

Chemistry
Standard level
Paper 1A

Practice paper

Topic: Chemical Bonding & Structure (Topic 4)

1. Which of the following statements about ionic bonding is correct?
 - A. It involves the sharing of electrons between non-metal atoms
 - B. It is the electrostatic attraction between oppositely charged ions
 - C. It only occurs between molecules
 - D. It involves delocalized electrons

2. Which substance has a giant covalent lattice structure?
 - A. Sodium Chloride
 - B. Diamond
 - C. Sulfur dioxide
 - D. Phosphorus(V) oxide

3. What is the shape and bond angle of the methane molecule (CH_4)?
 - A. Linear, 180 degrees
 - B. Trigonal planar, 120 degrees
 - C. Tetrahedral, 109.5 degrees
 - D. Bent, 104.5 degrees

4. Which molecule contains a double covalent bond?
 - A. F_2
 - B. O_2
 - C. N_2
 - D. H_2O

5. Which type of intermolecular force is the strongest?
 - A. London dispersion forces
 - B. Dipole-dipole forces
 - C. Hydrogen bonding
 - D. Covalent bonding

6. Which set of molecules is arranged in order of increasing boiling point?
 - A. $\text{H}_2\text{O} < \text{H}_2\text{S} < \text{H}_2\text{Se}$
 - B. $\text{CH}_4 < \text{C}_2\text{H}_6 < \text{C}_3\text{H}_8$
 - C. $\text{NH}_3 < \text{PH}_3 < \text{AsH}_3$
 - D. $\text{HF} < \text{HCl} < \text{HBr}$

7. Which of the following compounds is likely to be soluble in water?
 - A. Cyclohexane (C_6H_{12})
 - B. Iodine (I_2)
 - C. Ethanol ($\text{C}_2\text{H}_5\text{OH}$)

D. Methane (CH₄)

8. Metallic bonding is best described as:

- A. Attraction between positive ions and delocalized electrons
- B. Attraction between neutral atoms
- C. Sharing of electron pairs
- D. Attraction between polar molecules

9. Which molecule has a trigonal pyramidal shape?

- A. BF₃
- B. NH₃
- C. CH₄
- D. CO₂

10. What is the correct Lewis structure for Nitrogen (N₂)?

- A. N-N
- B. N=N
- C. N triple bond N
- D. N.N

11. Which molecule has a permanent dipole?

- A. CO₂
- B. CCl₄
- C. HCl
- D. BeCl₂

12. Which transition represents an increase in potential energy during bond formation?

- A. Atoms moving closer from infinity to the bond length
- B. Breaking a covalent bond
- C. Forming an ionic lattice
- D. Condensing a gas to a liquid

13. Which of the following is correct for the bond angles in H₂O and NH₃?

- A. H₂O > NH₃
- B. H₂O < NH₃
- C. H₂O = NH₃
- D. Both are 109.5 degrees

14. What happens to the electrical conductivity of an ionic compound when it melts?
- A. Decreases because ions are further apart
 - B. Stays the same
 - C. Increases because ions become mobile
 - D. Increases because electrons become delocalized
15. Which of the following is a polar molecule with non-polar bonds?
- A. NH_3
 - B. CHCl_3
 - C. No such molecule exists
 - D. O_3 (Ozone)
16. Which of the following substances has the highest electrical conductivity in the solid state?
- A. Graphite
 - B. Sodium chloride
 - C. Diamond
 - D. Silicon dioxide
17. Which statement explains why CO_2 is non-polar?
- A. The C-O bonds are non-polar
 - B. The molecule is asymmetrical
 - C. The bond dipoles cancel each other out due to shape
 - D. Oxygen is not more electronegative than carbon
18. Which pair of elements will form an ionic bond?
- A. Carbon and Oxygen
 - B. Sodium and Fluorine
 - C. Nitrogen and Chlorine
 - D. Sulfur and Hydrogen
19. Which molecule contains the shortest Carbon-Carbon bond?
- A. C_2H_6
 - B. C_2H_4
 - C. C_2H_2
 - D. C_6H_6
20. Which force is responsible for the high boiling point of water relative to other Group 16 hydrides?
- A. Covalent bonding

- B. Hydrogen bonding
- C. Ionic bonding
- D. London forces

21. Which molecule has a bent shape?

- A. BeCl_2
- B. SO_2
- C. BF_3
- D. CH_4

22. Which of the following contains both ionic and covalent bonds?

- A. NaCl
- B. H_2SO_4
- C. NaOH
- D. CH_3OH

23. What is the coordinate number of Na^+ in the NaCl crystal lattice?

- A. 4
- B. 6
- C. 8
- D. 12

24. Which factor increases the strength of metallic bonding?

- A. Increasing ionic radius and decreasing charge
- B. Decreasing ionic radius and increasing charge
- C. Increasing the number of protons only
- D. Decreasing the number of delocalized electrons

25. Which molecule does NOT follow the octet rule (SL level exceptions)?

- A. CH_4
- B. BF_3
- C. NH_3
- D. H_2O

26. Which of the following has a coordinate covalent (dative) bond?

- A. NH_3
- B. NH_4^+
- C. CH_4
- D. H_2O

27. Which compound has the highest lattice enthalpy?

- A. NaCl
- B. MgCl₂
- C. MgO
- D. NaF

28. Which of the following is true for London dispersion forces?

- A. They only exist in polar molecules
- B. They increase with increasing molar mass
- C. They are caused by permanent dipoles
- D. They are stronger than hydrogen bonds

29. Bond order of Oxygen (O₂) is:

- A. 1
- B. 2
- C. 3
- D. 1.5

30. Which of the following consists of molecules?

- A. SiO₂
- B. NaCl
- C. P₄O₁₀
- D. Fe