3.20 Density and the Particle Model of Matter: Test Pack

AQA 8464 · Calculator allowed · about 25 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State what is meant by the density of a material.

(Total for Question 1 is 1 mark)

---

2 Priya determines the density of a sample of cooking oil.

(a) The mass of an empty measuring cylinder is 38.2 g. The mass of the same cylinder containing 40 cm^3 of oil is 74.2 g. Calculate the mass of the oil. **(1)**

.....

(b) Calculate the density of the oil in g/cm^3. **(2)**

.....

(c) Priya repeats the experiment twice more and calculates densities of 0.91 g/cm^3 and 0.89 g/cm^3. Calculate the mean density of the oil from all three results. **(1)**

.....

(d) Explain why Priya measures the mass of the empty measuring cylinder first, rather than just measuring the mass of the cylinder and oil together. **(1)**

.....

.....

.....

.....

.....

.....

(Total for Question 2 is 5 marks)

© Revision Library | revisionlibrary.co.uk

3 A kettle boils dry and 15 g of the remaining water turns to steam. The specific latent heat of vaporisation of water is 2260000 J/kg.

(a) Calculate the energy needed to vaporise this water. Use the equation E = mL **(3)**

.....

(b) The kettle's heating element transfers energy to the water at a power of 2200 W. Calculate how long it takes to vaporise this water. Use the equation: power = energy transferred / time **(3)**

.....

(Total for Question 3 is 6 marks)

---

4 Chidi heats a pure solid wax at a constant rate from below its melting point until it is completely liquid. A graph of temperature against time shows the temperature rising, then a flat section while the wax melts, then rising again.

(a) State what is happening to the particles of wax during the flat section of the graph. **(2)**

(b) The wax is heated using a heater with a constant power output of 60 W. The flat section of the graph lasts for 280 seconds. Calculate the energy transferred to the wax during this time. Use the equation: energy transferred = power * time **(2)**

.....

(c) The mass of the wax is 40 g. Calculate the specific latent heat of fusion of the wax, giving your answer in J/kg. Use the equation E = mL **(2)**

.....

(Total for Question 4 is 6 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 3.20 Density and the Particle Model of Matter: Test Pack

Question 1

the mass per unit volume of a material (density = mass / volume) oe **B1**

Answer: Density is the mass per unit volume of a material.

Question 2

(a) 36.0 g cao **A1**

(a) Answer: 36.0 g

(b) 36.0 / 40 substituted ft from part (a) **M1**

(b) 0.90 g/cm^3 cao **A1**

(b) Answer: 0.90 g/cm^3

(c) 0.90 g/cm^3 cao **A1**

(c) Answer: 0.90 g/cm^3

(d) so the mass of the cylinder itself can be subtracted, leaving only the mass of the oil oe (otherwise the result would include the mass of the container as well as the liquid) **B1**

(d) Answer: So the mass of the empty cylinder can be subtracted, leaving only the mass of the oil.

Question 3

(a) converts 15 g to 0.015 kg **M1**

(a) 0.015 * 2260000 substituted **M1**

(a) 33900 J (3.39 * 10^4 J) cao **A1**

(a) Answer: 33900 J

(b) rearranges to time = energy transferred / power **M1**

(b) 33900 / 2200 substituted ft from part (a) **M1**

(b) awrt 15.4 s cao **A1**

(b) Answer: 15.4 s (awrt)

Question 4

(a) the energy transferred is increasing the potential energy of the particles, used to overcome the forces of attraction between them so they can move out of their fixed positions **B1**

(a) the kinetic energy of the particles (and therefore the temperature) stays the same during this time **B1**

(a) Answer: Energy is increasing the particles' potential energy (overcoming forces between them), while their kinetic energy, and so the temperature, stays the same.

(b) 60 * 280 substituted **M1**

(b) 16800 J cao **A1**

(b) Answer: 16800 J

(c) converts 40 g to 0.040 kg and rearranges to L = E / m **M1**

(c) 420000 J/kg (4.2 * 10^5 J/kg) cao ft from part (b) **A1**

(c) Answer: 420000 J/kg

© Revision Library | revisionlibrary.co.uk