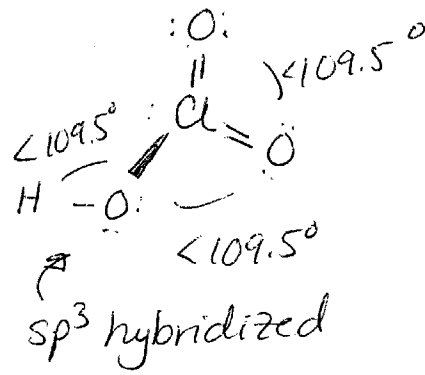
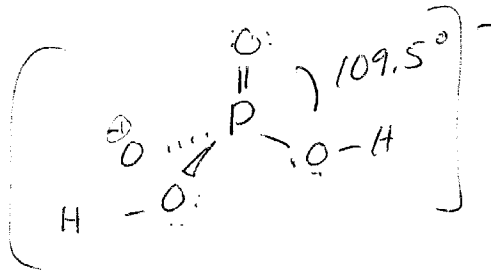


- # 1 e.  $\text{SCl}_2$  bent  $< 109.5^\circ$   $sp^3$  polar
- f.  $\text{CHCl}_3$  tetrahedral  $109.5^\circ$   $sp^3$  polar (asymmetric)
- g.  $\text{CH}_2\text{O}$  trigonal planar  $120^\circ$   $sp^2$  polar
- h.  $\text{O}_3$  bent  $120^\circ$   $sp^2$  polar ~~nonpolar~~ (all nonpolar bonds)
- i.  $\text{SO}_3^{2-}$  trigonal pyramid  $< 109.5^\circ$   $sp^3$  polar
- j.  $\text{NO}_3^-$  trigonal planar  $120^\circ$   $sp^2$  nonpolar
- k.  $\text{H}_2\text{SO}_4$  tetrahedral (central atom)  $109.5^\circ$   $sp^3$  polar

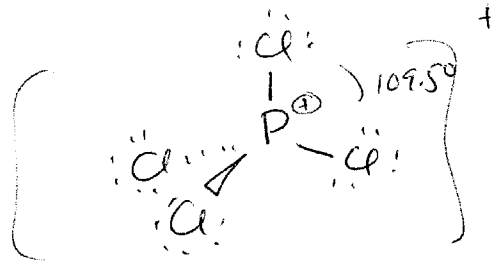
l.  $\text{HClO}_3$   
 trigonal pyramid  
 around Cl,  
 bent around O.



m.  $\text{H}_2\text{PO}_4^-$   
 tetrahedral  
 around P  
 $sp^3$ ,  $109.5^\circ$

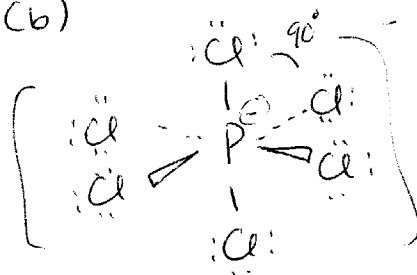


n.  $\text{PCl}_4^+$   
 tetrahedral  
 $109.5^\circ$   
 $sp^3$

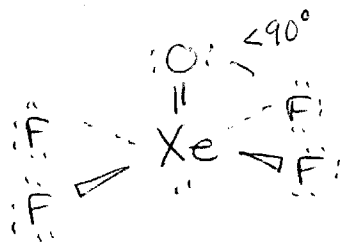


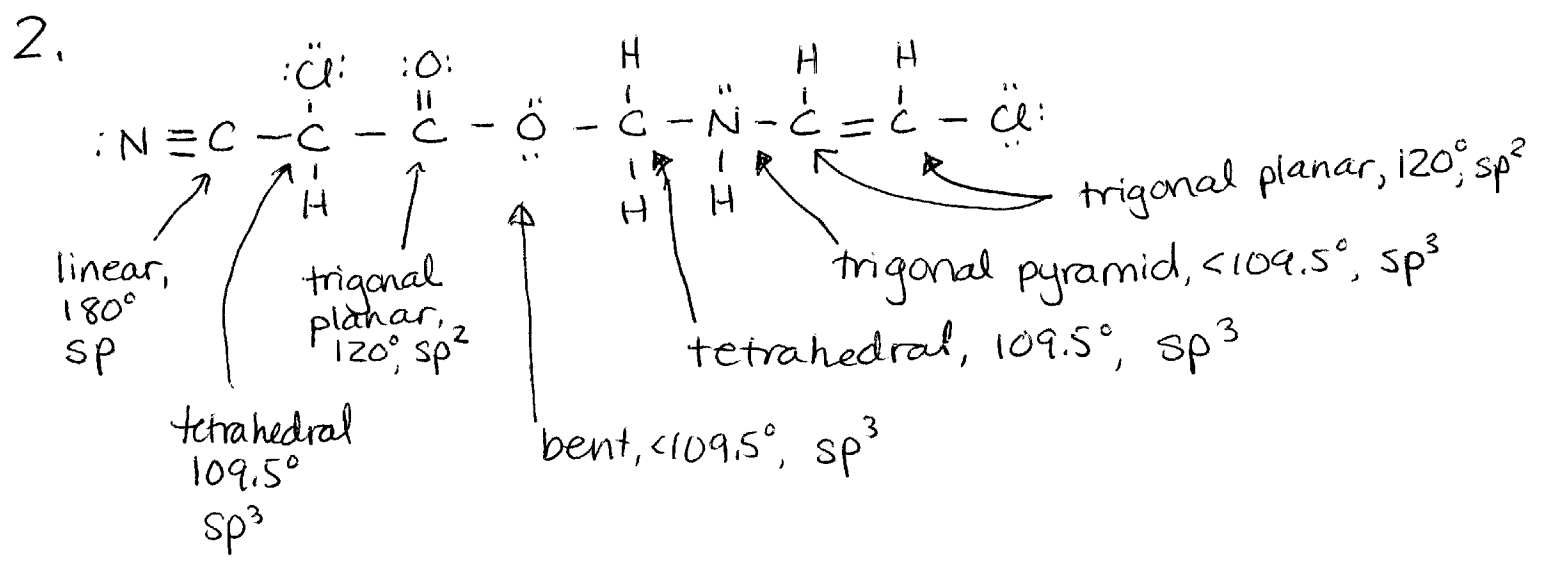
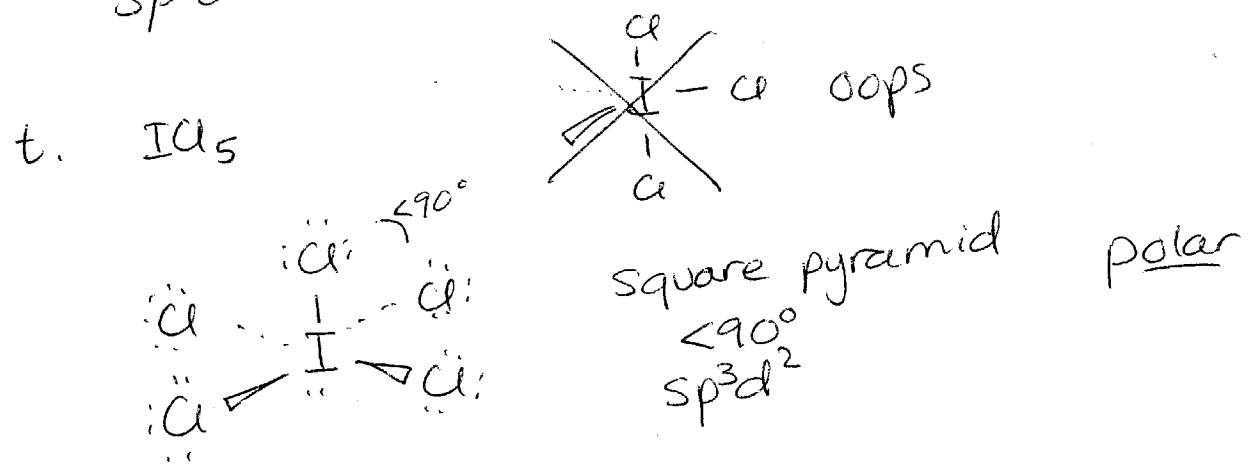
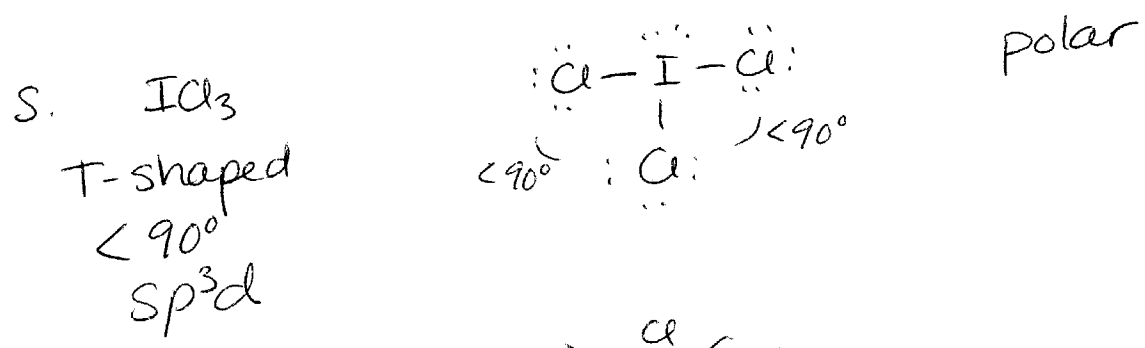
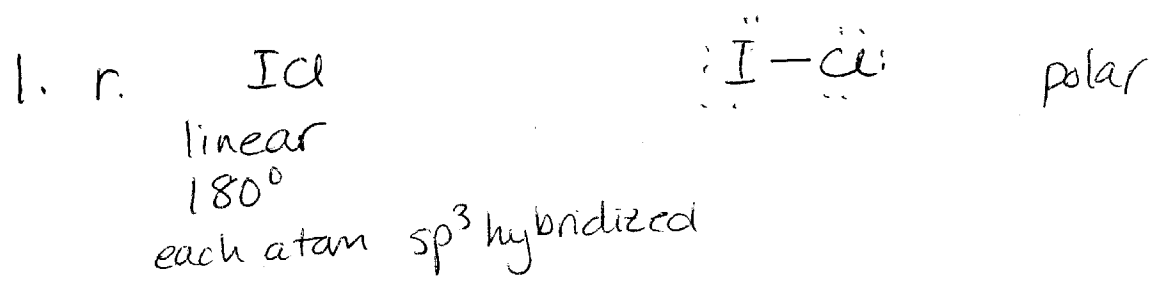
o. already done (b)

p.  $\text{PCl}_6^-$   
 octahedral  
 $90^\circ$



q.  $\text{XeOF}_4$   
 square pyramid  
 $\lt 90^\circ$

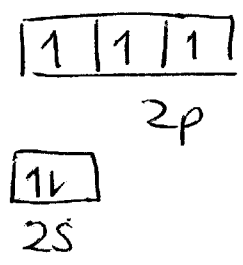
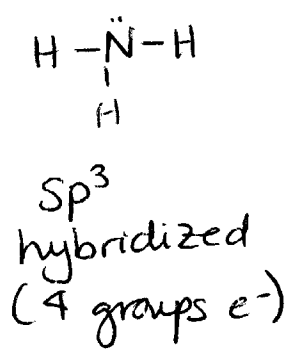




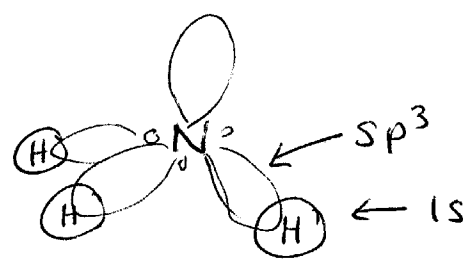
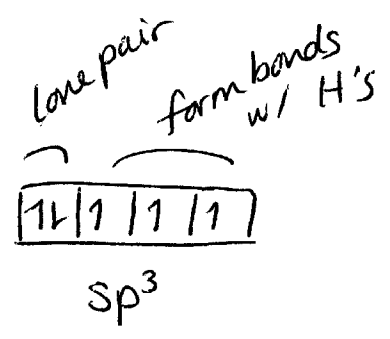
# Chapter 9- Answers to additional Problems

3. a.  $\text{NH}_3$

N atom: 5  $e^-$



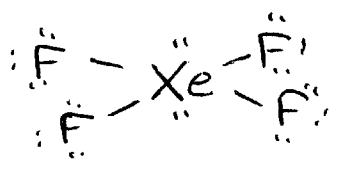
hybridize  
→



overlap of  $sp^3$  orbitals on N with  $1s$  orbitals on H.

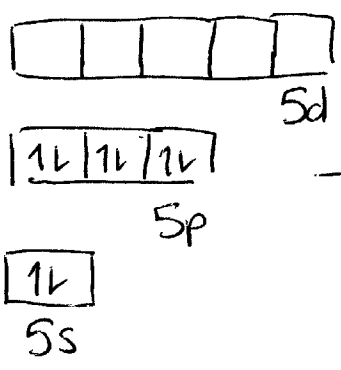
b.  $\text{XeF}_4$

$8 + 4(7) = 36e^-$

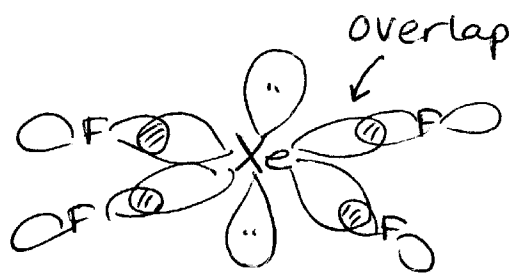
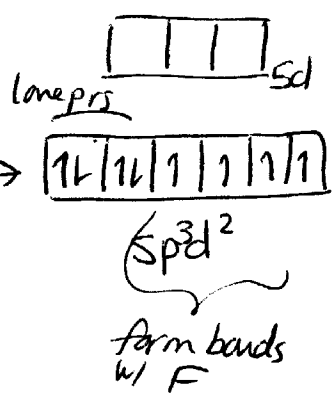


6 groups  $e^-$   
 $sp^3d^2$  hybridized

Xe atom - 8  $e^-$

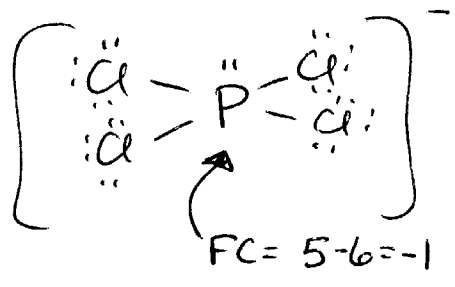


hybridize  
→



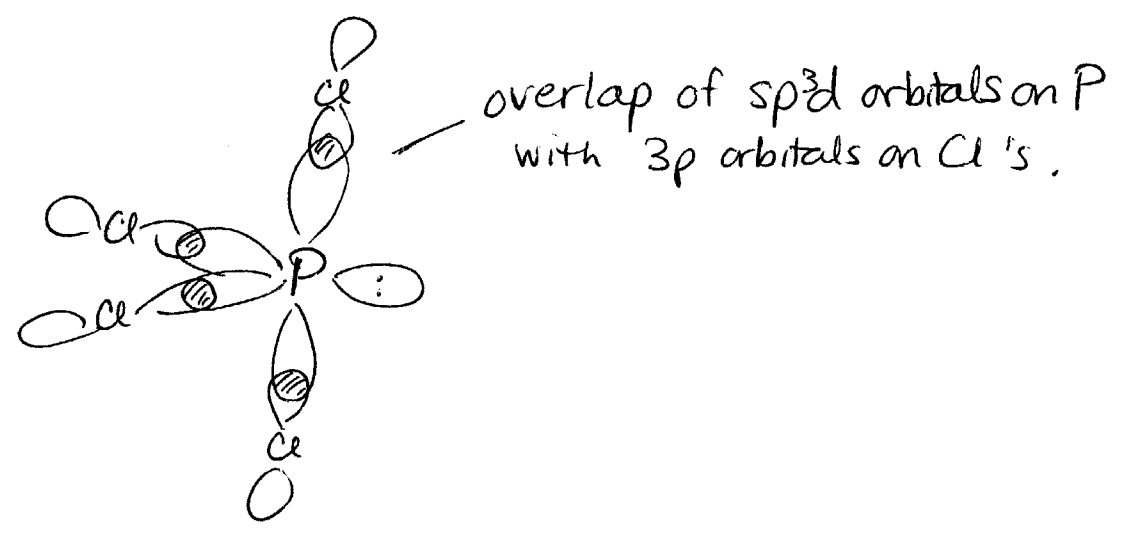
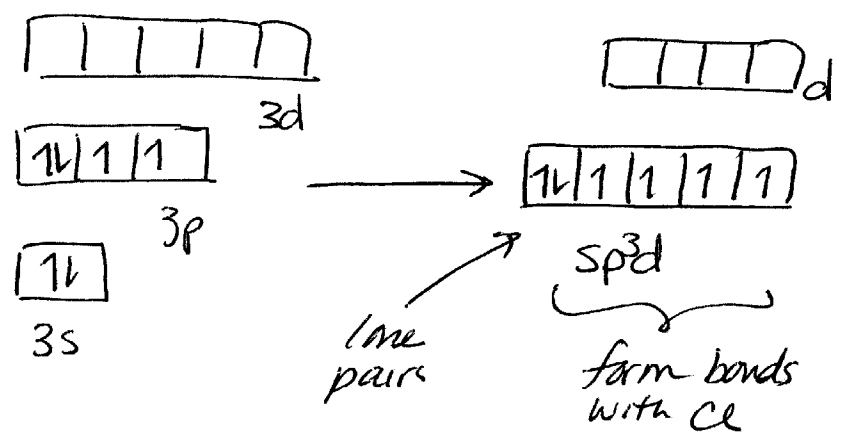
overlap of  $sp^3d^2$  orbitals on Xe with  $2p$  orbitals on F

3. C.  $\text{PCl}_4^-$   
 $5 + 4(7) + 1$   
 $34 \text{ ve}^-$



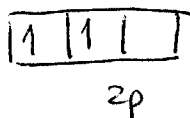
5 groups  $e^-$   
 $sp^3d$  hybridized

$P^-$  (6  $ve^-$ )

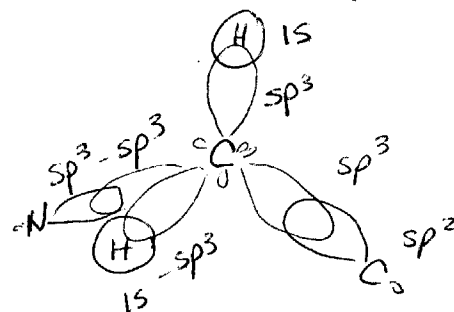
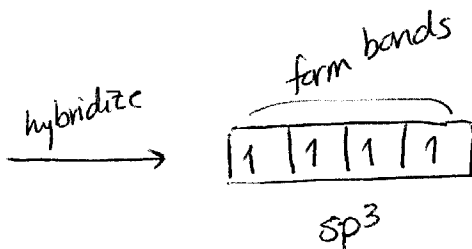


4. First carbon: 4 groups  $e^-$ ;  $sp^3$  hybridized

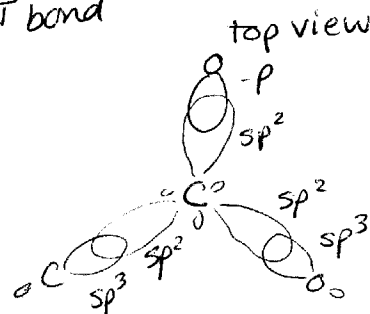
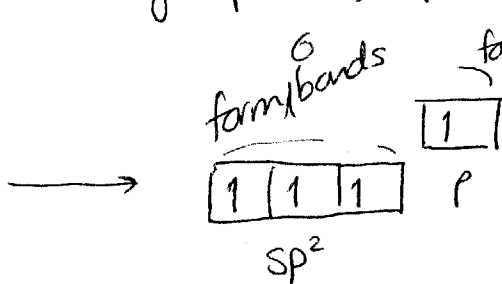
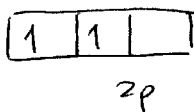
C has  $4e^-$



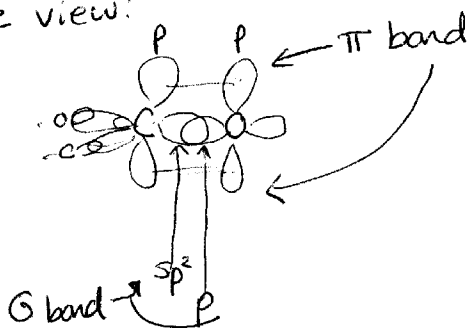
atom



Second carbon: 3 groups  $e^-$ ,  $sp^2$  hybridized

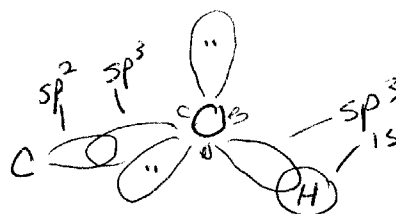
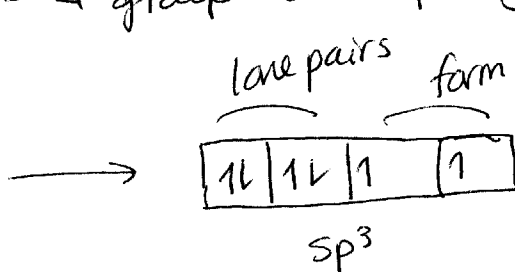
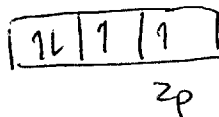


Side view:

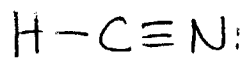


Oxygen atom - 4 groups  $e^-$   $sp^3$  hybridized

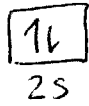
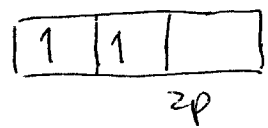
$6e^-$



5.



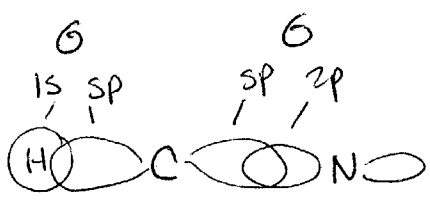
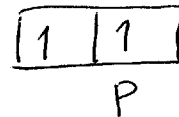
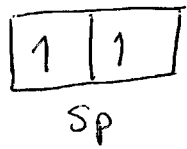
Central atom is sp hybridized (2 groups of e<sup>-</sup>)



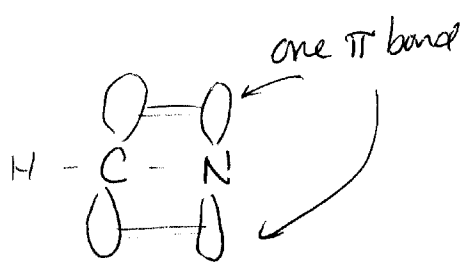
C atom

form  $\sigma$  bonds

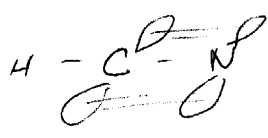
form  $\pi$  bonds



sigma bonds



Other pi bond



the  $\pi$  bonds are perpendicular to each other.