Chapter 1 Heating processes

Chapter test Total marks 28

Name: Class: Date: \_\_\_\_\_\_\_\_\_\_\_

A data sheet with appropriate physics constants will be provided for this test.

Question 1

4000 J of energy are required to raise the temperature of 1 kg of paraffin by 2°C. How much energy is required to raise the temperature of 5 kg of paraffin by 1°C? (2 marks)

A 20 kJ

B 2 kJ

C 1 kJ

D 10 kJ

E 10 MJ

Question 2

A thermometer is supplied with no markings. Describe the process you would go through to produce a calibrated scale. Would your scale be arbitrary or absolute? Explain your answer. (2 marks)

Question 3

An insulated container is filled with equal amounts of hot and cold water. The hot water is originally at 75.0°C and the cold water at 23.0°C. Calculate the temperature of the final mixture, assuming that no energy is gained or lost from the container. (2 marks)

Question 4

How much energy, in joules, is needed to raise the temperature of 100 kg of water from a room temperature of 20.0°C to a comfortable bath temperature of 35.0°C? (Assume no losses to the surrounding environment.) (2 marks)

Question 5

If the particles within two objects have the same average kinetic energy, are the two objects at the same temperature? Explain your answer. (2 marks)

Question 6

A student attempts to identify a metal by measuring its specific heat capacity. 100 g of the metal is heated to 75°C and then transferred to a 70 g copper calorimeter containing 200 g of water at 20°C. The temperature of the final mixture is 25°C. Using the table below, identify what metal the student is most likely to be testing. (4 marks)

Approximate specific heat capacities of some common materials.

|  |  |
| --- | --- |
| Material | Specific heat capacity (J kg–1 K–1) |
| human body | 3500 |
| methylated spirits | 250 |
| air | 1000 |
| aluminium | 900 |
| glass | 840 |
| iron | 440 |
| copper | 390 |
| brass | 370 |
| lead | 130 |
| mercury | 140 |
| water |  |
| ice | 2100 |
| liquid | 4200 |
| steam | 2000 |

Question 7

Energy must be supplied to ice for it to melt. The temperature of the resulting water is no higher than that of the original ice. Explain why. (2 marks)

Question 8

How many joules of energy would be required to melt exactly 100 g of ice, initially at –4°C? (Assume no losses to the surrounding environment.) (3 marks)

Question 9

0.50 kg of ice at 0°C is mixed with 0.10 kg of steam at 100°C. What will be the final temperature of the mixture? (5 marks)

Question 10

Steam produces much worse burns than does boiling water. Compare the amount of energy the body, at a temperature of 37°C, receives from the cooling of 0.10 g of water from 100°C, with the energy the body receives from the cooling of 0.10 g of steam originally at 100°C. (4 marks)