**A. Matching**

Match each description in Column B with the correct term in Column A. Write the letter of the correct description on the line.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. coordinate covalent bond</td>
<td>a. shows the kinds and numbers present in a molecule of a compound</td>
</tr>
<tr>
<td>2. nonpolar covalent bond</td>
<td>b. chemical formula that shows the arrangement of atoms in molecules and polyatomic ions</td>
</tr>
<tr>
<td>3. hydrogen bond</td>
<td>c. a covalent bond between two atoms of different electronegativities in which the bonding electrons are not shared equally</td>
</tr>
<tr>
<td>4. double covalent bond</td>
<td>d. interaction caused by the motion of electrons</td>
</tr>
<tr>
<td>5. dispersion force</td>
<td>e. a covalent bond formed by the equal sharing of bonding electrons by two atoms</td>
</tr>
<tr>
<td>6. molecular formula</td>
<td>f. a covalent bond involving two pairs of electrons; each atom donates one pair of electrons to the bond</td>
</tr>
<tr>
<td>7. structural formula</td>
<td>g. a covalent bond in which three pairs of electrons are shared by two bonded atoms</td>
</tr>
<tr>
<td>8. polar bond</td>
<td>h. substance in which all of the atoms are covalently bonded to each other</td>
</tr>
<tr>
<td>9. triple covalent bond</td>
<td>i. a covalent bond between two atoms in which the shared electron pair comes from only one of the atoms</td>
</tr>
<tr>
<td>10. network solid</td>
<td>j. force that occurs when a hydrogen atom that is covalently bonded to a very electronegative atom is also weakly bonded to an unshared pair of electrons in the same or a nearby molecule</td>
</tr>
</tbody>
</table>
B. Multiple Choice

Choose the best answer and write its letter on the line.

_______  11. Which of these elements does not exist as a diatomic molecule?
   a. I        c. H
   b. F        d. He

_______  12. Which one of the following compounds is not covalent?
   a. SCl₂      c. HCl
   b. KCl       d. S₂Cl₂

_______  13. How many valence electrons does an atom of any halogen have?
   a. 1        c. 4
   b. 2        d. 7

_______  14. A diatomic molecule with a triple covalent bond is
   a. N₂        c. H₂
   b. Br₂       d. O₂

_______  15. A molecule of nitrous oxide, N₂O, \( \text{N} \equiv \text{N} \rightarrow \text{O} \) contains all of the following except
   a. a coordinate covalent bond.
   b. a triple bond.
   c. a double bond.
   d. nonbonding pairs of electrons.

_______  16. If a bonding pair of electrons is unequally shared between two atoms, the bond is
   a. ionic.
   b. nonpolar covalent.
   c. coordinate covalent.
   d. polar covalent.

_______  17. What is the electron dot structure for water?
   a. \( \text{H} \cdot \cdot \cdot \text{O} \cdot \cdot \text{H} \)
   b. \( \text{H} \cdot \cdot \cdot \text{H} \cdot \cdot \cdot \text{O} \cdot \cdot \cdot \text{H} \)
   c. \( \text{H} \cdot \cdot \cdot \text{O} \cdot \cdot \cdot \text{H} \)
   d. \( \text{H} \cdot \cdot \cdot \text{O} \cdot \cdot \cdot \text{H} \)

_______  18. Which of the following compounds is not ionic?
   a. NaI
   b. CaCl₂
   c. CO₂
   d. Na₂O

_______  19. A covalent bond forms
   a. when an element becomes a noble gas.
   b. when atoms share electrons.
   c. between metals and nonmetals.
   d. when electrons are transferred from one atom to another.

_______  20. What is the electron dot structure for the polyatomic ion OH⁻?
   a. \([\text{H} \cdot \cdot \cdot \text{O} \cdot \cdot \cdot \text{H}]^-\)
   b. \([\text{H} \cdot \cdot \cdot \text{O} \cdot \cdot \cdot \text{H}]^-\)
   c. \([\text{H} \cdot \cdot \cdot \text{O} \cdot \cdot \cdot \text{H}]^-\)
   d. \([\cdot \cdot \cdot \text{O} \cdot \cdot \cdot \text{H}]^-\)

_______  21. Which of these compounds would not have covalent bonds?
   a. NO₂
   b. K₂O
   c. N₂O₄
   d. H₂O₂
22. A molecule with a single covalent bond is
   a. CO₂.  c. NO.

23. Chlorine is a gas, bromine is a liquid, and iodine is a solid because of differences in the strength of their
   a. hydrogen bonds.  c. dipole interactions.
   b. dispersion forces. d. polar bonds.

24. When H⁺ forms a bond with H₂O to form hydronium ion, H₃O⁺, this bond is called a coordinate covalent
   bond because
   a. both bonding electrons come from the oxygen atom.
   b. it is an especially strong bond.
   c. the electrons are equally shared.
   d. the oxygen no longer has eight electrons surrounding it.

25. Which of the following molecules has one lone pair of electrons?
   a. CH₄  c. H₂O
   b. HCl    d. NH₃

26. Which of the following is the weakest?
   a. hydrogen bond  c. dipole interaction
   b. polar covalent bond  d. ionic bond

27. The carbon tetrachloride molecule is
   a. four-cornered.  c. tetrahedral.
   b. square.       d. pyramidal.

C. Questions

Answer the following questions in the space provided.

28. Draw structural formulas for the following substances.
   a. Br₂
   b. N₂
   c. CO

29. State whether the following compounds contain polar covalent bonds, nonpolar covalent bonds, or ionic bonds. (You may refer to the table of electronegativities on the top of the next page.)
   a. KF
   b. SO₂
   c. NO₂
The following covalent molecules have only single covalent bonds. Draw an electron dot structure for each one.

a. HBr

c. PCl₃

b. H₂O₂