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SPECA

GCSE Combined Science (AQA Trilogy) · Physics

Particle Model of Matter · Mark Scheme

For use with the Worksheet. Marking points are indicative, not exhaustive: award equivalent correct answers.

1) $\rho = m \div V = 6 \div 0.008$ (1) = 750 kg/m³ (1) [2]

2) $m = \rho \times V = 8900 \times 0.002$ (1) = 17.8 kg (1) [2]

3) In a gas, particles are widely spaced/far apart, compared with a solid where they are tightly packed (1) [1]

4) Particles are close together but not arranged in a fixed pattern/are disordered (1); they are free to move past/slide over each other (1) [2]

5) No particles are created or destroyed during melting (1); melting is a physical change, so the same particles are simply rearranged, not lost (1) [2]

6) Because the substance recovers its original properties if the change is reversed: no new substance is formed (1) [1]

7) The total kinetic energy and potential energy (1) of all the particles that make up a system (1) [2]

8) Heating increases the particles' energy (1); which either raises the substance's temperature or brings about a change of state (1) [2]

9) $\Delta E = m \times c \times \Delta\theta = 0.2 \times 385 \times 50$ (1); correct substitution shown (1); = 3850 J (1) [3]

10) The energy needed to raise the temperature of one kilogram of a substance by one degree Celsius (1) [1]

11) $E = m \times L = 0.4 \times 334\,000$ (1); correct substitution shown (1); = 133 600 J (1) [3]

12) The energy needed to change the state of one kilogram of a substance, with no change in temperature (1) [1]

13) Specific latent heat of fusion: for a change between solid and liquid (1); specific latent heat of vaporisation: for a change between liquid and vapour/gas (1) [2]

14) The substance is changing state (1); energy is still being transferred (as latent heat), but it changes internal energy rather than temperature (1) [2]

15) The higher the temperature, the greater the particles' average kinetic energy (1) [1]

16) Particles move faster / have more kinetic energy at a higher temperature (1); so they collide with the container's walls more frequently and with greater force, increasing pressure (1) [2]

17) Submerge the rock fully in a known volume of water in a measuring cylinder (1); the volume of the rock equals the volume of water displaced (the rise in water level) (1) [2]

18) Specific heat capacity: energy needed to change temperature, within one state (energy per kg per °C) (1); specific latent heat: energy needed to change state, at constant temperature (energy per kg) (1) [2]

Total: 33 marks

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