

Chemical Bonding Problem Set

1. Covalent bonds:
 - a. are stronger than ionic bonds
 - b. involve the sharing of electrons between atoms
 - c. consist of the electrostatic attraction between ions
 - d. more than one of the above is correct
2. For which of the following pairs of elements would bonding be primarily ionic?
 - a. C and Cl
 - b. Cu and I
 - c. Mg and Cl
 - d. C and S
3. Isoelectric species have the same electron configuration. Which of the following does not belong in the same group of isoelectric species with the others?
 - a. N^{3-}
 - b. F^-
 - c. Na^+
 - d. Ar
4. Which of the following contributes most directly to the existence of a higher boiling point for H_2O than H_2S ?
 - a. H_2O has a lower molecular weight than H_2S
 - b. The electronegativity difference between hydrogen and oxygen is greater than the electronegativity difference between hydrogen and sulfur
 - c. The vapor pressure at a given temperature is greater for H_2O than for H_2S
 - d. more than one of the above
5. Sulfur can form a *transargononic* compound with fluorine, SF_6 , in which the atomic orbitals of sulfur hybridize to form six sp^3d^2 orbitals. What is the shape of the molecule?
 - a. trigonal bipyramidal
 - b. octahedral
 - c. tetrahedral
 - d. none of the above
6. Which of the following molecules is not linear?
 - a. BeCl_2
 - b. C_2H_2
 - c. SO_2
 - d. BeH_2

7. Which of the following reactions between atomic species would be most exothermic?
- a. $\text{H}(g) + \text{Cl}(g) \longrightarrow \text{HCl}(g)$
 - b. $\text{H}(g) + \text{I}(g) \longrightarrow \text{HI}(g)$
 - c. $\text{H}(g) + \text{Br}(g) \longrightarrow \text{HBr}(g)$
 - d. $\text{H}(g) + \text{F}(g) \longrightarrow \text{HF}(g)$
8. The fact that many metals can be attained in their pure form by reaction of their chlorides with sodium can be most attributed to which of the following?
- a. Sodium forms an ionic compound with chlorine
 - b. The electronegativity of sodium is lower than that of most other metals
 - c. Sodium is a very electrophilic element
 - d. Sodium chloride has a large lattice energy