Tutorial 4 Solutions

8-30 (a) $C^{\delta+}$-$O^{\delta-}$ (b) "nonpolar" (according to Table 8.3)
(c) $H^{\delta+}$-$Cl^{\delta-}$ (d) $Br^{\delta-}$-$Te^{\delta+}$ (e) $Se^{\delta+}$-$S^{\delta-}$

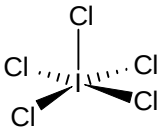
8-42 (a) GaI_3 = gallium iodide (b) Na_2O = sodium oxide
(c) SrF_2 = strontium fluoride (d) Ca_3P_2 = calcium phosphide

8-80 Order from longest to shortest is the same as weakest to strongest
CH_3OH (single bond), CO_3^{2-} (1⅓ bonds), CO_2 (double bond), CO (triple bond)

8-88 (68-a) all tetrahedral, with bond angles ≈ 109.5
(68-b) all trigonal pyramidal (tetrahedral with one lone pair), bond angles < 109.5
(68-c) all bent (tetrahedral with 2 lone pairs), bond angles < 109.5

(74) O_3, SO_2 are bent (trigonal planar with one lone pair), bond angles < 120
SO_3 is trigonal planar, bond angle = 120

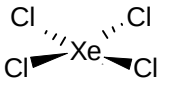
8-94 (a)



square-based pyramid

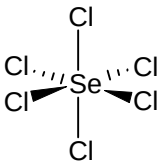
all the angles are 90º.

(b)



square planar

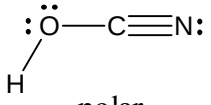
(c)



octahedral

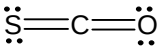
8-98 Only ICl_5 has a dipole moment.

8-100 (a)



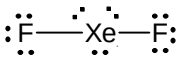
polar

(b)



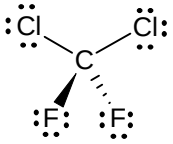
polar

(c)



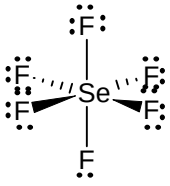
non-polar

(d)



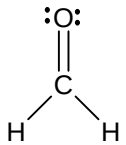
polar

(e)



non-polar

(f)



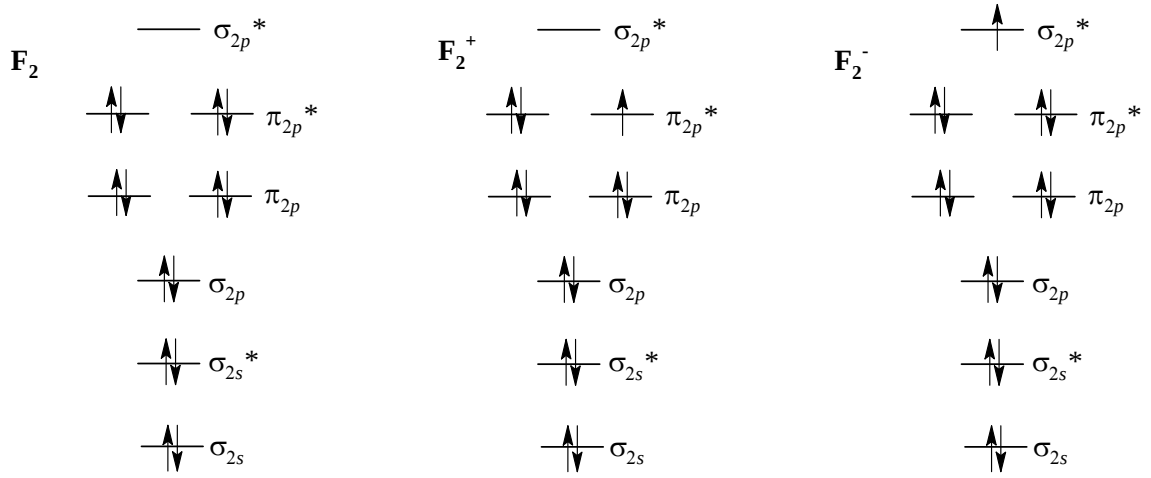
polar

9-32 from left to right on the acrylonitrile:
sp^2, sp^2, sp
a = 120º, b = 120º, c = 180º
6 σ and 3 π bonds

from left to right on the methyl methacrylate:
sp^2, sp^2, (CH_3) sp^3, (CO) sp^2, sp^3
d = 120º, e = 120º, f < 109.5º
14 σ and 2 π bonds

9-40 Looking at Figure 9.39, the F_2 molecule has a net of 1 σ bond. (σ_{2s} and σ_{2s}* cancel, π_{2p} and π_{2p}* cancel, leaving σ_{2p} as the lone bond, which is 1 σ bond).

Remember to use the formula for bond order on p. 405.



BO = (8-6)/2 = 1

BO = (8-5)/2 = 1.5

BO = (8-7)/2 = 0.5

Therefore, the shortest (strongest, highest bond order) bond is F_2^+, which has 1 unpaired electron.

The longest (weakest, smallest bond order) bond is F_2^-, which also has 1 unpaired electron.

F_2 has no unpaired electrons and has bond strength between F_2^+ and F_2^-.