Review Worksheet

Mr Charman

Exam question

Exam question - particle model

Solids:

- Have a fixed shape
- Difficult to compress

Gases

- Will spread and fill the entire container
- Easy to compress

Use your knowledge to explain the above properties. You should consider:

- The spacing between the particles
- The movement of individual particles
- The forces between particles   **(4 marks)**

Exam question - density

1. A block of material is in the shape of a cuboid. It has sides of length 3.0 cm, 4.5 cm and 6.0 cm, and a total mass of 0.405 kg. Find the density of the block. **(3 marks)**

Exam questions - specific heat capacity and specific latent heat.

1. Calculate the total energy transferred when 250 g of ice cubes at 0 °C are changed to steam at 100 °C.

    Specific latent heat of fusion of ice = 334 000 J/kg °C
    Specific heat capacity of water = 4200 J/kg °C
    Specific latent heat of vapourisation of water = 2260 000 J/kg

2. A block of ice at -3 °C was heated. After 7500 J of energy was transferred to the ice, the ice had melted and reached a temperature of 5 °C . Calculate the mass of the ice.

    Specific latent heat of ice = 2100 J/kg °C
    Specific latent heat of fusion of ice = 334 000 J/kg °C
    Specific heat capacity of water = 4200 J/kg °C

Exam question - gas pressure

1.
   a. Describe the motions of particles in a gas.   **(1 mark)**

   b. Explain why heating a gas increases the pressure.   **(4 marks)**

Answers

Review - particle model

Solids:

- Have a fixed shape
  - **Strong forces of attraction mean particles are not free to moves around so shape is fixed. (1)**
- Difficult to compress
  - **Particles have no gaps between one another so there is no room for particles to move closer. (1)**

Review

Gases

- Will spread and fill the entire container
  - **Very weak intermolecular forces of attraction so particles move randomly and spread out. (1)**
- Easy to compress
  - **Particles are far apart, so there is space for the particles to move closer (1)**

Density - review

Review

- Volume of block = length X width X height
- Volume of block = 3.0 X 4.5 X 6.0 = **81 cm^3**   (1)

- Mass of block = 0.405 kg = **405 g**   (1)

- Density of block = mass / volume
- Density of block = 405 / 81 = **5 g/cm^3**   (1)

Specific heat capacity and specific latent heat - review

1) Mass = 0.25 kg **(1)**

    Ice melting = 0.25 X 334000 = 83500 J **(1)**

    Temperature change = 100 - 20 = 80 °C **(1)**

    Water heating = 0.25 X 4200 X 80 = 84000 J **(1)**

    Water boiling = 0.25 X 2260000 = 565000 J **(1)**

    Total thermal energy = 83500 + 84000 + 565000 = **732500 J (1)**

2) Ice heating:

E = m X 2100 X 3 = m X 6300 **(1)**

Ice melting:

E = m X 340000 **(1)**

Water heating:

E = m X 4200 X 5 = m X 21000 **(1)**

Total thermal energy transfer:

7500 = m X 6300 + m X 340000 + m X 21000 = m X 361300 **(1)**

m = 7500 / 361300 **(1)**

m = **0.02 kg (1)**

Gas pressure - review

1)

   a) **Random (motion)**

   b) **Heating increases the temperature of the gas. (1)**
       The temperature is proportional to the (average) kinetic energy of the particles. (1)
       An increase in kinetic energy means the particles will move faster. (1)
       This causes more frequent collisions so the pressure of the gas increases. (1)

In lesson questions

Pause the video to complete your task

1. Copy and complete the table. Use the words below to help you fill in the gaps.

State	Solid	Liquid	Gas
Diagram			
Arrangement			
Movement			
Attraction between particles			

particles; touching; ordered rows; random; rows; vibrate; strong; weak; attractive forces

Resume once you're finished

Pause the video to complete your task

Independent practice

1. A wooden post has a volume of 0.025 m^3 and a mass of 20 kg. Calculate its density in kg/m^3.

2. Calculate the mass m (in kg) if the ρ = 10 kg/m^3 and V = 15 m^3

3. An object has a mass of 20 000 kg and a density of 5 000 kg/m^3. Calculate its volume in m^3.

4. **Challenge -** list the equipment and measurements taken to find the density of an irregular solid object?

Resume once you're finished

Independent practice

1. Water has a specific heat capacity of 4200 J/kg°C . Calculate the energy change when mass is 10 kg and change in temperature is 6 °C.

2. Specific latent heat of vapourisation of water is 2 260 000 J/kg. Calculate the energy transferred when 1.5 kg of water in a kettle changes from liquid to a gas at 100 °C.

3. What is the specific latent heat of copper if it requires 414 000 J of heat energy to melt 2 kg of copper?

4. A kettle contains 0.2 kg of water at 20 °C. Work out the total thermal energy required to turn all of the water into steam.

   Specific heat capacity of water = 4200 J/kg °C
   Specific latent heat of vapourisation of water = 2260 000 J/kg

Pause the video to complete your task

Gas pressure

1) State two things particles collide with.
2) What is temperature and measure of?
3) What two words could be used to describe the motion of gas particles?
4) Challenge - explain how gas particles cause pressure inside the balloon.

Resume once you're finished

Answers

Review

State	Solid	Liquid	Gas
Diagram			
Arrangement	Ordered structure in rows, all particles touching	Random structure, all particles touching	Random structure, particles not touching
Movement	Fixed positions, can vibrate	Can move freely over each other	Fast moving, random
Attraction between particles	Very strong forces of attraction	Weaker forces of attraction	weakest forces of attraction

Review

1. A wooden post has a volume of 0.025 m^3 and a mass of 20 kg. Calculate its density in kg/m^3. **800 kg/m^3**

2. Calculate the mass m (in kg) is the ρ = 10 kg/m^3 and V = 15 m^3. **150 kg**

3. An object has a mass of 20 000 kg and a density of 5 000 kg/m^3. Calculate its volume in m^3. **4 m^3**

4. **Challenge -** list the equipment and measurements taken to find the density of an irregular solid object?

   Top pan balance - measures mass in grams

   Eureka - displaces water equal to volume of object

   Measuring cylinder - measures the volume of displaced water in cm^3

Independent practice -review

1. Water has a specific heat capacity of 4200 J/kg°C . Calculate the energy change when mass is 10 kg and change in temperature is 6 °C. **252000 J**

2. Specific latent heat of vapourisation of water is 2 260 000 J/kg. Calculate the energy transferred when 1.5 kg of water in a kettle changes from liquid to a gas at 100 °C. **3390000 J**

3. What is the specific latent heat of copper if it requires 414 000 J of heat energy to melt 2 kg of copper? **207 000 J/kg**

4. A kettle contains 0.2 kg of water at 20 °C. Work out the total thermal energy required to turn all of the water into steam. **519200 J**

   Specific heat capacity of water = 4200 J/kg °C
   Specific latent heat of vapourisation of water = 2260 000 J/kg

Review

1. State two things particles collide with. **Walls of container, other particles**

2. What is temperature and measure of? **Average kinetic energy of the particles**

3. What two words could be used to describe the motion of gas particles? **Constant and random**

4. **Challenge -** explain how gas particles cause pressure inside the balloon.
    *   **The pressure of a gas results from collisions between the gas particles and the walls of the container**
    *   **Each time a gas particle hits the wall, it exerts a force on the wall.**
    *   **The total force per unit area is the pressure.**