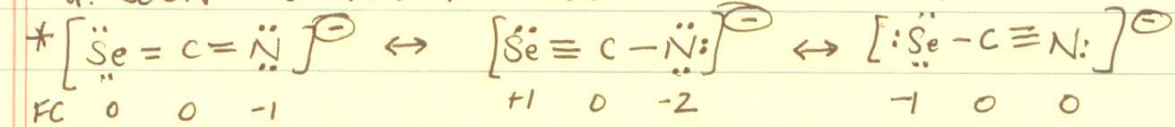
Ch. 3 HW: #2, 3, 12, 14, 17a, 30, 41, 43

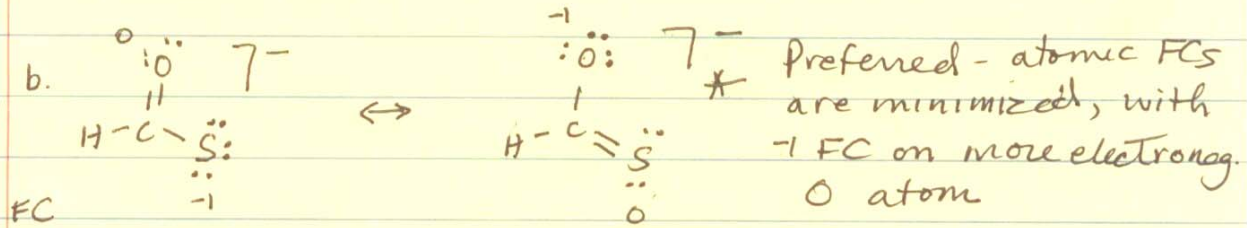
2)

a. $SeCN^-$ $6+4+5+1 = 16\ ve^-$



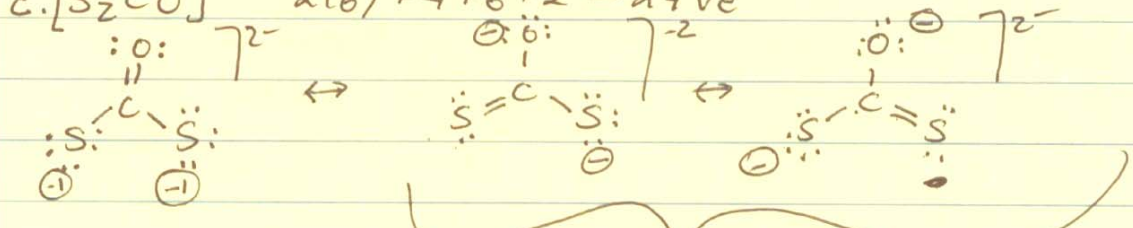
*Preferred - individual FCs are minimized, with -1 FC on most electronegative N atom

b. $1+4+6(2)+1 = 18\ ve^-$



* Preferred - atomic FCs are minimized, with -1 FC on more electroneg. O atom

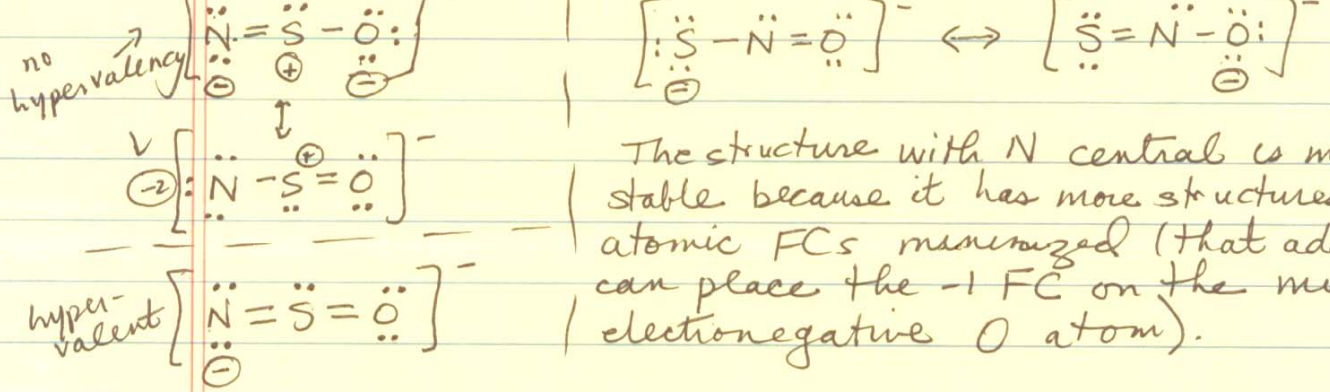
c. $[SzCO]^{2-}$ $2(6)+4+6+2 = 24\ ve^-$



Preferred - One -1 FC is on the more electroneg. O atom.

3)

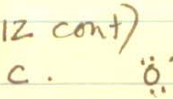
NSO^- 18 ve^- vs. SNO^-



The structure with N central is more stable because it has more structures with atomic FCs minimized (that additional can place the -1 FC on the most electronegative O atom).

12.) a. As in #11, as the central atom becomes less electronegative, e^- are closer to the H's, allowing for smallest bond angles in AsH_3.

b. F–S–F is smaller. More electroneg. F pulls e^- farther from S, allowing for less bonding pair – bonding pair repulsion and a smaller angle.

12 cont) c.  + resonance When N is the central atom (in NO_2^-), bonding e^- are closer to the more electroneg. outer atoms, allowing for a smaller angle

d. See #11. Angle is smaller in BrO_3^-.

14) The size of the outer groups increases from $Cl \rightarrow CH_3 \rightarrow SiH_3$. In addition, the electronegativity decreases, meaning that there is more e^- density close to the central atom and more bonding pair – bonding pair repulsion. Both of these factors cause larger bond angles.

17) a. P may be hypervalent because it has access to 3d orbitals. N cannot sustain 5 bonds.

30. (a) The CF_3 groups are equatorial. They are larger and more repulsive than the Cl atoms and will therefore occupy the equatorial positions, in order to take advantage of the 120-degree angles between bonding electron pairs.

(b) The axial bonds are likely to be longer. There is greater bond-pair—bond-pair repulsion involving the axial Cl atoms, due to the smaller 90-degree angles. To offset this increased repulsion, the axial bonds will be longer.

41)

a. 32 ve⁻ tetrahedral

b. trigonal pyramidal

c. 40 ve⁻ trig. bipyramidal

41)

d. trig. planar + res.

e. T-shaped

f. octahedral

g.

h. octahedral

i. Tetrahedral

j) P_4O_6
24 e⁻ used in bonds
56 total → 32e⁻ for nonbonding pairs

43) $VOCl_3$, PCl_3, SOF_4, ICl_3, CF_2Cl_2 are polar.