

Name _____
Chemistry _____

Date _____
Aversano/Herz _____

Student Study Guide for Bonding Test

Key Topics to Study:

1. **Molecular Symmetry and Polarity:**
 - Understand the relationship between molecular symmetry and polarity.
 - Example: Symmetrical molecules are nonpolar despite having polar bonds.
2. **Electronegativity:**
 - Know which elements have the highest electronegativity and how it affects bonding (e.g., Se > Ga).
3. **Types of Bonds:**
 - Recognize bond types (nonpolar covalent, polar covalent, ionic, metallic).
 - Example: Solid cobalt exhibits metallic bonding.
4. **Molecular and Ionic Compounds:**
 - Identify formulas that represent nonpolar molecules and molecular compounds .
5. **Electron Configurations:**
 - Study the stability of noble gases due to full valence shells, e.g., neon.
6. **Ionic vs. Covalent Compounds:**
 - Understand how ionic compounds form from metal and nonmetal reactions.
 - Example: Sodium phosphate has both ionic and covalent bonds.
7. **Intermolecular Forces:**
 - Compare intermolecular forces to actual bonds
8. **Conductivity:**
 - Explain why ionic substances conduct electricity in liquid but not solid phases.
9. **Electron Dot Diagrams:**
 - Practice drawing dot diagrams for molecules like, and ionic compounds like calcium chloride.
10. **Bond Polarity:**
 - Determine the most polar bond and molecular polarity based on shape and bond polarity.

Commonly Asked Concepts:

- Reasons behind water's high boiling point (hydrogen bonding).

Study Tips:

- Practice bond type identification based on electronegativity differences.
 - Draw diagrams to solidify understanding of molecular geometry and polarity.
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Practice Study Sheet: Bonding Review

Part I – Multiple Choice

1. Given the molecule CF_4 , the molecule is:
 - (1) symmetrical and polar
 - (2) asymmetrical and polar
 - (3) symmetrical and nonpolar
 - (4) asymmetrical and nonpolar
2. Which element has the highest electronegativity?
 - (1) Si
 - (2) P
 - (3) S
 - (4) Cl
3. What type of bond is present in a sample of gold?
 - (1) ionic
 - (2) polar covalent
 - (3) metallic
 - (4) nonpolar covalent
4. Which formula represents a polar molecule?
 - (1) CBr_4
 - (2) H_2S
 - (3) O_2
 - (4) N_2
5. Which symbol represents an atom with the most stable valence electron configuration?
 - (1) Ar
 - (2) Na
 - (3) Cl
 - (4) Mg
6. The oxygen atoms share a total of:
 - (1) two pairs of electrons
 - (2) one pair of electrons

- (3) three pairs of electrons
 - (4) four pairs of electrons
- 7. An ionic bond is most likely to form between:
 - (1) nitrogen and sulfur
 - (2) calcium and chlorine
 - (3) hydrogen and fluorine
 - (4) oxygen and oxygen
- 8. Which type of substance can conduct electricity when dissolved in water but not in solid form?
 - (1) molecular compound
 - (2) ionic compound
 - (3) metallic element
 - (4) nonmetallic element
- 9. Why is CCl₄ classified as nonpolar even though it contains polar bonds?
 - (1) The bonds are nonpolar.
 - (2) The molecule has a symmetrical shape.
 - (3) It has an excess of electrons.
 - (4) The molecule is asymmetrical.

Part II – Short Answer

1. **Atomic Structure:** Why is argon considered unreactive?

2. **Electron Configuration:** Identify the noble gas that has the same electron configuration as a sodium ion.

3. **Unknown Substance Properties:**

- A solid has a low melting point, is insoluble in water, and does not conduct electricity.
- a. Identify the type of bonding present in the solid.

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- b. Explain why this type of solid has a low melting point.
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4. **Bond Polarity:**

- Which bond is most polar: C–F or H–H, or N–O or Si–Cl?
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5. **Molecular Polarity:** Explain why NH_3 while CH_4 is nonpolar.

Extra Practice Questions:

1. Write a brief explanation of why ionic compounds like NaCl conduct electricity in solution but not as solids.
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