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Chapter 12
Chemical Bonding

I. Matching

Match the description in Column B with the correct term in Column A. Write the letter in the blank provided. Each term matches with only one description, so be sure to choose the best description for each term.

Column A

_____ 1. bond

_____ 2. bond energy

_____ 3. covalent bond

_____ 4. ionic compound

_____ 5. polar covalent bond

_____ 6. electronegativity

_____ 7. resonance

_____ 8. linear structure

_____ 9. trigonal planar structure

_____ 10. tetrahedral structure

_____ 11. trigonal pyramid structure

_____ 12. bent or V-shaped structure

Column B

A. 3 single bonds and a lone pair on central atom

B. more than one valid Lewis structure may be drawn for a molecule

C. electrons unequally shared by two atoms

D. 2 electron pairs (2 bonds) on central atom

E. energy required to break a bond

F. 2 single bonds and a lone pair on central atom

G. ability of an atom to attract shared electrons to itself

H. force that holds atoms together

I. 3 electron pairs (3 bonds) on central atom

J. formed by a metal and a nonmetal

K. electrons shared by two atoms

L. 4 electron pairs (4 bonds) on central atom

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_____ 14. To attain a noble gas configuration an atom of sulfur must

a) gain two electrons .
b) lose two electrons .
c) gain one electron.
d) lose one electron.

_____ 15. Which of these is NOT a characteristic of an ionic compound?

a) is a solid
b) has a low melting point
c) is composed of metallic and nonmetallic elements
d) when melted will conduct electricity

_____ 16. An ionic bond is formed

a) between two nonmetals.
b) when electrons are transferred from one atom to another.
c) when electrons are shared between atoms.
d) when an element changes into a noble gas.

_____ 17. A bond formed between two elements that have a *very* large difference in electronegativity is called:

a) a covalent bond
b) a polar covalent bond
c) a double bond
d) an ionic bond

_____ 18. Which of the following molecules has a single pair of shared electrons?

a) O_2
b) CO
c) Cl_2
d) N_2

_____ 19. Which of the following molecules has a dipole moment?

a) O_2
b) N_2
c) CO_2
d) HCl

_____ 20. Which of the following molecules exhibits resonance?

a) NH_3
b) SO_3
d) CCl_4
e) H_2S

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_____ 22. The shape of the NF_3 molecule is:

a) linear
b) bent
c) tetrahedral
d) trigonal pyramid

_____ 23. An example of a nonpolar molecule would be:

a) CO
b) H_2O
c) Br_2
d) HF

_____ 24. Which one of the following statements about solid sodium chloride is INCORRECT?

a) within the crystal, each sodium ion is surrounded by chloride ions
b) each sodium ion is attracted to chloride ions because of their opposite charges
c) each sodium ion is tightly bonded to only one chloride ion, forming molecules of NaCl, the "building blocks" of the crystal
d) the bonding in sodium chloride crystals is strong

_____ 25. Consider the three compounds NH_3, PH_3, and AsH_3. Which of the following statements about these compounds is INCORRECT?

a) each of the three molecules has a lone pair of electrons
b) each of the three molecules is trigonal planar
c) each of the molecules is polar
d) each of the molecules has covalent bonds

III. Free Response

Answer the question in the space provided.

26. Write the complete electron configuration for the simple ion that each of the following atoms forms, and indicate the element that has the same configuration as the ion.

a) Ca: _____ _____

b) Al: _____ _____

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27. Draw Lewis structures for each of the following molecules or ions. Predict the molecular structure for each.

	Lewis Structure	Molecular Structure
a) NI_3		
b) CS_2		
c) $COCl_2$ (C is central atom)		
d) NH_4^+		
e) OF_2		

28. Draw Lewis structures for the carbonate ion, CO_3^{2-}, showing all possible resonance structures.