Name _____ Date_____
Chemistry 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) CBr4
    - (2) H2S
    - (3) O2
    - (4) N2
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?

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

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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.

- b. Explain why this type of solid has a low melting point.

4. **Bond Polarity**:
   - Which bond is most polar: C–F or H–H, or N–O or Si–Cl?

5. **Molecular Polarity**: Explain why NH3 while CH4 is nonpolar.

Extra Practice Questions:

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