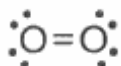

1. How many pairs of electrons are shared between the nitrogen atoms in a molecule of N₂?

- A) 5 B) 2 C) 3 D) 6

2. 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

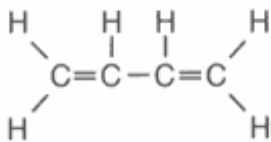
3. Given a formula for oxygen:



What is the total number of electrons shared between the atoms represented in this formula?

- A) 1 B) 2 C) 8 D) 4

4. 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

5. In which compound do atoms form bonds by sharing electrons?

- A) H₂O B) Na₂O C) CaO D) MgO

6. Which pair of atoms will share electrons when a bond is formed between them?

- A) Ba and I B) Br and Cl
C) K and Cl D) Li and I

7. Which formula represents a molecular compound?

- A) HI B) KI C) KCl D) LiCl

8. 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.
-

9. A chemist performs the same tests on two homogeneous white crystalline solids, *A* and *B*. The results are shown in the table below.

	Solid A	Solid B
Melting Point	High, 801°C	Low, decomposes at 186°C
Solubility in H ₂ O (grams per 100.0 g H ₂ O at 0°C)	35.7	3.2
Electrical Conductivity (in aqueous solution)	Good conductor	Nonconductor

The results of these tests suggest that

- A) both solids contain only ionic bonds
 B) both solids contain only covalent bonds
 C) solid *A* contains only covalent bonds and solid *B* contains only ionic bonds
 D) solid *A* contains only ionic bonds and solid *B* contains only covalent bonds
-
10. 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
11. Which pair of atoms has the most polar bond?
- A) H – Br B) H – Cl
 C) I – Br D) I – Cl
12. The electronegativity difference between the atoms in a molecule of HCl can be used to determine
- A) the entropy of the atoms
 B) the atomic number of the atoms
 C) the first ionization energy of the atoms
 D) the polarity of the bond between the two atoms
13. Which formula represents a molecule with the most polar bond?
- A) CO B) NO C) HI D) HCl
14. Given the formula:
- $$\begin{array}{ccccccc}
 & \text{H} & \text{H} & \text{H} & & & \\
 & | & | & | & & & \\
 \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{O} & - \text{H} & \\
 & | & | & | & & & \\
 & \text{H} & \text{H} & \text{H} & & &
 \end{array}$$
- The bond between which two atoms has the greatest degree of polarity?
- A) C and C B) C and O
 C) H and C D) H and O
15. Which molecule has a nonpolar covalent bond?
- A) H–H B) $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{N}-\text{H} \\ | \\ \text{H} \end{array}$
 C) $\text{H}-\text{O}-\text{H}$ D) H–Cl
16. 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) $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H} \end{array}$

17. The degree of polarity of a chemical bond in a molecule of a compound can be predicted by determining the difference in the
- A) melting points of the elements in the compound
 - B) densities of the elements in the compound
 - C) electronegativities of the bonded atoms in a molecule of the compound
 - D) atomic masses of the bonded atoms in a molecule of the compound
18. Which formula represents a nonpolar molecule containing polar covalent bonds?
- A) H₂O
 - B) CCl₄
 - C) NH₃
 - D) H₂
19. Which type of molecule is CF₄?
- A) polar, with a symmetrical distribution of charge
 - B) polar, with an asymmetrical distribution of charge
 - C) nonpolar, with a symmetrical distribution of charge
 - D) nonpolar, with an asymmetrical distribution of charge
20. Which bond is most polar?
- A) H—F
 - B) H—Cl
 - C) H—Br
 - D) H—I
21. Which of the following compounds has the highest boiling point?
- A) H₂O
 - B) H₂S
 - C) H₂Se
 - D) H₂Te
22. Which formula represents a polar molecule?
- A) O₂
 - B) CO₂
 - C) NH₃
 - D) CH₄
23. Which phrase describes a molecule of CH₄, in terms of molecular polarity and distribution of charge?
- A) polar with an asymmetrical distribution of charge
 - B) polar with a symmetrical distribution of charge
 - C) nonpolar with an asymmetrical distribution of charge
 - D) nonpolar with a symmetrical distribution of charge
24. Given the formula representing a molecule:
- $$\text{H} - \text{C} \equiv \text{C} - \text{H}$$
- The molecule is
- A) symmetrical and polar
 - B) symmetrical and nonpolar
 - C) asymmetrical and polar
 - D) asymmetrical and nonpolar
25. Which formulas represent two polar molecules?
- A) CO₂ and HCl
 - B) CO₂ and CH₄
 - C) H₂O and HCl
 - D) H₂O and CH₄
26. At STP, fluorine is a gas and bromine is a liquid because, compared to fluorine, bromine has
- A) stronger covalent bonds
 - B) stronger intermolecular forces
 - C) weaker covalent bonds
 - D) weaker intermolecular forces
27. Which statement explains why low temperature and high pressure are required to liquefy chlorine gas?
- A) Chlorine molecules have weak covalent bonds.
 - B) Chlorine molecules have strong covalent bonds.
 - C) Chlorine molecules have weak intermolecular forces of attraction.
 - D) Chlorine molecules have strong intermolecular forces of attraction.
28. Which formula represents a nonpolar molecule?
- A) H₂S
 - B) HCl
 - C) CH₄
 - D) NH₃
29. Which substance is correctly paired with its type of bonding?
- A) NaBr—nonpolar covalent
 - B) HCl—nonpolar covalent
 - C) NH₃—polar covalent
 - D) Br₂—polar covalent
30. Which of these substances has the strongest intermolecular forces?
- A) H₂O
 - B) H₂S
 - C) H₂Se
 - D) H₂Te

31. Hexane (C₆H₁₄) and water do *not* form a solution.

Which statement explains this phenomenon?

- A) Hexane is polar and water is nonpolar.
- B) Hexane is ionic and water is polar.
- C) Hexane is nonpolar and water is polar.
- D) Hexane is nonpolar and water is ionic.