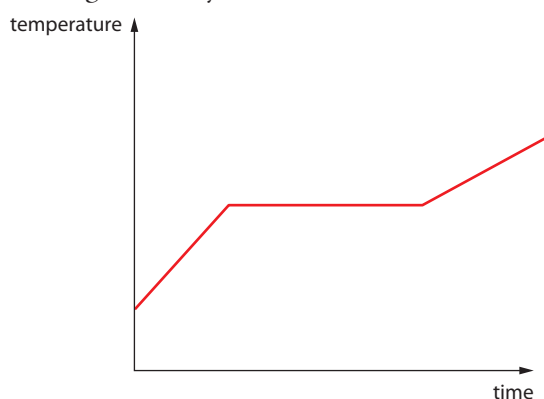


Self-test questions

Topic 3

- 1 How many grams of helium (${}^4_2\text{He}$) contain the same number of atoms as 24 g of ${}^{12}_6\text{C}$?
A 4
B 8
C 12
D 24
- 2 Forty (40) grams of water at 20°C is mixed with eighty (80) g of water at 80°C . What is the final temperature of the mixture?
A 50°C
B 55°C
C 60°C
D 65°C
- 3 The graph shows the variation with time of the temperature of a constant mass of a solid that is being heated by a heater of known constant power.

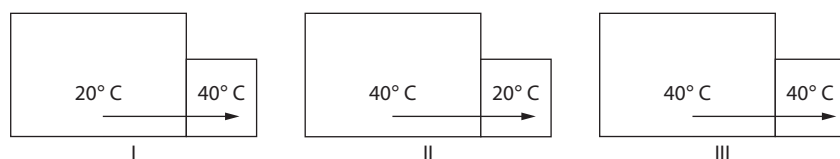


Quantities that may need to be measured in order to determine the specific latent heat of fusion of the solid include:

- I the melting temperature
- II the time interval needed for melting
- III the mass of the solid

The list of required quantities is:

- A I only
 - B II only
 - C II and III
 - D I, II and III
- 4 The diagrams show two blocks of unequal mass made of the same material. The temperatures of the blocks are indicated. In which case or cases is the flow of heat correctly indicated?



- A II only
- B III only
- C I and II only
- D II and III only

5 A quantity of helium gas (${}^4_2\text{He}$) and a quantity of argon (${}^{40}_{18}\text{Ar}$) are kept at the same temperature. What is an estimate of the ratio of the rms speed of helium molecules to that of argon?

- A $\sqrt{10}$
- B 10
- C $\sqrt{9}$
- D 9

6 A real gas cannot be approximated by an ideal gas under conditions of high pressure, small volume and low temperature. Suggested reasons for this include:

- I The collisions of the molecules are no longer elastic
- II The forces between molecules are no longer negligible
- III The volume of the molecules is no longer negligible

A correct explanation is:

- A I only
- B II only
- C II and III
- D I, II and III

7 The pressure of a fixed quantity of an ideal gas is 2.2×10^5 Pa. The temperature of the gas is increased from 30°C to 330°C at constant volume. What is an approximate value of new pressure of the gas?

- A 2.4×10^6 Pa
- B 2.0×10^4 Pa
- C 4.4×10^5 Pa
- D 1.1×10^5 Pa

8 An ideal gas is in a container with a movable piston. The piston is moved in rapidly decreasing the volume of the gas. What is the reason for the increase in the temperature of the gas?

- A the molecules are closer together
- B the molecules collide with each other more frequently
- C the molecules collide with the container walls more frequently
- D the piston transfers kinetic energy to the molecules

9 A container holds n moles of an ideal gas at kelvin temperature T . The number of moles is doubled without changing the temperature. What are the changes in the internal energy of the gas and the average kinetic energy of the molecules of the gas?

	Internal energy	Average kinetic energy
A	doubles	doubles
B	doubles	stays the same
C	stays the same	doubles
D	stays the same	stays the same

10 The temperature of an ideal gas is doubled at constant pressure. What is the change in the rms speed of the molecules and the density of the gas?

	rms speed	density
A	doubles	doubles
B	increases by $\sqrt{2}$	doubles
C	doubles	halves
D	increases by $\sqrt{2}$	halves