liquid becomes equal to the atmospheric pressure. As the temperature decreases, the bubbles will slow down and as soon as, the liquid rises into the capillary. The boiling point of the sample is reached when the bubbles stops. Read the thermometer and record the temperature.

substance	Boiling point(°C)
Pentane	36.1
Hexane	69
Heptane	98.4
Octane	125.7
2-Methylheptane	117.7
3-Methylheptane	119
2,2-Dimethylhexane	106.8
3-Ethylpentane	93.5
2,2,4-Trimethylpentane	99.2
Acetone	56-57
Methanol	65
Ethanol	78-79
Propanol	97-98
2-Propanol(isopropanol)	82-83
Water	100
Cyclohexane	80.7