Thermometry

U75-5 An electric kettle has a heating coil of 48ohms resistance. What is the rise in temperature of 1.2 kg of water in the kettle after the latter has been plugged to a 240 V power supply for 42 seconds?
[Assume that the specific heat capacity of water is 4.2 $Jg^{-1}°C^{-1}$ and the loss of heat to the surroundings is negligible]
A. 2° B. 10° C. 20° D. 30°

U77-10 A bath contains 150 kg of water at 50 °C. Hot water at 60 °C flows into the bath at the rate of 20 kg per minute and at the same time cold water at 10 °C flows into the bath at a rate of 35 kg per minute. Assuming no heat loss or gain from the surrounding, find the time taken for the water in the bath to become 30 °C. Assume the water in the bath is uniform in temperature.
A. 30 minutes B. 20 minutes C. 10 minutes D. 5 minutes

U83-8 A thermally insulated crystal of mass 0.028 kg is heated electrically at a constant rate of 3.0 W. The following readings of the temperature T of the crystal were taken at various time t:

t/s	0	200	400	560	640	740	800	1000	1200	1400	1520
T/K	179	196	207	210	210	210	215	230	243	256	264

Draw a graph of T against t.
(a) Use the graph to find the specific heat capacity of the crystal at a temperature of 250 K, showing clearly how you arrive at your answer.

U85-16 A solid of mass 2 kg whose heat capacity is 0.8 J K^{-1} is heated from 30 °C to 80 °C. What is the amount of heat required?
A. 144 J B. 80 J C. 72 J D. 40 J E. 20 J

U88-13 A resistor of resistance 2 kΩ has a thermal capacity of 10.0 J K^{-1}. When a voltage of 12 V is applied across it for 100 s, what is the rise in temperature of the resistor if it is thermally insulated?
A. 0.3 K B. 0.72 K C. 12.6 K D. 200 K E. 1000 K

U92-13 Which of the following statements concerning the definitions or concepts of specific heat capacity is **incorrect**?
A. The value of the specific heat capacity of a body depends on the mass of the body.
B. The value of the specific heat capacity of a body is independent of the weight of the body.
C. The amount of heat absorbed by unit mass of a substance, when its temperature is raised by 1 °C, is equivalent to the specific heat capacity of the substance.
D. The amount of heat liberated by unit mass of a substance, when its temperature is lowered by 1 °C, is equivalent to the specific heat capacity of the substance.

U93-14 The temperature of a substance of 5 kg increased by 0.4 °C after absorbing 2000 J of heat. What is the specific heat capacity of this substance?
A. 10^3 J kg^{-1} K^{-1} B. 10^4 J kg^{-1} K^{-1} C. 10^5 J kg^{-1} K^{-1} D. 10^6 J kg^{-1} K^{-1}

U93-P7c Two identical copper calorimeters are 60 g in mass each. One contains 40 g of water and the other 50 g of alcohol. Both calorimeters and their contents are heated and then allowed to cool off from 60 °C to 50 °C. The time taken for water to cool from 60 °C to 50 °C is 240 s and the corresponding time for alcohol is 79 s. If the specific heat capacity of copper is 400 J kg^{-1} K^{-1} and that of water is 4200 J kg^{-1} K^{-1}, find the specific heat capacity of alcohol. [784 J kg^{-1} K^{-1}]

U2k-14 If the ratio of mass of two substances X and Y is 2: 1 and the ratio of their temperature increase is 3: 1, then the ratio of their specific heat will be _____ and the ratio of their heat absorption will be _____.
A. 3: 4 ……1: 8 B. 2: 5……3: 5 C. 2: 3……4: 1 D. 2: 1 …… 4: 3

U99-12 After two objects A and B of equal masses and initial temperature absorb an equal amount of heat, it is found that object A has higher temperature than object B. We can conclude that __.
A. object A has a greater volume that object B
B. object B has a greater volume that object A
C. object A has a higher specific heat capacity that object B
D. object B has a higher specific heat capacity that object A

U2k03-10 A solar furnace has a concave mirror of collecting area 0.8 m^2. The average thermal radiation rate from the sun reaching the earth is 750 W m^{-2}. A small sphere of mass 0.05 kg having a specific heat capacity 2000 J kg^{-1} K^{-1} is heated by the furnace from 20 °C to 50 °C. Calculate the time needed for the heating.

A. 50 s B. 20 s C. 10 s D. 5 s

U2k13-13 Equal masses of three liquids A, B, and C with specific heat capacities c_1, c_2, c_3 and at temperatures of θ_1, θ_2 and θ_3 respectively is mixed thoroughly. If there is no change of state and the mixture is thermally isolated, what is its final temperature?

A. $\frac{\theta_1+\theta_2+\theta_3}{3}$

B. $\frac{c_1\theta_1+c_2\theta_2+c_3\theta_3}{c_1+c_2+c_3}$

C. $\frac{c_1\theta_1+c_2\theta_2+c_3\theta_3}{3}$

D. $\frac{c_1+c_2+c_3}{3(c_1\theta_1+c_2\theta_2+c_3\theta_3)}$