

Forces between particles and what they decide

AP Chemistry · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test lasts 45 minutes and is worth 20 points. Answer all questions, show your working for calculations and use the correct units. For explanations, name the intermolecular force and compare its strength.

Level: AP Chemistry · **Curriculum:** AP Chem Unit 3

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Naming forces (2 marks)

Name the strongest intermolecular force in liquid CH_3OH and in liquid CH_3Cl .

Question 2 Boiling point trend (3 marks)

The boiling points of Cl_2 , Br_2 and I_2 are $-34\text{ }^\circ\text{C}$, $59\text{ }^\circ\text{C}$ and $184\text{ }^\circ\text{C}$.

- Name the force acting between the molecules. (1 mark)
- Explain the trend. (2 marks)

Question 3 Vapour pressure (3 marks)



A liquid in a closed container.

The diagram shows a liquid in a closed flask at $25\text{ }^\circ\text{C}$.

- State what is meant by equilibrium vapour pressure. (2 marks)
- Explain what happens to the vapour pressure when the temperature rises to $40\text{ }^\circ\text{C}$. (1 mark)

Question 4 Ethanol and ethoxyethane (3 marks)

Ethanol ($\text{C}_2\text{H}_5\text{OH}$) boils at 78°C and ethoxyethane ($\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$) boils at 35°C although it is heavier (74.1 g/mol against 46.1 g/mol). Explain why.

Question 5 Clausius-Clapeyron (3 marks)

A liquid has $\Delta H_{\text{vap}} = 30.0\text{ kJ/mol}$ and vapour pressure of 20.0 kPa at 300 K . Calculate its vapour pressure at 320 K ($R = 8.314\text{ J/(mol}\cdot\text{K)}$).

Question 6 Types of solid (2 marks)

Classify solid silicon dioxide (quartz) and solid iodine, and explain why one melts above 1700°C and the other near 114°C .

Question 7 Altitude cooking (2 marks)

Explain why a pressure cooker cooks food faster than an open pan.

Question 8 Rank three liquids (2 marks)

Substance A	Substance B	Substance C
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ butane	CH_3COCH_3 propanone	$\text{CH}_3\text{CH}_2\text{OH}$ ethanol

Three liquids for comparison.

The molar masses are 58.1 , 58.1 and 46.1 g/mol . Rank A, B and C in order of increasing boiling point and justify.