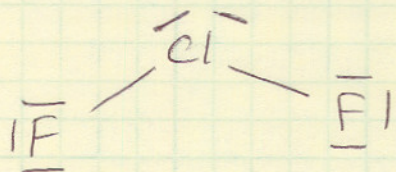


INTRODUCTION TO NATURAL SCIENCE

CHEMISTRY HW - WEEK 7 - WINTER 2007

Chapter 9

(20) (a)  $\text{ClF}_2^+$



$$\begin{array}{r} \text{Cl} \quad 7e \\ 2\text{F} \quad 14e \\ \hline 21e \\ +1e \\ \hline \text{Charge} \quad 20e \\ \hline 10e \text{ pairs} \\ -2e \\ \hline 8e \text{ pair} \end{array}$$

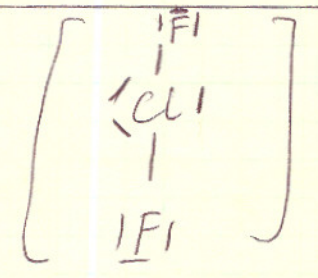
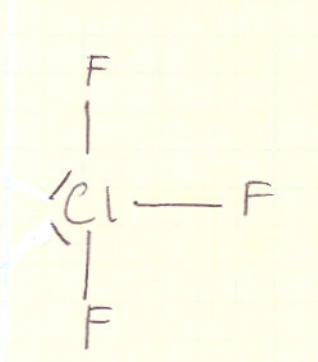
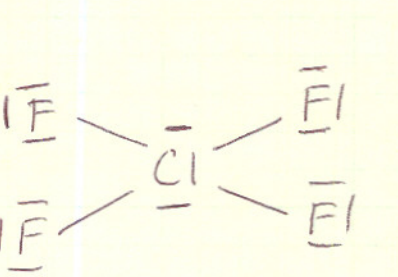
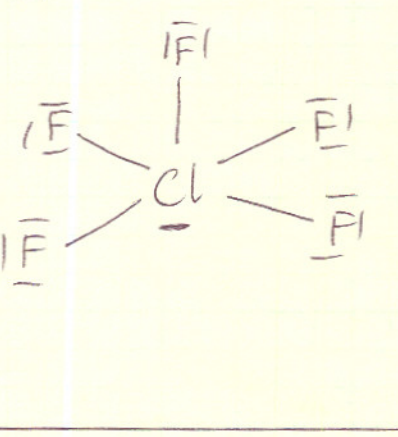
$e^-$  pair geometry = tetrahedral  
molecular geometry = bent

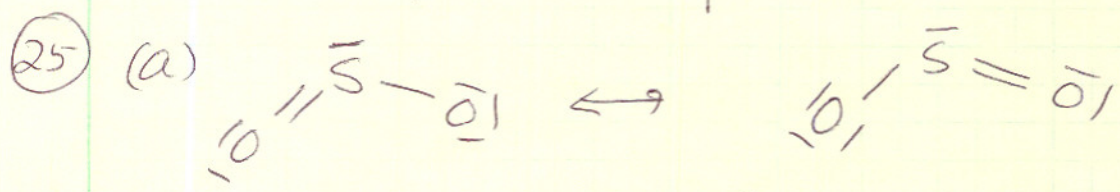
molecule	$e^-$ pair geometry	molecular geometry
(b) $\left[ \begin{array}{c} \text{Cl} - \text{Sn} - \text{Cl} \\   \\ \text{Cl} \end{array} \right]^-$	tetrahedral	pyramidal
(c) $\begin{array}{c} \text{O} \\   \\ \text{O} - \text{P} - \text{O} \\   \\ \text{O} \end{array}$	tetrahedral	tetrahedral
(d) $\text{S} = \text{C} = \text{S}$	linear	linear

(21)	molecule	$\bar{e}$ -pair geometry	molecular geometry
(a)	$\bar{O} = C = \bar{O}$	linear	linear
(b)	$\left[ \bar{O} = \bar{N} - \bar{O} \right]^-$ (has a resonance str.)	trigonal planar	bent
(c)	$\bar{O} - \bar{O} = \bar{O}$ (has a resonance str.)	trigonal planar	bent
(d)	$\left[ \bar{O} - \bar{Cl} - \bar{O} \right]^-$	tetrahedral	bent

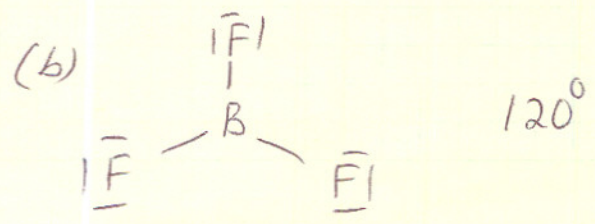
The central atom ~~changes from~~ <sup>increases by one from</sup> group 4 to group 7. This adds one extra valence  $\bar{e}$  to the electron count. All molecules are bent, except  $CO_2$ , although they may have different  $\bar{e}$  pair geometries.

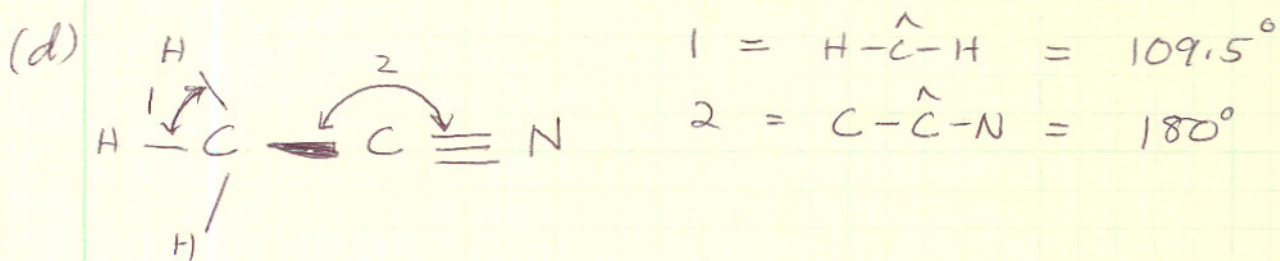
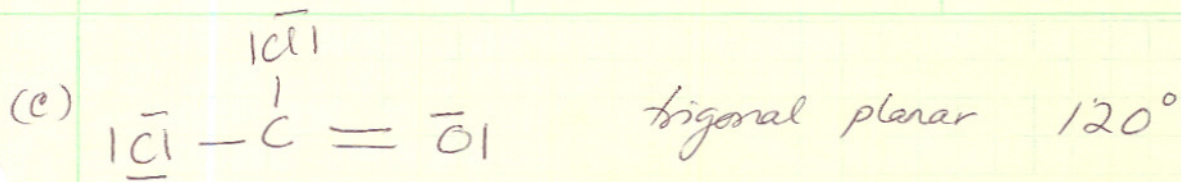
(22) [also note that ozone and  $NO_2^-$  ions are isoelectronic and have identical geometries]

23)	molecule	$\bar{e}$ pair geometry	molecular geometry
(a)		trigonal bipyramidal	linear
(b)		trigonal bipyramidal	T-shape
(c)		octahedral	square planar
(d)		octahedral	square pyramidal



less than  $120^\circ$





(27)

① =  $120^\circ$

② =  $109.5^\circ$

③ =  $120^\circ$

④ = less than  $109.5^\circ$  (about  $105^\circ$ )

⑤ = less than  $109.5^\circ$  (about  $107^\circ$ )

Each The first 2 Carbon atoms in the  $-\text{CH}_2-\text{CH}(\text{NH}_2)-\text{CO}_2\text{H}$  chain is tetrahedral. The last C atom is trigonal planar. None of these bond angles are  $180^\circ$ . This chain is not linear.

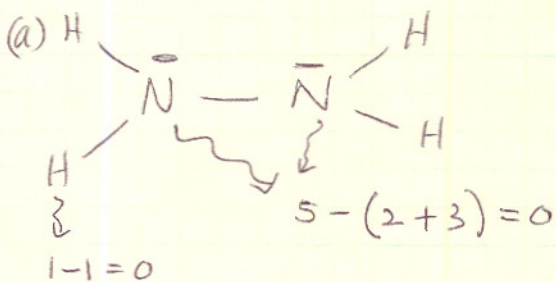
(28)

① = less than  $109.5^\circ$  (about  $105^\circ$ )

② =  $120^\circ$

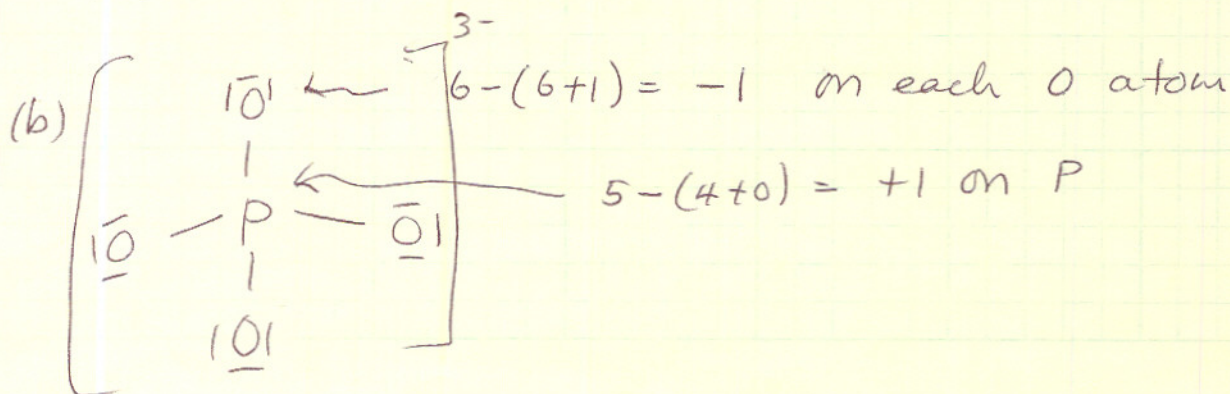
③ =  $120^\circ$

(29)

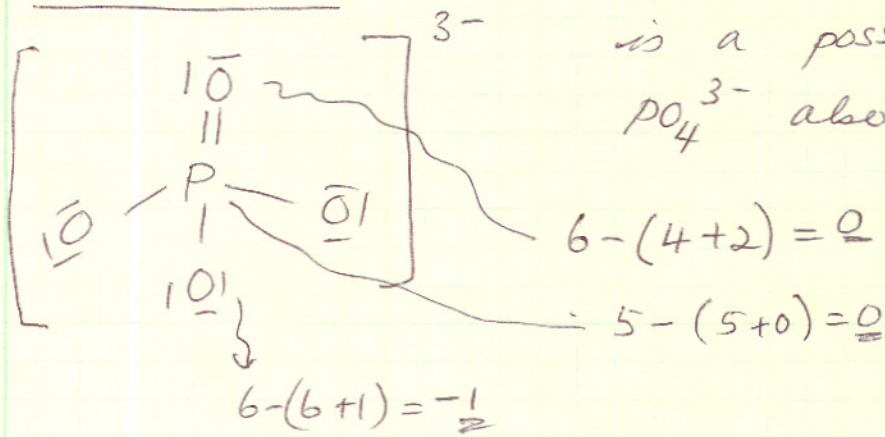


all H have formal charge = 0

all N  $\longrightarrow$  = 0

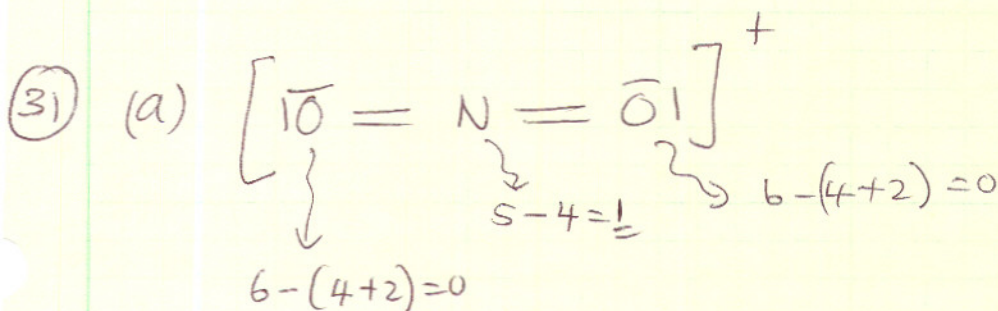
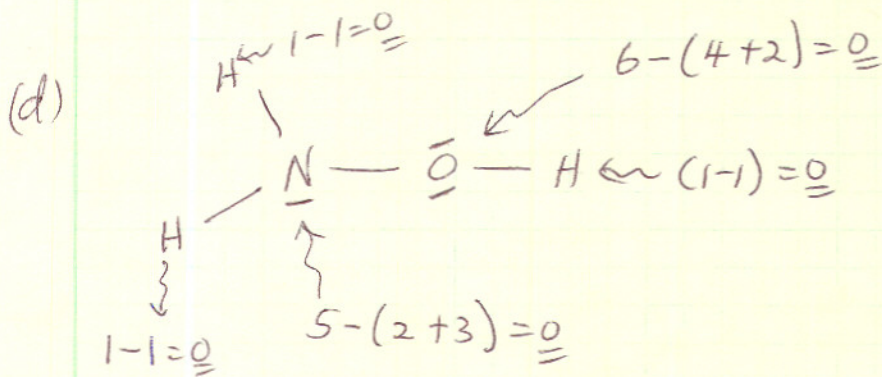
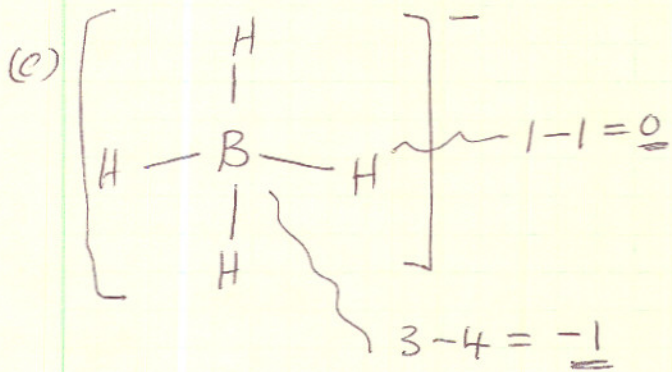


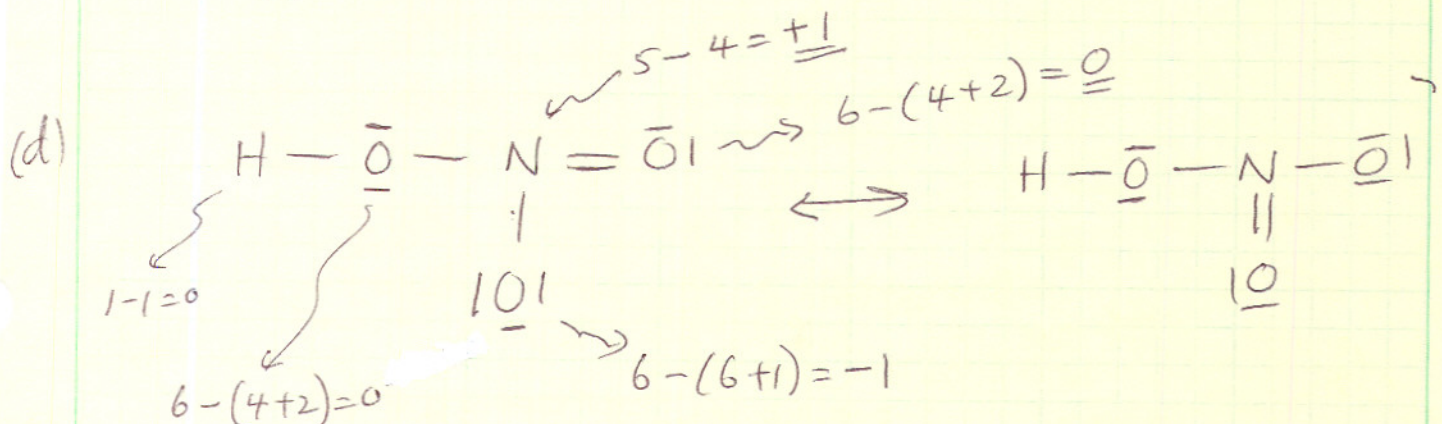
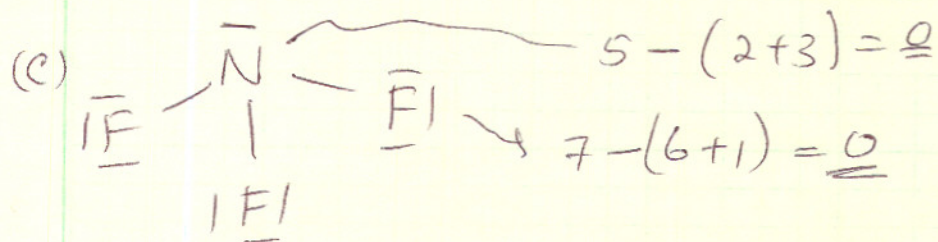
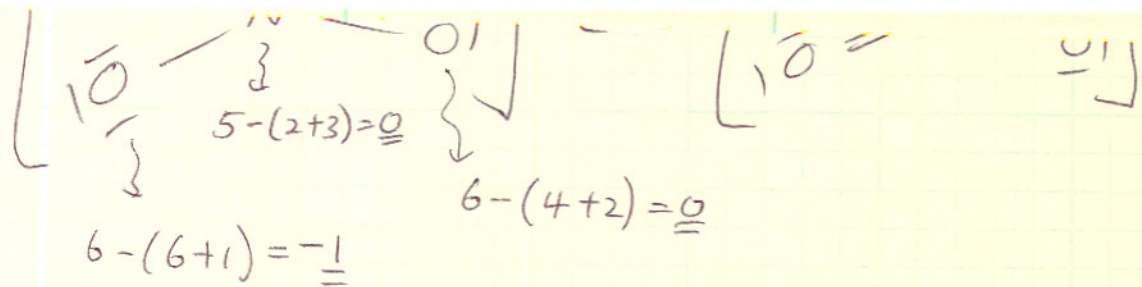
please note



is a possible structure for  $\text{PO}_4^{3-}$  also.

This structure is therefore preferred to the previous one!





From the downloaded sheet

(a) electron affinity - the amount of energy released when a gaseous atom accepts an electron to form a gaseous ion.

(b) The amount of energy required ~~at~~ <sup>to remove an e from</sup> a gaseous  $\text{Ca}^+$  ion, ~~to~~ <sup>to form a gaseous</sup>  $\text{Ca}^{2+}$  ion.

(c) A bond formed between two non-metal atoms by sharing electrons between them. Each atom donates one electron to form the bond.

(d) ions with the same number of electrons.

(e) No two electrons in the same atom can have the same set of four quantum numbers.

(f) It is not possible to know with any degree of certainty both the position and the momentum of an electron simultaneously (within an atom).