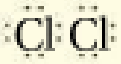
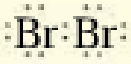
Lesson Check Answers

1. Molecular formulas show how many atoms of each element one molecule of a compound contains.
2. The representative unit of a molecular compound is a molecule. The representative unit of an ionic compound is a formula unit.
3. noble gases; monatomic
4. NO has 1 N atom and 1 O atom; N_2O has 2 N atoms and 1 O atom.
5. nitrogen (N_2) or oxygen (O_2)
6. Molecular structures show the arrangement of atoms in a molecule.

Answers

7. a. 

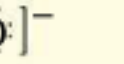
   b. 

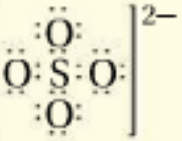
   c. 

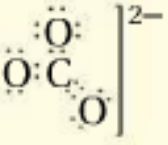
8. a. 

   b. 

Answers

9. 

10. a. 

    b. 

Used when molecules cannot be adequately drawn by one diagram.

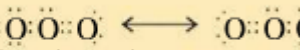
Lesson Check Answers

11. the configurations of noble gases

12. The shared electron pair comes from one of the bonding atoms. In other covalent bonds, each bonding atom provides an electron.

14 A large bond dissociation energy corresponds to a strong covalent bond.

13 The octet rule cannot be satisfied in molecules whose total number of valence electrons is an odd number. There are also molecules in which an atom has fewer, or more, than a complete octet of valence electrons.

15.  The actual bonding of oxygen atoms in ozone is a hybrid, or mixture, of the extremes represented by the resonance forms.

16. Two dots represent each covalent bond.

17. when they can attain a noble gas structure by sharing two pairs or three pairs of electrons

18. the arrangement of atoms in a molecule

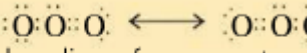
Lesson Check Answers

11. the configurations of noble gases

12. The shared electron pair comes from one of the bonding atoms. In other covalent bonds, each bonding atom provides an electron.

13. A large bond dissociation energy corresponds to a strong covalent bond.

14. The octet rule cannot be satisfied in molecules whose total number of valence electrons is an odd number. There are also molecules in which an atom has fewer, or more, than a complete octet of valence electrons.

15.  The actual bonding of oxygen atoms in ozone is a hybrid, or mixture, of the extremes represented by the resonance forms.

16. Two dots represent each covalent bond.

17. when they can attain a noble gas structure by sharing two pairs or three pairs of electrons

18. the arrangement of atoms in a molecule

19. The H-H bond is stronger because it has a greater dissociation energy.

20. **a.** 

b. 

c. 

Lesson Check Answers

21. When two atoms combine, their atomic orbitals overlap to produce molecular orbitals. An atomic orbital belongs to a particular atom, and a molecular orbital belongs to a molecule as a whole.

22. Each molecule assumes the shape that places valence-electron pairs as far apart as possible.

23. Orbital hybridization provides information about both molecular bonding and molecular shape.

24. **a.** trigonal planar
b. tetrahedral
c. linear

25. A sigma bond is formed by the overlap of two orbitals along the axis between two nuclei. See Figure 8.13.

26. a. 109.5° (tetrahedral),
b. 107° (pyramidal),
c. 105° (bent)

27. 3 sigma bonds and 2 pi bonds

28. tetrahedral

Sample Problems

29. Identify the type of BONDS between each atom. END 1.7 is the "cut off" between polar covalent and ionic.

    a. H and Br are moderately covalent (END 0.7)

    b. K and Cl are ionic (END 2.4) … alkali metal (1A) + halogen (7A)

    c. C and O are moderately to very polar covalent (END 0.9)

    d. Cl and F are moderately to very polar covalent (END 0.8) … two halogens

    e. Li and O are ionic (END 2.5)

    f. Br and Br are nonpolar covalent (END 0.0)

30. Place the bonds in order from least to most polar:

    H – S (END 0.4) & H – C (END 0.4)

    H – Br (END 0.7)

    H – Cl (END 1.0)

Lesson Check Answers

31. The more electronegative atom attracts electrons more strongly and gains a partial negative charge. The less electronegative atom has a partial positive charge.

32. Intermolecular attractions are weaker than either ionic or covalent bonds.

33. Because of the variety of intermolecular attractions.

34. The atoms in CCl_4 are oriented so that the bond polarities cancel.

35. a. $H^{\delta+}-O^{\delta-}-O^{\delta-}-H^{\delta+}$

b. $Br^{\delta+}-Cl^{\delta-}$

c. $H^{\delta+}-Br^{\delta-}$

d. $H^{\delta+}-O^{\delta-}-H^{\delta+}$

36. The atoms in a network solid are covalently bonded in a large array (or crystal), which can be thought of as a single molecule.

37. Polar molecules tend to become oriented with respect to the positive and negative plates.

38. **BIG**IDEA In dipole interactions, the slightly positive end of a polar molecule attracts the slightly negative end of