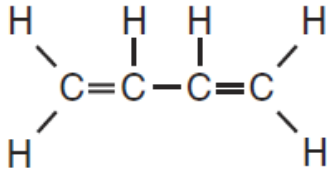


- Which compound has covalent bonds?
A) **H₂O** B) Li₂O C) Na₂O D) K₂O
- What is the number of electrons shared between the atoms in a molecule of nitrogen, N₂?
A) 8 B) 2 C) 3 **D) 6**
- Which substance has nonpolar covalent bonds?
A) **Cl₂** B) SO₃ C) SiO₂ D) CCl₄
- Which statement describes a multiple covalent bond?
A) Two electrons are shared.
B) Four electrons are shared.
C) Two electrons are transferred.
D) Four electrons are transferred.
- What is formed when two atoms of bromine bond together?
A) a monatomic molecule
B) a diatomic molecule
C) a heterogeneous mixture
D) a homogeneous mixture
- Which compound has both ionic and covalent bonding?
A) **CaCO₃** B) CH₂Cl₂
C) CH₃OH D) C₆H₁₂O₆
- Given the formula of a substance:


What is the total number of shared electrons in a molecule of this substance?
A) **22** B) 11 C) 9 D) 6
- Which two substances are covalent compounds?
A) C₆H₁₂O₆(s) and KI(s)
B) C₆H₁₂O₆(s) and HCl(g)
C) KI(s) and NaCl(s)
D) NaCl(s) and HCl(g)

- Which element has atoms that can form single, double, and triple covalent bonds with other atoms of the same element?
A) hydrogen B) oxygen
C) fluorine **D) carbon**
- An unknown substance, liquid X, is tested in the laboratory. The chemical and physical test results are listed below.
 - Nonconductor of electricity
 - Insoluble in water
 - Soluble in hexane
 - Low melting point as a solid
 - Combustion produces only CO₂ and H₂O

Based on these results, a student should conclude that liquid X is
A) ionic and organic
B) ionic and inorganic
C) covalent and organic
D) covalent and inorganic
- Which molecule will have a double covalent bond?
A) F₂ **B) O₂** C) Cl₂ D) N₂
- Multiple covalent bonds exist in a molecule of
A) F₂ **B) N₂** C) Br₂ D) H₂
- Which is the correct electron-dot formula for a hydrogen molecule at STP?
A) H· B) H: C) H·H **D) H:H**
- Which formula represents a molecular solid?
A) NaCl(s) **B) C₆H₁₂O₆(s)**
C) Cu(s) D) KF(s)
- In the formula for the compound XCl₄, the X could represent
A) C B) H C) Mg D) Zn
- The bonding in NH₃ is most similar to the bonding in
A) H₂O B) NaCl C) MgO D) KF

17. Which statement correctly describes diamond and graphite, which are different forms of solid carbon?

- A) They differ in their molecular structure, only.
- B) They differ in their properties, only.
- C) They differ in their molecular structure and properties.**
- D) They do not differ in their molecular structure or properties.

18. Which characteristic is a property of molecular substances?

- A) good heat conductivity
- B) good electrical conductivity
- C) low melting point**
- D) high melting point

19. Which elements can react to produce a molecular compound?

- A) calcium and chlorine
- B) hydrogen and sulfur**
- C) lithium and fluorine
- D) magnesium and oxygen

20. Atoms of which element can bond to each other to form chains, rings, and networks?

- A) carbon**
- B) fluorine
- C) hydrogen
- D) oxygen

21. The bond between which two atoms is most polar?

- A) C-O
- B) F-F
- C) H-O**
- D) N-H

22. The *least* polar bond is found in a molecule of

- A) HI**
- B) HF
- C) HCl
- D) HBr

23. An atom of which element reacts with an atom of hydrogen to form a bond with the greatest degree of polarity?

- A) carbon
- B) fluorine**
- C) nitrogen
- D) oxygen

24. Which formula represents a nonpolar molecule containing polar covalent bonds?

- A) $\text{H}-\text{H}$
- B) $\text{O}=\text{C}=\text{O}$**
- C) $\begin{array}{c} \text{N} \\ / \quad | \quad \backslash \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$
- D) $\begin{array}{c} \text{O} \\ / \quad \backslash \\ \text{H} \quad \text{H} \end{array}$

25. Which molecule has a nonpolar covalent bond?

- A) $\text{H}-\text{H}$
- B) $\begin{array}{c} \text{H}-\text{N}-\text{H} \\ | \\ \text{H} \end{array}$
- C) $\text{H}-\text{O}-\text{H}$
- D) $\text{H}-\text{Cl}$

26. Which formula represents a molecule having a nonpolar covalent bond?

- A) $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{N}-\text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$
- B) $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{H} \\ | \\ \text{H} \end{array}$
- C) $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H}-\text{C}-\text{C}-\text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$
- D) $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H} \end{array}$

27. The chemical bond between which two atoms is most polar?

- A) C-N
- B) H-H
- C) S-Cl
- D) Si-O**

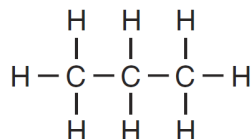
28. Which formula represents an asymmetrical molecule?

- A) CH_4
- B) CO_2
- C) N_2
- D) NH_3**

29. Which statement describes the charge distribution and the polarity of a CH_4 molecule?

- A) The charge distribution is symmetrical and the molecule is nonpolar.**
- B) The charge distribution is asymmetrical and the molecule is nonpolar.
- C) The charge distribution is symmetrical and the molecule is polar.
- D) The charge distribution is asymmetrical and the molecule is polar.

30. Given the formula representing a molecule:



Which statement explains why the molecule is nonpolar?

- A) Electrons are shared between the carbon atoms and the hydrogen atoms.
- B) Electrons are transferred from the carbon atoms to the hydrogen atoms.
- C) The distribution of charge in the molecule is symmetrical**
- D) The distribution of charge in the molecule is asymmetrical.

31. Which formula represents a polar molecule?

- A) H_2 **B) H_2O** C) CO_2 D) CCl_4

32. Which term represents an intermolecular force in a sample of water?

- A) hydrogen bonding**
- B) covalent bonding
- C) metallic bonding
- D) ionic bonding

33. The boiling points, at standard pressure, of four compounds are given in the table below.

Boiling Points of Four Compounds

Compound	Boiling Point ($^{\circ}\text{C}$)
H_2O	100.0
H_2S	-59.6
H_2Se	-41.3
H_2Te	-2.0

Which type of attraction can be used to explain the unusually high boiling point of H_2O ?

- A) ionic bonding
- B) hydrogen bonding**
- C) polar covalent bonding
- D) nonpolar covalent bonding

34. Which compound has the strongest hydrogen bonding between its molecules?

- A) HBr B) HCl **C) HF** D) HI

35. Which of the following compounds in the liquid phase has the highest normal boiling point?

- A) C_5H_{12}** B) C_4H_{10}
C) C_3H_8 D) C_2H_6

36. Which characteristic of the compound C_5H_{12} causes it to have a higher normal boiling point than C_2H_6 ?

- A) The distance between molecules of C_5H_{12} is greater.
- B) The force of attraction between molecules of C_5H_{12} is greater.**
- C) C_5H_{12} has a larger number of ionic bonds.
- D) C_5H_{12} has a larger number of double bonds.

-
- | | |
|--|--|
| <p>37. The <i>strongest</i> van der Waals forces of attraction exist between molecules of</p> <p>A) I₂ B) Br₂ C) Cl₂ D) F₂</p> <p>38. Argon has a higher boiling point than neon because argon has</p> <p>A) fewer electrons in its 2nd principal energy level</p> <p>B) more electrons in its outermost principal energy level</p> <p>C) weaker intermolecular forces of attraction</p> <p>D) stronger intermolecular forces of attraction</p> | <p>39. At 25°C, F₂ is a gas but I₂ is a solid. This is most likely due to the fact that</p> <p>A) F₂ is a dipole but I₂ is not</p> <p>B) I₂ is a dipole but F₂ is not</p> <p>C) F₂ molecules have stronger intermolecular attractions</p> <p>D) I₂ molecules have stronger intermolecular attractions</p> |
|--|--|
-

Answer Key
Practice Chemistry Exam 4

1. **A**

2. **D**

3. **A**

4. **B**

5. **B**

6. **A**

7. **A**

8. **B**

9. **D**

10. **C**

11. **B**

12. **B**

13. **D**

14. **B**

15. **A**

16. **A**

17. **C**

18. **C**

19. **B**

20. **A**

21. **C**

22. **A**

23. **B**

24. **B**

25. **A**

26. **C**

27. **D**

28. **D**

29. **A**

30. **C**

31. **B**

32. **A**

33. **B**

34. **C**

35. **A**

36. **B**

37. **A**

38. **D**

39. **D**