
EXPERIMENT 18 DETERMINATION OF MELTING POINT OR SOLIDIFICATION POINT OF OILS AND FATS

Structure

- 18.0 Objectives
- 18.1 Introduction
- 18.2 Principle
- 18.3 Requirements
- 18.4 Procedure
- 18.5 Results and Inference
- 18.6 Precautions

18.0 OBJECTIVES

After attending to this experiment, we shall be able to :

- learn to perform determination of melting point or solidification point of oils and fats.

18.1 INTRODUCTION

Oils and fats are chiefly mixtures of glycerides. They do not exhibit either a definite or a sharp melting point. Therefore, the term melting point does not imply the same characteristics that it does with pure crystalline substances. Fats pass through a stage of gradual softening before they become completely liquid. The melting point or solidification point is, therefore, defined by the specific conditions of the method by which it is determined.

18.2 PRINCIPLE

The melting point or solidification point is determined by taking the solid fat inside a small capillary tube.

18.3 REQUIREMENTS

Apparatus

Melting point tubes - thin walled, uniformly bored capillary glass tubes open at both ends.

Calibrated Thermometer - with LC 0.2°C subdivisions and a suitable range.

Beaker - with a side-tube heating arrangement.

Heat source - gas burner or a spirit lamp.

18.4 PROCEDURE

Melt the sample and filter it through a filter paper to remove any impurities and the last traces of moisture. Make sure that the sample is absolutely dry. Mix the sample thoroughly. Insert a clean melting point tube into the molten sample product so that a column of the material, about 10 mm long, is forced into the tube. Chill the sample in the tube at once by placing the end of the tube containing the sample against a piece of the ice until the fat has solidified. Place the melting point tube in a test-tube and hold it for one hour either in a refrigerator or in water maintained at 4 to 10°C. Remove the melting point tube and attach with a rubber band or any other suitable means to the thermometer so that the lower end of the melting point tube is even with the bottom of the bulb of the thermometer. Pour water at about 10°C into the beaker and suspend the thermometer in the center of the apparatus, so that the lower end of the sample column is about 30 mm below the surface of water. Heat the side tube of the apparatus gently, so that the temperature of the water rises slowly at the rate of 2°C/min till the temperature reaches 25°C, and thereafter at the rate of 0.5°C/min. Note the temperature of the water when the sample column commences to rise in the melting point tube. Report the average of two such separate determinations as the melting point, provided that the readings do not differ by more than 0.5°C.

18.5 RESULTS AND INFERENCE

The difference between the results of two determinations carried out simultaneously or in rapid succession by the same analyst (repeatability) shall not exceed 0.5°C. The melting point of commonly used edible oils is given as below.

Type of Oil	Soidification Point/Melting Point, °C	Type of Oil	Soidification Point/ Melting Point, °C
Coconut oil	23 - 28	Safflower oil	-13 to -20
Cottonseed oil	3 - 4	Sunflower oil	-16 to -19
Groundnut oil	0 - 3	Soybean oil	-8 to -18
Mustard oil	-8 to -16	Rice bran oil	-5 to -10
Sesame oil	0 to -6	Palm oil	27 to 50

18.6 PRECAUTIONS

- Parallax error should be avoided while reading the temperature in thermometer.
- Observe the temperature at which liquid become clear, as fat passes through a opalescent stage before melting completely.
- The presence of moisture in fat influences the melting point to a considerable extent. Hence, Sample should be clear and free from moisture.
- The thermometer should be read to the nearest 0.5°C.