University of Mosul

College of Science

Department of Physics

Second Stage

Heat and Thermodynamic

2024 – 2025

Lecture 5: Calender 's Constant pressure air & other kinds of thermometers

Preparation

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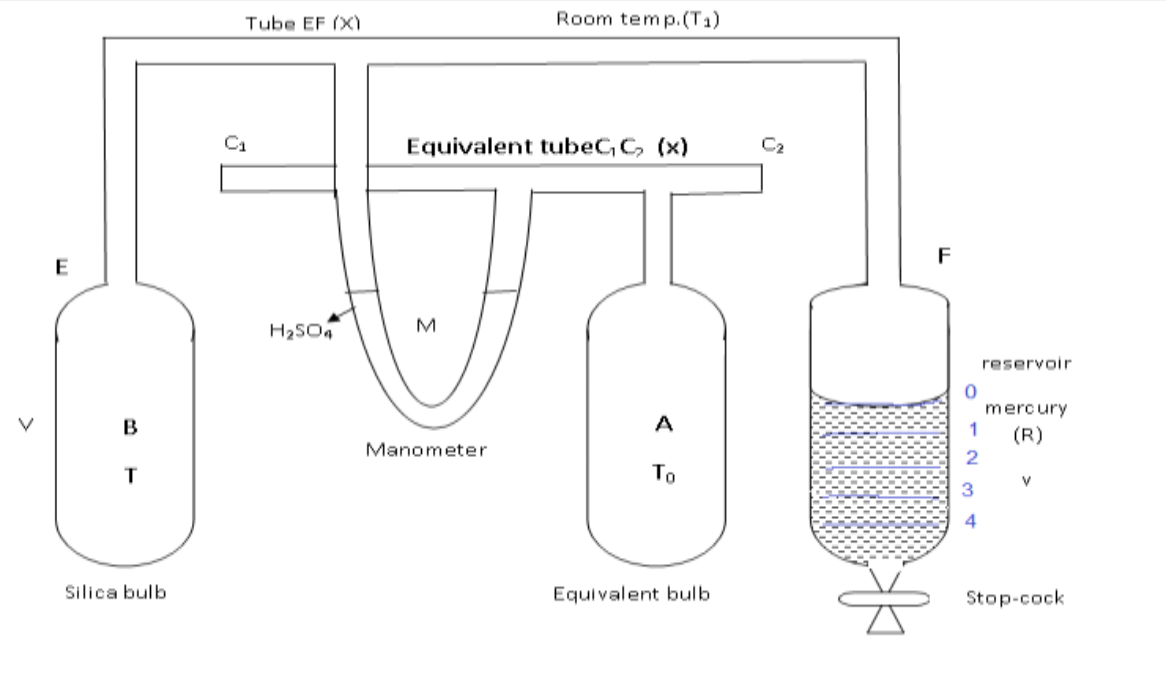
2.2 Calender's Constant pressure air thermometer



The thermometer work

Bulbs A, B and reservoir R are placed in crushed ice and the ends of tube C_1C_2 are closed when the pressure on both sides of the manometer M is equal. So the air pressure in the bulb B is equal to the air pressure in the bulb A, Then we put the bulb B in the liquid whose temperature is to be measured, the pressure in the bulb B will increase and the levels of mercury in the manometer will vary, so open the tap slightly so that the mercury flows until the mercury is equal to the height of the two ends of the M manometer.

volume of the bulb A = volume of the bulb B = V

volume of tube EF= volume of equivalent tube C_1C_2=X

volume of air at the end of the reservoir R = v

Air pressure at each side = P.

temperature of the body whose temperature is to be measured = T

Room temperature = T_1

ice temperature $=T_0$

$$\therefore T = 273\left(\frac{V}{V-v}\right) \qquad K.\ldots(3)$$

6. Bimetallic thermometers: These are thermometers that work according to the principle of different expansion of different solid objects. These thermometers are used in meteorology to record changes in temperature during the day.

7.Vapor pressure thermometers: They work on the principle of the change in vapor pressure with the change of temperature. These thermometers are used to measure low temperatures, such as a helium vapor pressure thermometer.

8. Magnetic thermometers: They are thermometers that work according to the principle of changing the magnetization in a material with a change in temperature, according

to Curie's law.

$$M = C\frac{H}{T}$$

M: Magnetic degree , C: Curie constant

H: magnetic filled applied to matter , T: temperature degree in Kelvin.