Name _____ Date _____ Class _____

CHAPTER 6 REVIEW

Chemical Bonding

SECTION 1

SHORT ANSWER **Answer the following questions in the space provided.**

1. a A chemical bond between atoms results from the attraction between the valence electrons and _____ of different atoms.

(a) nuclei
(b) inner electrons
(c) isotopes
(d) Lewis structures

2. b A covalent bond consists of

(a) a shared electron.
(b) a shared electron pair.
(c) two different ions.
(d) an octet of electrons.

3. a If two covalently bonded atoms are identical, the bond is identified as

(a) nonpolar covalent.
(b) polar covalent.
(c) ionic.
(d) dipolar.

4. b A covalent bond in which there is an unequal attraction for the shared electrons is

(a) nonpolar.
(b) polar.
(c) ionic.
(d) dipolar.

5. c Atoms with a strong attraction for electrons they share with another atom exhibit

(a) zero electronegativity.
(b) low electronegativity.
(c) high electronegativity.
(d) Lewis electronegativity.

6. c Bonds that possess between 5% and 50% ionic character are considered to be

(a) ionic.
(b) pure covalent.
(c) polar covalent.
(d) nonpolar covalent.

7. a The greater the electronegativity difference between two atoms bonded together, the greater the bond's percentage of

(a) ionic character.
(b) nonpolar character.
(c) metallic character.
(d) electron sharing.

8. The electrons involved in the formation of a chemical bond are called valence electrons.

9. A chemical bond that results from the electrostatic attraction between positive and negative ions is called a(n) ionic bond.

Name _____ Date _____ Class _____

SECTION 1 continued

10. If electrons involved in bonding spend most of the time closer to one atom rather than the other, the bond is polar covalent.

11. If a bond's character is more than 50% ionic, then the bond is called a(n) ionic bond.

12. A bond's character is more than 50% ionic if the electronegativity difference between the two atoms is greater than 1.7.

13. Write the formula for an example of each of the following compounds:

Answers will vary.

H_2 **a.** nonpolar covalent compound

HCl **b.** polar covalent compound

NaCl **c.** ionic compound

14. Describe how a covalent bond holds two atoms together.

A pair of electrons is attracted to both nuclei of the two atoms bonded together.

15. What property of the two atoms in a covalent bond determines whether or not the bond will be polar?

electronegativity

16. How can electronegativity be used to distinguish between an ionic bond and a covalent bond?

The difference between the electronegativity of the two atoms in a bond will determine whether the bond is ionic or covalent. If the difference in electronegativity is greater than 1.7, the bond is considered ionic.

17. Describe the electron distribution in a polar-covalent bond and its effect on the partial charges of the compound.

The electron density is greater around the more electronegative atom, giving that part of the compound a partial negative charge. The other part of the compound has an equal partial positive charge.

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CHAPTER 6 REVIEW

Chemical Bonding

SECTION 2

SHORT ANSWER Answer the following questions in the space provided.

1. Use the concept of potential energy to describe how a covalent bond forms between two atoms.

As the atoms involved in the formation of a covalent bond approach each other, the electron-proton attraction is stronger than the electron-electron and proton-proton repulsions. The atoms are drawn to each other and their potential energy decreases. Eventually, a distance is reached at which the repulsions between the like charges equals the attraction of the opposite charges. At this point, potential energy is at a minimum and a stable molecule forms.

2. Name two elements that form compounds that can be exceptions to the octet rule.

Choose from hydrogen, boron, beryllium, phosphorus, sulfur, and xenon.

3. Explain why resonance structures are used instead of Lewis structures to correctly model certain molecules.

Resonance structures show that one Lewis structure cannot correctly represent the location of electrons in a bond. Resonance structures show delocalized electrons, while Lewis structures depict electrons in a definite location.

4. Bond energy is related to bond length. Use the data in the tables below to arrange the bonds listed in order of increasing bond length, from shortest bond to longest.

a.

Bond	Bond energy (kJ/mol)
H—F	569
H—I	299
H—Cl	432
H—Br	366

H—F, H—Cl, H—Br, H—I

SECTION 2 continued

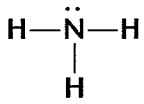
b.

Bond	Bond energy (kJ/mol)
C—C	346
C≡C	835
C=C	612

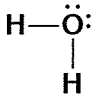
C≡C, C=C, C—C

5. Draw Lewis structures to represent each of the following formulas:

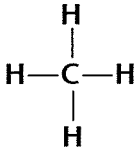
a. NH_3



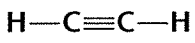
b. H_2O



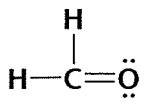
c. CH_4



d. C_2H_2



e. CH_2O



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CHAPTER 6 REVIEW

Chemical Bonding

SECTION 3

SHORT ANSWER **Answer the following questions in the space provided.**

1. a The notation for sodium chloride, NaCl, stands for one

(a) formula unit.
(b) molecule.
(c) crystal.
(d) atom.

2. d In a crystal of an ionic compound, each cation is surrounded by a number of

(a) molecules.
(b) positive ions.
(c) dipoles.
(d) negative ions.

3. b Compared with the neutral atoms involved in the formation of an ionic compound, the crystal lattice that results is

(a) higher in potential energy.
(b) lower in potential energy.
(c) equal in potential energy.
(d) unstable.

4. b The lattice energy of compound A is greater in magnitude than that of compound B. What can be concluded from this fact?

(a) Compound A is not an ionic compound.
(b) It will be more difficult to break the bonds in compound A than those in compound B.
(c) Compound B has larger crystals than compound A.
(d) Compound A has larger crystals than compound B.

5. b The forces of attraction between molecules in a molecular compound are generally

(a) stronger than the attractive forces among formula units in ionic bonding.
(b) weaker than the attractive forces among formula units in ionic bonding.
(c) approximately equal to the attractive forces among formula units in ionic bonding.
(d) equal to zero.

6. Describe the force that holds two ions together in an ionic bond.

The force of attraction between unlike charges holds a negative ion and a positive ion together in an ionic bond.

7. What type of energy best represents the strength of an ionic bond?

lattice energy

Name _____ Date _____ Class _____

SECTION 3 continued

8. What types of bonds are present in an ionic compound that contains a polyatomic ion?

The atoms in a polyatomic ion are held together with covalent bonds, but polyatomic ions combine with ions of opposite charge to form ionic compounds.

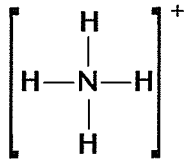
9. Arrange the ionic bonds in the table below in order of increasing strength from weakest to strongest.

Ionic bond	Lattice energy (kJ/mol)
NaCl	−787
CaO	−3384
KCl	−715
MgO	−3760
LiCl	−861

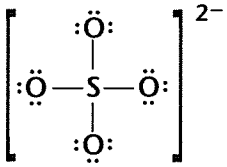
KCl, NaCl, LiCl, CaO, MgO

10. Draw Lewis structures for the following polyatomic ions:

a. NH_4^+



b. SO_4^{2-}



11. Draw the two resonance structures for the nitrite anion, NO_2^-.