



Matter and material: States of matter and the kinetic molecular theory

Practice test and memo

Practice test

Mark allocation: 40 marks

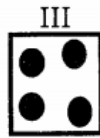
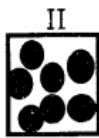
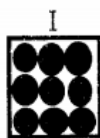
Time allocation: 40 minutes

1. Four options are provided as possible answers to the following questions. Each question has only one correct answer. Write only the letter (A-D) next to the question number.
 - 1.1 The temperature of a substance depends on: **(2)**
 - A. The number of molecules in the substance
 - B. The density of a substance
 - C. Forces of attraction between the molecules
 - D. The kinetic energy of the molecules
 - 1.2 The change in the phase of matter from the gaseous phase to the liquid phase is known as: **(2)**
 - A. Evaporation
 - B. Melting
 - C. Condensation
 - D. Sublimation
 - 1.3 Which ONE of the following statements best explains why gases are easily compressed? **(2)**
 - A. Gases are made up of particles which are in constant motion
 - B. The distance between the particles is large
 - C. The distance between the particles is small
 - D. The kinetic energy of the particles does not change
 - 1.4 Which of the following statements below how air pressure changed with elevation and temperature: **(2)**
 - A. Air pressure increases with increased elevation and with increased temperature
 - B. Air pressure decreases with increased elevation and with increased temperature
 - C. Air pressure increases with increased elevation and decreases with increased temperature
 - D. Air pressure decreases with increased elevation and increases with increased temperature

2. Learners investigated the melting and boiling points of 6 substances, **A–F**, and the results are given in the table below.

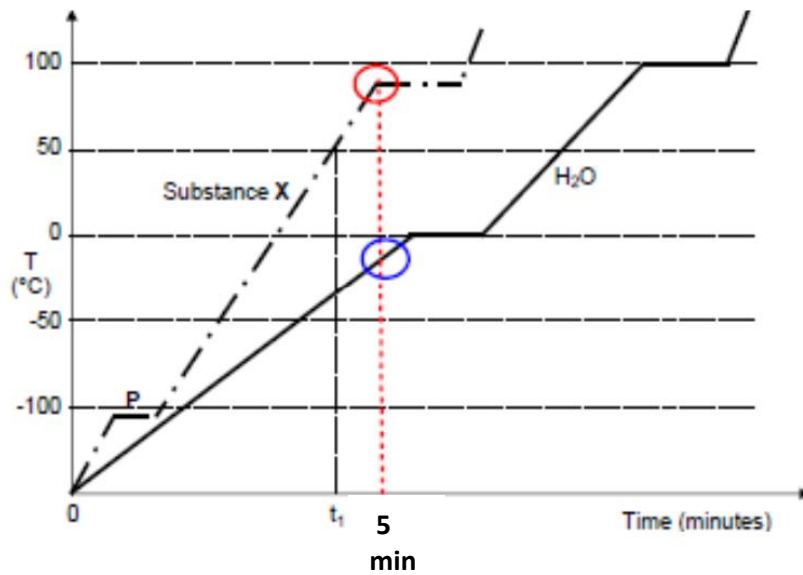
Substance	Melting point (°C)	Boiling point (°C)
A	3000	4200
B	200	500
C	-200	-150
D	-5	15
E	-300	-220
F	1083	2567

- 2.1 Define the term boiling point. (2)
- 2.2 For the above investigation, write down:
- 2.2.1 The dependent variable. Explain. (1)
- 2.2.2 The independent variable. (1)
- 2.2.3 A controlled variable. (1)
- 2.2.4 An investigative question. (2)
- 2.3 From the above table of results, write down the letter/s (**A–F**) of any substance/s that:
- 2.3.1 Is a gas at 25 °C. (2)
- 2.3.2 Is a liquid at 300 °C. (2)
- 2.4 From the above table, which substance has the strongest forces of attraction between particles. Explain. (2)
- 2.5 Which diagram represents the particle arrangement of substance C in the table above at -120°C ? Write only I, II or III. (1)



3. Container A contains 1 litre of water. Container B contains 1 L of petrol. Both containers are left open at a temperature of 25°C. After 50 minutes, half of the liquid in container A has “disappeared”.
- 3.1 What happened to the liquid that “disappeared”? (1)
- 3.2 If left open long enough the liquid in both containers will “disappear”. Explain this phenomenon as the molecular level. (2)
- 3.3 How does the average kinetic energy of the molecules in container A compare with the average kinetic energy of the molecules in container B? Explain. (2)
- 3.4 What can be done to prevent the liquid from “disappearing”? (1)

4. The two graphs (not drawn to scale) below represent the change in temperature of two substances, **X** and H_2O (water) when heated for a certain time. Both substances are in the solid phase at $t=0$ minutes:



- 4.1 Is the boiling point of X HIGHER THAN, LOWER THAN or THE SAME AS the boiling point of water (H_2O)? (1)
- 4.2 In what phase is:
- 4.2.1 H_2O when substance X begins to change into a gas? (1)
- 4.2.2 Substance X when H_2O begins to melt? (1)
- 4.3 In what phase is each substance when the temperature is -10°C ? (2)
- 4.4 Write down the physical state of substance X at 5 minutes. (1)
- 4.5 What process takes place in substance X as represented by the flat part of the graph at P? (1)
- 4.6 What is the physical state of the substance X at P? (2)
- 4.7 Explain what happens at a particle level at P. (3)



Practice test memo

1.
 - 1.1 D✓✓
 - 1.2 C✓✓
 - 1.3 B✓✓
 - 1.4 B✓✓

2.
 - 2.1 The temperature at which the vapour pressure of a liquid equals the atmospheric pressure✓✓
 - 2.2
 - 2.2.1 Melting point and/or boiling point✓ They depend on the substance✓
 - 2.2.2 Type of substance/substance A-F✓ This is the variable that is being controlled✓
 - 2.2.3 Same surrounding room temperature✓ same volume of each substance, same heating rate of each substance, same heating equipment for each substance, same type of container for each substance, same measuring device/thermometer to measure the temperature of each substance
 - 2.2.4 What are the melting and boiling points of different substances?✓✓
What is the relationship between temperature and the melting/boiling points of different substances?
 - 2.3
 - 2.3.1 C,D,E✓
 - 2.3.2 B✓
 - 2.4 Substance A✓ has the highest boiling point✓
 - 2.5 II✓

3.
 - 3.1 Evaporated✓
 - 3.2 The surface particles get bumped off by particles below them in the liquid✓ giving those particles enough energy to escape the liquid and turn to gas✓
 - 3.3 Same✓ kinetic energy of the particles depends on temperature✓ both liquids are at the same surrounding temperature of 25°C
 - 3.4 Cover the containers✓

4.
 - 4.1 Higher✓
 - 4.2
 - 4.2.1 Solid✓
 - 4.2.2 Liquid✓
 - 4.3 Water is a solid✓ X is a liquid✓
 - 4.4 Liquid✓
 - 4.5 Melting✓
 - 4.6 Solid and liquid✓
 - 4.7 The temperature is the same since the kinetic energy of the particles remains the same✓
This is because all the energy is going into weakening the intermolecular forces of attraction between the particles✓
The particles move further apart and therefore gain potential energy✓