

Chapter04 Bonding_SL

1. Which two atoms form the most polar bond?

- A. C and F
- B. C and Cl
- C. Si and F
- D. Si and Cl

2. Which combination describes the sulfate(IV) ion, SO_3^{2-} (also known as sulfite ion)?

	Number of electron domains around S	Electron domain geometry	Molecular geometry	O-S-O angle
A.	3	trigonal planar	trigonal planar	120°
B.	3	tetrahedral	trigonal pyramidal	109.5°
C.	4	trigonal pyramidal	trigonal pyramidal	107°
D.	4	tetrahedral	trigonal pyramidal	107°

3. Which correctly states the strongest intermolecular forces in the compounds below?

	CH_4	CH_3Cl	CH_3NH_2
A.	dipole-dipole	London forces	hydrogen bonding
B.	London forces	dipole-dipole	hydrogen bonding
C.	hydrogen bonding	London forces	dipole-dipole
D.	London forces	hydrogen bonding	dipole-dipole

4. Which bonds cause the boiling point of water to be significantly greater than that of hydrogen sulfide?

- A. London (dispersion)
- B. Covalent
- C. Ionic
- D. Hydrogen

5. What are the approximate bond angles and structure of crystalline SiO₂?

	O-Si-O	Structure
A.	90°	giant molecule
B.	109°	giant molecule
C.	180°	small molecule
D.	180°	giant molecule

6. Which metal has the strongest metallic bond?

- A. Li
- B. Na
- C. K
- D. Rb

7. Between which pair of molecules can hydrogen bonding occur?

- A. CH₄ and H₂O
- B. CH₃OCH₃ and CF₄
- C. CH₄ and HF
- D. CH₃OH and H₂O

8. Which compound has resonance structures?

- A. C_6H_{12}
- B. CH_3CHO
- C. $NaBr$
- D. Na_2CO_3

9. Which of the following are van der Waals' forces?

- I. Dipole-dipole forces
- II. Hydrogen bonds
- III. London (dispersion) forces

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

10. Which substance has a giant covalent structure?

	Melting point / °C	Solubility in water	Electrical conductivity in the molten state
A.	186	high	none
B.	801	high	good
C.	1083	low	good
D.	1710	low	none

11. Which pair of molecules has the same bond angles?

- A. PCl_3 and BCl_3
- B. SO_2 and CO_2
- C. H_2O and NH_3
- D. CCl_4 and SiH_4

12. Which molecule is non-polar?

- A. OF_2
- B. NH_3
- C. BF_3
- D. SO_2

13. Which molecules react to form a dative covalent (coordinate) bond?

- A. CH_4 and NH_3
- B. C_2H_2 and Cl_2
- C. NH_3 and HF
- D. Cl_2 and HF

14. What describes the structure of silicon and silicon dioxide?

	Silicon		Silicon Dioxide	
	Shape	Si-Si bonds per silicon atom	Shape	Si-O bonds per silicon atom
A.	planar	4	planar	4
B.	linear	2	linear	2
C.	tetrahedral	4	linear	2
D.	tetrahedral	4	tetrahedral	4

15. Which statement is correct about carbon-oxygen bond lengths?

- A. The C–O bond lengths are equal in propanoic acid, $\text{C}_2\text{H}_5\text{COOH}$.
- B. The C–O bond length in carbon dioxide, CO_2 , is longer than the C–O bond length in methanol, CH_3OH .
- C. The C–O bond length in carbon dioxide, CO_2 , is longer than the C–O bond length in carbon monoxide, CO .
- D. The C–O bond lengths are equal in ethyl ethanoate, $\text{CH}_3\text{COOC}_2\text{H}_5$.

16. Which compounds have an ionic lattice structure in the solid state?

- I. Silicon dioxide
 - II. Sodium fluoride
 - III. Ammonium nitrate
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

17. How do the bond angles in CH_4 , NH_3 and H_2O compare?

- A. $\text{CH}_4 = \text{NH}_3 = \text{H}_2\text{O}$
- B. $\text{CH}_4 < \text{NH}_3 < \text{H}_2\text{O}$
- C. $\text{NH}_3 < \text{CH}_4 < \text{H}_2\text{O}$
- D. $\text{H}_2\text{O} < \text{NH}_3 < \text{CH}_4$

18. Which particles are responsible for electrical conductivity in metals?

- A. Anions
 - B. Cations
 - C. Electrons
 - D. Protons
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