

Covalent Bonding

Unit Review Packet

Learning Targets

Identify the information a molecular formula provides.

Describe the representative units that define molecular compounds and ionic compounds.

Explain the result of electron sharing in covalent bonds.

Explain how the strength of a covalent bond is related to its bond dissociation energy.

Describe how the VESPR theory helps predict the shapes of molecules.

Describe how electronegativity values determine the charge distribution in a polar molecules.

Evaluate the strengths of intermolecular attractions compared with the strengths of ionic and covalent bonds.

Explain why the properties of covalent compounds are so diverse.

1. Why do atoms form bonds?
2. What subatomic particles are involved most in the bonding process?
3. What type of atoms (metals, metalloids, nonmetals) are bonded to each other in an ionic bond?
4. How do atoms achieve a stable octet in an ionic bond?
5. What types of atoms (metals, metalloids, nonmetals) are bonded to each other in a covalent bond?
6. How do atoms achieve a stable octet in a covalent bond?
7. In a dot structure, how many electrons should be surrounding each atom?
8. What is one major exception to the rule in number 7?
9. What is an ionic bond?

10. What is a covalent bond?
11. What is the difference between a dot structure and line structure?
12. What do molecular formulas tell you about a molecule or compound?
13. What is a diatomic molecule? Give at least two examples of diatomic molecules.
14. Ionic compounds are typically in what state at room temperature?
15. Covalent molecules are typically in what state at room temperature?
16. Compare the melting point, solubility in water, and electrical conductivity of ionic and covalent compounds.
17. What are the three different types of covalent bonds? Explain when two atoms are likely to form each type.
18. Why do scientists use the VESPR theory?
19. What is a nonopolar covalent bond?
20. What is a polar covalent bond?

21. What is electronegativity?

22. What does the electronegativity difference between two atoms tell you?

23. What is a polar molecule?

24. What is a nonpolar molecule?

25. What is a dipole?

26. Explain dipole forces.

27. Explain dispersion (London) forces.

28. Explain hydrogen bonding.

29. Explain what ionic attractions are.

30. Rank the intermolecular forces from weakest to strongest.

VESPR REVIEW

Shape	Number of unshared pairs	Molecular Model
Linear		
Bent		
Trigonal Pyramidal		
Trigonal Planar		
Tetrahedral		

DOT/LINE STRUCTURE REVIEW

Draw the dot and line structure for each of the following covalently bonded molecules.



IDENTIFYING POLARITY IN BONDS AND MOLECULES

For each of the molecular compounds below, draw the **line structure** and determine the **types of bonds present**, whether the **molecule is polar or nonpolar** and what **types of intermolecular forces are present**.

1) SO_2

2) SO_3

3) HCN

4) HClO

5) HCl

6) NH_3

Name: _____

7) H_2S 8) CHCl_3 9) CO_2 **DETERMINING IONIC VS. COVALENT COMPOUNDS USING MOLECULAR FORMULAS**

Determine if the elements in the following compounds are metals or nonmetals. Identify the type of bonding that will occur in the compound.

Compound	First Element (metal or nonmetal)	Second Element (metal or nonmetal)	Bond Type
NO_2			
NaCl			
SO_2			
MgBr_2			
CaO			
H_2O			
HF			

Name: _____

Fe_2O_3			
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Molecule	E.N.D.	Bonds (NPC,PC,I)	Molecule Polarity	Line Structure	Name of Shape	Drawing of Shape
SiBr_4						
H_2S						
NBr_3						
PI_3						
CO_2						
BF_3						
O_2						
NaCl						
MgF_2						

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ADDITIONAL REVIEW QUESTIONS

1. Which are POLAR molecules?



2. Based on the EN values, which elements will combine to have the most ionic character?

$F = 4.0$

$O = 3.4$

$C = 2.6,$

$Mg = 1.2$

3. Which substance has 3 single covalent bonds?



4. All the bonds below are polar, but which molecules are polar?



5. Which substance(s) have one double bond?



6. Which substance(s) have a triple bond?

