

Chapter 13 Test

Chemical Bonding

Name Kay
Class _____ Date _____

Part I

Select the response that best completes each statement. Write the letter of each answer in the space provided on the left.

B 1. The nature of both ionic bonds and covalent bonds is _____.

- a. magnetic
- b. electrical
- c. gravitational
- d. frictional

D 2. A measure of bond strength is the _____.

- a. number of valence electrons
- b. relative atomic radii
- c. number of octets
- d. bond energy

A 3. Electrostatic attraction between cations and anions occurs in _____.

- a. ionic bonds
- b. nonpolar covalent bonds
- c. polar covalent bonds
- d. metallic bonds

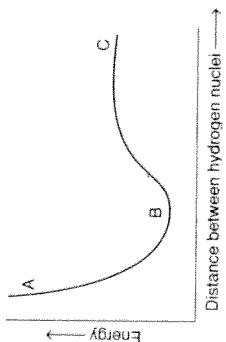
C 4. A covalent bond is characterized by the _____.

- a. formation of ions
- b. loss of valence electrons
- c. sharing of electrons
- d. increase in potential energy of atoms

B 5. An ionic compound consists of ions that collectively make up an(1) _____.

- a. series of molecules
- b. crystal lattice
- c. sea of electrons
- d. octet

Refer to the graph below to answer questions 6–8.



6. At which point has a covalent bond been formed?

B 7. At which point is the potential energy lowest?

A 8. At which point are the repulsive forces greater than the attractive forces?

Questions 9–14: Indicate whether the bonds in each of the following molecules are ionic (i), polar covalent (p), or nonpolar covalent (c). Electronegativities are given in the chart.

Element	Electronegativity
chlorine	3.0
fluorine	4.0
hydrogen	2.1
lithium	1.0
magnesium	1.2
nitrogen	3.0
oxygen	3.5
potassium	0.8
sulfur	2.5

Write the correct answer in the space provided.

15. The compound hydrogen iodide (HI) is polar covalent. Sketch a molecule of HI and show the charge distribution.
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Critical Thinking

16. Predict the type of bond that is most likely to be present in compounds made from elements of Groups 2A and 6A. Using electron dot (Lewis) symbols, show the formation of the compound magnesium oxide from the elements, and write the formula for this compound.
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Part II

Questions 17–24: Draw electron dot structures for the following compounds or polyatomic ions. In molecules containing carbon (C), the carbon atom is the central atom.

17. Cl₂

1C
AS-
AS

A5

Select the response that best completes each statement. Write the letter of each answer in the space provided on the left.

B 25. The phenomenon in which more than one electron dot structure represents the bonding pattern in a molecule is called _____.

- a. triple bonding
- b. resonance
- c. polarity
- d. Lewis structure

D 26. Compounds of the noble gases always _____.

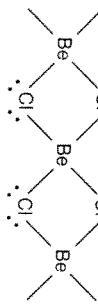
- a. follow the octet rule
- b. have fewer than eight valence electrons
- c. lack valence electrons
- d. have more than an octet of electrons

Write the correct answer in the space provided.

27. The compound BeF_2 is an exception to the octet rule. Draw its electron dot structure.



28. The molecule BeCl_2 , in the solid state, consists of long chains of atoms as shown below.

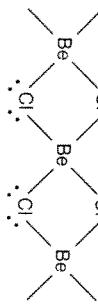


When it is heated, the chains are broken and BeCl_2 molecules are formed. Draw the electron dot structure for the BeCl_2 vapor molecule. Explain why the solid molecules are arranged in chains.

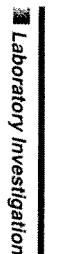


Critical Thinking

28. The molecule BeCl_2 , in the solid state, consists of long chains of atoms as shown below.



When it is heated, the chains are broken and BeCl_2 molecules are formed. Draw the electron dot structure for the BeCl_2 vapor molecule. Explain why the solid molecules are arranged in chains.



Critical Thinking

Write the correct answer in the space provided.

38. If a molecule with the formula AZ_2 is linear, with the dipoles aligned at 180° and pointing in opposite directions, the molecule will probably be (polar/nonpolar)

NONPOLAR

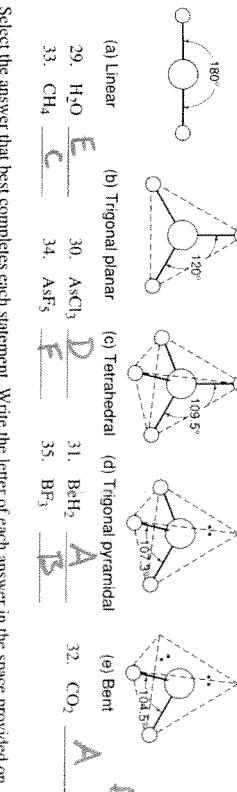
Laboratory Investigation

39. Fill in the table below for N_5 .

number of lone pairs	<u>0</u>
number of bond pairs	<u>5</u>
geometry	<u>Trig bipyramidal</u>

Part III

Questions 29–35: For each of the following, choose the letter of the drawing below that best represents its shape.



Select the answer that best completes each statement. Write the letter of each answer in the space provided on the left.

C 36. A molecule with polar bonds can be nonpolar if _____.

- a. the bonds are ionic
- b. the difference in electronegativity is zero
- c. the individual dipoles cancel each other
- d. no halogens are involved

B 37. An important factor in determining whether a molecule with polar bonds will be polar or nonpolar is the molecule's _____.

- a. shape
- b. dipole moment
- c. stability
- d. charge