Mark schemes

Q1.

(a) the volume decreased

1

(b) the distance decreased

1

(c) the frequency of collisions increased

1

(d) the air pressure increased

1

(e) the mean speed of the particles increases

1

(f) $0.0130 = 2.60\times10^{-8} \times 1010 \times \Delta\theta$

1

$$\Delta\theta = \frac{0.0130}{(2.60 \times 10^{-8} \times 1010)}$$

1

$\Delta\theta = 495$ (°C)

allow a correct answer given to more than 3 s.f.

1

[8]

Q2.

(a) polarity of the potential difference doesn't change

allow direction of the potential difference doesn't change

1

(b) $E = QV$

1

(c) $5010 = Q \times 12$

1

$$Q = \frac{5010}{12}$$

1

$Q = 417.5$ (C)

allow 418 (C)

1

(d) $5010 = 0.015 \times L$

1

$$L = \frac{5010}{0.015}$$

1

$L = 334\,000$ (J/kg)

1

(e) **Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

5-6

Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

3-4

Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

1-2

No relevant content

0

Indicative content

- particles in a solid are in a regular pattern
- particles in a liquid are in a random arrangement

- particles in a solid are vibrating about fixed positions
- particles in a liquid are moving freely

- as the ice changes to water the temperature remains constant

- because as the ice changes to water the potential energy of the particles increases

- as the water warms the particles move faster
- so the kinetic energy of the particles increases

- internal energy is the total kinetic and potential energy of all the particles

ignore any references to density of ice vs liquid water
ignore any references to spacing of particles

[14]

Q3.

(a) balance

1

(b) control variable

1

(c) use tongs / gloves
or
use a heatproof mat

allow other sensible methods of avoiding contact with hot beaker eg using a cloth

allow wait for the beaker (and hot water) to cool down

1

(d) 25 200 = 0.0090 *L*

1

$$L = \frac{25\,200}{0.0090}$$

1

L = 2 800 000
or
L = 2.8×10^6

1

J/kg

1

(e) the transfer of thermal energy from the water to the surroundings

1

[8]