**Chem 130**
**Problem Set Ch.10**

Key begins on page 3.

**1.** Which of the following molecules or ions possess a dipole?

a) $OF_2$ b) $CO_3^{-2}$ c) $PF_5$ d) $IF_5$ e) $CS_2$

**2.** Which of the following molecules or ions exhibits resonance?

a) $OF_2$ b) $CO_3^{-2}$ c) $PF_5$ d) $IF_5$ e) $CS_2$

**3.** Which of the following molecules or ions has a trigonal bipyramidal electron pair geometry?

a) $OF_2$ b) $CO_3^{-2}$ c) $PF_5$ d) $IF_5$ e) $CS_2$

**4.** Indicate the hybridization type of each of the molecules or ions in problem #1.

a)_____ b)_____ c)_____ d)_____ e)_____

**5.** The three molecular shapes that are possible with $sp^3$ hybridization are

a) 'see-saw', T-shape, linear
b) octahedral, square pyramid, square planar
c) trigonal planar, angular, T-shape
d) tetrahedral, trigonal pyramid, angular
e) none of these

**6.** In each of the following hypothetical bonds, indicate the direction the shared electrons would shift in this polar arrangement.

F----H Al----Br O----N N----P

**7.** The bonding in acetylene, $C_2H_2$, is best described as:

a) 5 sigma bonds
b) 2 sigma bonds & 5 pi bonds
c) 5 pi bonds
d) 3 sigma bnonds & 2 pi bonds

**8.** Although VSEPR usually is used to predict bond angles, it can be used to predict relative bond distances (or bond lengths). In the molecule $PCl_5$ the five P-Cl bonds lengths are not the same. Which ones would you expect to be longer, which ones shorter, and why?

**9**. The tetrahedral **bond angle** is approximately

a) $90^o$ b) $180^o$ c) $109.5^o$ d) $120^o$ e) $72^o$

**10.** When a carbon atom has **$sp^3$** hybridization, it has:

a) four $\sigma$ bonds
b) three $\sigma$ bonds and one $\pi$ bond
c) two $\sigma$ bonds and two $\pi$ bonds
d) one $\sigma$ bonds and three $\pi$ bonds
e) four $\pi$ bonds

**11.** Draw the three **molecular shapes** that are possible with $sp^3d^2$ hybridization.

**12.** A bond in which an electron pair is shared unequally by two atoms is:

a) ionic
b) polar covalent
c) nonpolar covalent
d) coordinate covalent
e) dipolar

**13.** Draw the Lewis Structure for Ozone, $O_3$. The approximate O-O-O bond angle in ozone, is:

**14.** The molecule $AX_3$, in which A is the central atom, is polar and obeys the rule of 8; therefore,

a) A has no lone pairs
b) A has one lone pair
c) A has two lone pairs
d) A has three lone pairs
e) A has four bonding pairs

**15.** Draw the box diagram illustrating the electron configuration for the **Ground State**, **Excited State** and **Hybridized State** of Sulfur in $SF_4$.

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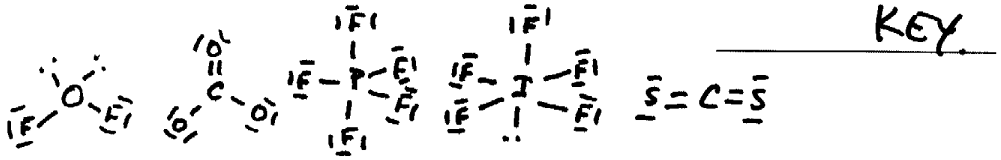

KEY

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H-C≡C-H

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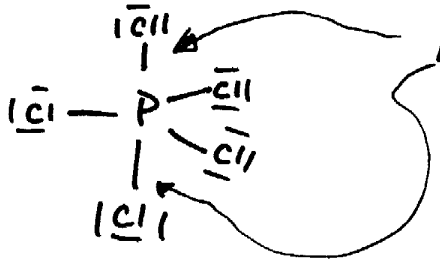

AXIAL BONDS ARE LONGER, THERE ARE MORE REPULSIVE FORCES HERE AS EACH IS AFFECTED BY 3 OTHER BONDS 90° AWAY.

**9**. The tetrahedral **bond angle** is approximately

a) 90° b) 180° c) 109.5° d) 120° e) 72°

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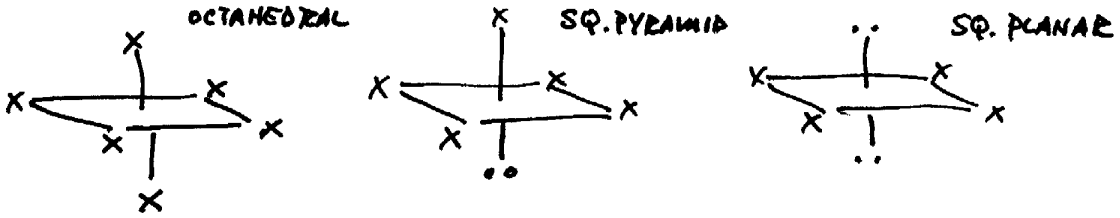


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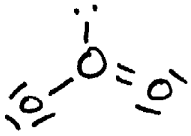

TRIGONAL PLANAR
eg PR. ARR.
120°

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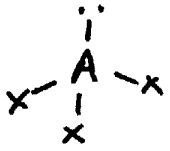

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