IM Practice Test Questions

Question 1

A sample of CH_3OH reaches its boiling point and begins to boil. Which of the following occurs during the boiling process?

- a) The C-H bonds inside the methanol molecule are broken
- b) The O-H bonds inside the methanol molecule are broken.
- c) The overall temperature of the methanol sample rises.
- d) The hydrogen bonds between methanol molecules are broken.

Question 2

Which would be most attracted to a polar solvent such as water?

- a. Acetone
- b. Dimethyl ether
- c. Methanol
- d. Pentane

Question 3

Rank the molecules from highest to lowest vapor pressure

- a) Ethene > Propane > Acetaldehyde > Methanol
- b) Methanol > Acetaldehyde > Propane > Ethene
- c) Propane > Acetaldehyde > Ethene > Methanol
- d) Acetaldehyde > Methanol > Ethene > Propane

Question 4

Which one of the following classifications is **incorrect**?

- (a) NaF(s), ionic solid
- (b) $H_2O(s)$, molecular solid
- (b) $C_5H_{12}(s)$, molecular solid
- (c) $SiO_2(s)$, network covalent solid
- (e) S(s), metallic solid

Question 5

Which of the following compounds would be expected to have the highest melting point?

- (a) CaF_2
- (b) CaCl₂
- (c) CaBr₂
- (d) CaI_2

What type of intermolecular forces exist because of the attraction between temporary dipoles and induced temporary dipoles?

- (a) Dipole-dipole forces
- (b) London dispersion forces
- (c) Hydrogen bond interactions
- (d) Ionic bonding

Question 7

Rank the ionic bond strength for the following ionic compounds, from weakest to strongest:

Question 8

Which of the following has the highest boiling point?

- (a) CH₄
- (b) C_2H_6
- (c) $C_{3}H_{8}$
- (d) C_4H_{10}
- (e) C_5H_{12}

Question 9

Which probably has the **lowest** boiling point under standard conditions?

- (a) HF
- (b) HCl
- (c) HBr
- (d) HI

Question 10

Which of the following substances can be melted without breaking chemical bonds?

- (a) diamond
- (b) barium carbonate
- (c) magnesium chloride
- (d) sulfur dioxide
- (e) silicon dioxide

Examine each set of liquids shown below. Which of the pairs are most likely to be miscible?

- 1. Water and ethanol (C₂H₅OH)
- 2. Benzene (C_6H_6) and pentane (C_5H_{10})
- 3. Hexane (C_6H_{12}) and water
- (a) 1, 2 only
 (b) 2 only
 (c) 1 only
- (d) 1, 2, 3
- (e) 2, 3 only

Question 12

Which of the following has the highest lattice energy?

- a) LiF
- b) NaF
- c) NaCl
- d) NaI
- e) KI

Question 13

Samples of which of the following compounds are capable of hydrogen bonding?

 CH_4 , NH_3 , CH_3NH_2 , H_2Te , HF

a) NH₃, H₂Te
b) NH₃, CH₃NH₂
c) CH₄, NH₃, H₂Te
d) CH₃NH₂, HF, NH₃
e) HF, H₂Te

Question 14

Organize the following molecules from lowest to highest boiling point.

The highest vapor pressure occurs for which of the following combinations of chemical and temperature?

- a) C₅H₁₂ at 300 K
- b) C_5H_{12} at 250 K
- c) C_4H_8 at 300 K
- d) C₄H₈ at 250 K
- e) C₃H₇OH at 300 K

Question 16

How many of the following compounds are capable of dipole-dipole interactions.

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PCl_5 \quad XeF_2 \quad CO_2 \quad H_2CO \quad BrF_5
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- a) None
- b) One
- c) Two
- d) Three
- e) All

Question 17

Hexane, C_6H_{14} (molar mass = 86 g/mol) has a boiling point of 68°. Ethanol, CH_3CH_2OH (molar mass = 46 g/mol) has a boiling point of 78°. Which of the following statements are true?

I. Ethanol has stronger intermolecular attractions since it has a higher boiling point.

II. London dispersion forces are the primary reason that ethanol has a higher boiling point.

III. Both molecules are capable of hydrogen bonding interactions.

IV. Ethanol's higher boiling can be explained by its capability for hydrogen bonding interactions.

V. Hexane's larger London dispersion interactions are responsible for hexane's higher boiling point

- a) Only I and IV are true
- b) Only II is true
- c) Only I is true
- d) I, II, III and IV are all true
- e) I, III and IV are true

Which of the following compounds is capable of hydrogen bonding?

- a) CH₃COCH₃
- b) CH₃OCH₃
- c) H₂CO
- d) CH₃F
- e) CH₃CH₂OH

Question 19

The highest viscosity occurs for which of the following combinations of chemical and temperature?

- a) $C_5H_{10}OH$ at 250 K
- b) $C_5H_{10}OH$ at 300 K
- c) C_4H_6OH at 300 K
- d) C_4H_6OH at 250 K
- e) C_3H_7OH at 300 K

Question 20

 CH_2F_2 has a dipole moment of 1.93 D and a boiling point of -52 °C. CH_2Cl_2 has a dipole moment of 1.60 D and a boiling point of 40 °C.

What explanation provides the best reasoning for the observed trend in boiling point?

- a) CH_2F_2 is capable of hydrogen bonding whereas CH_2Cl_2 is not.
- b) CH_2F_2 has stronger dipole-dipole interactions than CH_2Cl_2 .
- c) CH_2Cl_2 has stronger London dispersion interactions than CH_2F_2 .
- d) CH_2Cl_2 is ionic whereas CH_2F_2 is not.

Question 21

Which of the following substances is most likely to contain ionic bonding?

- a) A solid at room temperature with a low melting point which does not conduct electricity
- b) A solid at room temperature with a high melting point which does not conduct electricity
- c) A solid at room temperature with a high melting point which conducts electricity when solid

Which chemical is most likely NaCl based on the data given in the table

Substance	Conductivity as a Solid	Conductivity as a Liquid	Conductivity in Water	
Α	None	None	High None	
В	High	High		
С	None	High	High	
D	High	None	None	

Question 23

Which one of the following classifications is incorrect?

- a) CO_2 (g), molecular compound
- b) SiO₂ (s), molecular compound
- c) NaCl (s), ionic crystal
- d) SiC(s), network covalent material
- e) CaO(s), ionic crystal

Question 24

Given the data shown, which selection correctly identifies the most likely bonding present?

- a) Ionic Compound (A), Molecular Compound (B), Network Covalent Compound (C)
- b) Ionic Compound (C), Molecular Compound (A), Network Covalent Compound (B)
- c) Ionic Compound (C), Molecular Compound (B), Network Covalent Compound (D)
- d) Ionic Compound (B), Molecular Compound (D), Network Covalent Compound (C)

Substance	Conductivity as a Solid	Conductivity as a Liquid	Solubility in Water	Melting Point (°C)
А	None	None	Low	-7.2
В	None	None	None	1,710
С	None	High	High	770
D	High	None	None	550

Question 25

The alloys bronze and steel are shown in the diagrams. Which answer correctly relates the malleabilities of the alloys to the malleability of the pure metal structure?

- a) Both metal alloys would show increased malleability compared to their pure metal forms.
- b) Both metal alloys would show decreased malleability compared to their pure metal forms.

c) Bronze would show similar malleability when compared to pure copper but Steel would show decreased malleability compared to pure iron.

d) Bronze would show decreased malleability when compared to pure copper but Steel would show increased malleability compared to pure iron.



Brass is an alloy made of copper and zinc. Which diagram best shows the arrangement of copper and zinc atoms within the alloy? What type of alloy is brass?



Question 27

The figure shows two closed containers. Each contains the same volume of ethanol in equilibrium with its vapor at the same temperature. The vapor pressure of the ethanol is:

- a) Higher in container 1 because the surface area of the liquid is greater
- b) Lower in container 1 because the level of the liquid is lower
- c) The same in both containers because the volume of the liquid is the same
- d) The same in both containers because the temperature is the same





Container 1

Container 2