

# **Kinetic and molecular model of matter: Part 1 - Questions**

1. Using appropriate key words, explain why liquids cannot be compressed. **[2 marks]**

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2. Describe the movement of particles in a solid. **[2 marks]**

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3. Describe Brownian motion and how this can be demonstrated in a school laboratory, for example by using smoke particles in air. **[3 marks]**

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4. Relate the properties of solids, liquids and gases to the forces and distances between molecules and to the motion of the molecules. **[6 marks]**

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5. Describe how and why the molecular arrangement of water molecules in ice is different to most other molecules, and why this results in ice being less dense than the water it is placed in (demonstrated by the fact that ice floats in water). **[2 marks]**

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## Kinetic and molecular model of matter: Part 2 - Questions

1. Describe the difference between boiling and evaporation. **[2 marks]**

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2. When a nurse uses a cotton swab to rub alcohol over the skin before administering an injection, the skin often feels cold in that localised area. Explain why. **[2 marks]**

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3. A balloon has a volume of  $200\text{cm}^3$  and a pressure of  $40\text{Pa}$ . What would the new pressure be if the volume was changed to  $150\text{cm}^3$  and what assumption are you making during this change? **[3 marks]**

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4. Describe three factors which affect the rate of evaporation from the surface of a liquid, and explain how each factor makes a difference. **[6 marks]**

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5. Describe what is meant by the expression  $pV = \text{constant}$  and what assumption is being made when using this rule. **[2 marks]**

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## Thermal properties and temperature: Part 1 - Questions

1. Identify and explain some of the everyday applications and consequences of thermal expansion, using a named example in your answer. **[2 marks]**

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2. Describe and explain the how a liquid-in-glass thermometer is made, and what the basic principles are in the design, structure and action of these thermometers. **[6 marks]**

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3. In the context of a liquid-in-glass thermometer, describe and explain the terms sensitivity, range and linearity by correctly using them in sentences. **[3 marks]**

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4. Compare the thermal expansion of melting a 200g block of a solid metal, compared to evaporating a 200g liquid of the same metal. **[2 marks]**

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5. Explain why we have so many different types of thermometers, such as liquid-in-glass thermometers, digital thermometers, infrared thermometers and so on. **[3 marks]**

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## Thermal properties and temperature: Part 2 - Questions

1. Water with a mass of 800g is heated from 20°C to 40°C. The specific heat capacity of water is 4120 J/kg/°C. Calculate the energy required to raise the temperature of water by this amount. **[2 marks]**

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2. What is meant by specific heat capacity and how is this different to just heat capacity (without the word specific)? **[1 mark]**

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3. What is meant by specific heat capacity and how is this different to specific latent heat? **[1 mark]**

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4. Describe a practical way to find the specific heat capacity of water. **[6 marks]**

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5. What is the difference between latent heat of fusion and latent heat of vaporisation? Sketch a graph of an ice cube being heated over time at a constant rate and label the key features of this graph. **[4 marks]**

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## Thermal processes - Questions

1. Compare the structure and properties of a good insulator compared to a good conductor. **[2 marks]**

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2. Describe two different real-life examples of convection in action. **[3 marks] + [3 marks] = [6 marks]**

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3. How does radiation differ to both conduction and convection? **[2 marks]**

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4. Describe the effects of dark, light, smooth, rough, shiny and dull surfaces on incident infrared radiation. Give at least two real-life examples of this in action. **[6 marks]**

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5. Use each of the following words in a short paragraph about light waves to show how they are all different: transmitted, reflected, refraction, absorbed, emitted. **[5 marks]**

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## Thermal Physics Practicals and Calculations - Questions

1. Describe how you would find the specific heat capacity of a liquid such as water using standard laboratory equipment. Clearly state all equipment used and all measurements taken. Explain how you will make your data reliable. **[6 marks]**

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2. Describe how you would find the specific heat capacity of a solid block such as aluminium using standard laboratory equipment. Clearly state all equipment used and all measurements taken. Explain how you will make your data reliable. **[6 marks]**

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3. If water has a specific heat capacity of  $4120 \text{ J/kg}^\circ\text{C}$ , how much energy will it take to raise 250ml of water from  $20^\circ\text{C}$  to  $80^\circ\text{C}$ ? **[3 marks]**

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4. If you use a kettle which is only 60% efficient, how much energy does the kettle use in total to heat the water in question 3? **[3 marks]**

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