Thermometers & Temperature

U85-14 In an experiment, two different types of thermometers P and Q are used to record the temperatures of some objects and the corresponding readings are as follows:

Thermometer used	Temperatures of objects measured (°C)			
	Object 1	Object 2	Object 3	Object 4
P	50.0	100.0	150.0	200.0
Q	50.2	100.0	148.7	197.4

From this experiment, we may conclude that _____.

A. P must be a constant-volume gas thermometer
B Q is less reliable at lower temperature
C. thermometer P is more accurate than thermometer Q
D. thermometer Q is more accurate than thermometer P
E. N.O.T.A.

U87-8 The ice point has been chosen as a fixed point on some thermometric scales because _____.

A. its temperature is zero degree
B. the heat content of ice is zero
C. all ice is at the temperature of 0 °C
D. it is the coldest temperature known
E. it is an easily-reproducible temperature, quite accurate for the purpose of calibrations

U89-13 Given that two different bodies are in thermal equilibrium. Which of the following statements is always **correct**?

A. The two bodies have the same temperature
B. The two bodies have the same internal energy
C. The two bodies have the same specific heat capacity
D. The two bodies have different specific heat capacities
E. There is no activity of heat exchange going on between the two bodies

U89-15 The absolute zero of the thermodynamic temperature scale may be defined as the temperature at which _____.

A. the internal energy of a body is zero
B. the internal energy of a body is a minimum
C. the volumes of all bodies become zero
D. all gases and liquids turn into solids
E. the volumes of all gases and liquids become zero

U87-P8a Define the *pressure coefficient of expansion* of gas.

(b) Fig.U87-P8a shows a fixed-volume gas thermometer. A glass bulb B is filled with dry air, and placed in a large beaker containing hot water. The temperature of the water is measured by mercury thermometer T. An experiment performed by a student using this fixed-volume gas thermometer produced the following results:

Atmospheric pressure $P_a = (754 \pm 1)$ mmHg

Reading of mercury column at N = (160 ± 1) mm

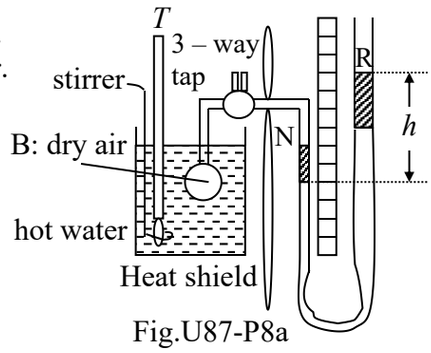

Fig.U87-P8a

Temperature t of water to beaker/°C	20.0 ± 0.1	40.0 ± 0.1	50.0 ± 0.1	60.0 ± 0.1	70.0 ± 0.1
Reading of mercury column at R/mm	126 ± 1	171 ± 1	196 ± 1	216 ± 1	242 ± 1

(i) Using the data above, plot a graph of pressure $P(P = P_0 + h)$ versus temperature t.
(ii) Find the gradient of the graph.
(iii) Estimate from your graph the existing room temperature.
(iv) Find the pressure coefficient of expansion of air from the graph.

U98-13 The length of the mercury thread of an uncalibrated thermometer is 9.5 cm when immersed in steam, and is 0.5 cm in melting ice. What will be the length of the mercury thread when the thermometer is immersed in a beaker of water at 20 °C?

A. 2.4 cm B. 2.3 cm C. 1.9 cm D. 1.8 cm

U99-11 Which of the following instrument is **most suitably** used to measure a fast-changing temperature in the range of 20 °C to 40 °C? (Assuming that they have all been calibrated so as to give direct readings.)

A. A thermocouple
B. A mercury thermometer
C. An alcohol thermometer
D. A platinum resistance thermometer

U92-P7a

Mode of thermometric evaluation	Boiling-point (100 °C)	Freezing-point (0 °C)	A particular room temperature (to be determined)
Pressure as recorded by a constant-volume gas thermometer	1.05×10^7 Pa	8.07×10^6 Pa	8.80×10^6 Pa
Resistance as recorded by a platinium resistance thermometer	150.00 Ω	126.00 Ω	132.95 Ω

the table above shows the observations of a particle room temperature by using two types of thermometer, together with the boiling point and freezing point values. Using these data, calculate the room temperatures on the scales of the constant-volume gas thermometer and the platinium resistance thermometer. [2 answers]
Explain why these values differ (at the same room temperature).
[30.04 °C, 28.95 °C]

U2k14-12 Which of the following is **not** a thermometric property of a thermometric material?

A. The change in electrical resistance of a conductor.
B. The change in volume of a gas at constant pressure.
C. The change in pressure of a gas at constant volume.
D. The change in mass at constant pressure and volume.

U2k16-11 For the same mass of water and ice at 0 °C, which of the following physical quantities is **not** equal?

A. internal energy
B. number of moles
C. number of molecules
D. average kinetic energy of the molecules