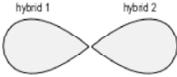
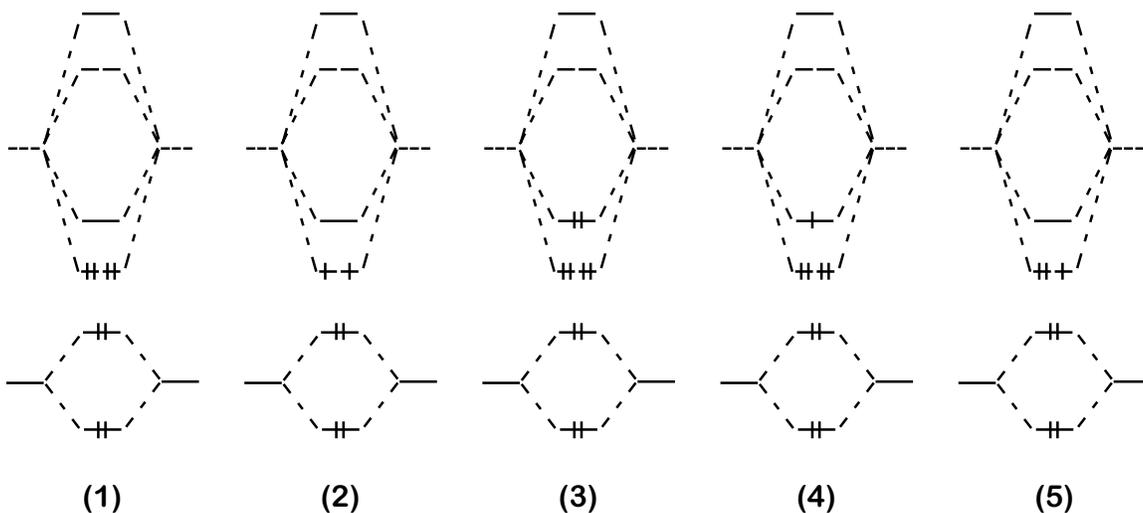






10. Draw the Lewis structure for  $\text{IF}_5$ . The molecular geometry is:
- 1) square planar                      2) square pyramidal                      3) trigonal bipyramidal  
4) octahedral                              5) none of the above
11. The molecule  $\text{IF}_5$  is:
- 1) polar                      2) nonpolar                      3) can't tell
12. In  $\text{IF}_5$ , what is the hybridization on **I**?
- 1)  $\text{sp}^3\text{d}^3$                       2)  $\text{sp}^3\text{d}^2$                       3)  $\text{sp}^3\text{d}$                       4)  $\text{sp}^3$                       5)  $\text{sp}^2$
13. The picture at right depicts which type of orbital hybridization?
- 1)  $\text{sp}$                       2)  $\text{sp}^2$                       3)  $\text{sp}^3$                       4)  $\text{sp}^4$                       5) none of the above
- 
14. In the orbital hybridization *above*, how many atomic orbitals were used to create the resulting molecular orbitals?
- 1) 1                      2) 2                      3) 3                      4) 4                      5) 5
15. A molecule has  $\text{sp}^3\text{d}$  hybridization with one lone pair. The **electron pair geometry** of this molecule is:
- 1) tetrahedral                      2) octahedral                      3) linear  
4) square pyramidal                      5) trigonal bipyramidal
16. What hybrid orbitals make up the sigma bond between **C1** and **C2** in propylene,  $\text{CH}_2\text{CHCH}_3$ ?
- 1)  $\text{sp}$  &  $\text{sp}^3$                       2)  $\text{sp}$  &  $\text{sp}^2$                       3)  $\text{sp}^2$  &  $\text{sp}^3$                       4)  $\text{sp}^2$  &  $\text{sp}^2$                       5)  $\text{sp}^3$  &  $\text{sp}^3$

17. Which of the following molecular orbital representations correctly describes  $N_2^+$ ?



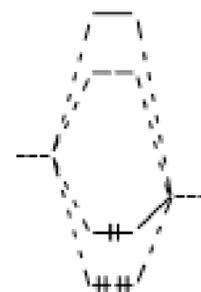
18. From molecular orbital theory, the bond order in  $N_2^+$  is:

- 1) single              2) double              3) 0.5              4) 1.5              5) 2.5

19. Consider the molecular orbital diagram shown at right:

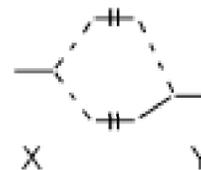
This energy diagram best describes:

- 1)  $O_2$               2)  $NO^-$               3)  $NO^+$               4)  $N_2$



20. In the diagram at right, the  $\pi$  bonding orbitals are best described as:

- 1) all O                                      2) all N  
 3) more O than N                      4) more N than O  
 5) equal mixture of O and N



21. Using molecular orbital theory, what is the bond order in the anion  $N_2^+$ ?

- 1) 1                      2) 1.5                      3) 2                      4) 2.5                      5) 3

### Solubility Rules for some ionic compounds in water

#### Soluble Ionic Compounds

1. All sodium ( $\text{Na}^+$ ), potassium ( $\text{K}^+$ ), and ammonium ( $\text{NH}_4^+$ ) salts are SOLUBLE.
2. All nitrate ( $\text{NO}_3^-$ ), acetate ( $\text{CH}_3\text{CO}_2^-$ ), chlorate ( $\text{ClO}_3^-$ ), and perchlorate ( $\text{ClO}_4^-$ ) salts are SOLUBLE.
3. All chloride ( $\text{Cl}^-$ ), bromide ( $\text{Br}^-$ ), and iodide ( $\text{I}^-$ ) salts are SOLUBLE -- EXCEPT those also containing: lead, silver, or mercury (I) ( $\text{Pb}^{2+}$ ,  $\text{Ag}^+$ ,  $\text{Hg}_2^{2+}$ ) which are NOT soluble.
4. All sulfate ( $\text{SO}_4^{2-}$ ) salts are SOLUBLE -- EXCEPT those also containing: calcium, silver, mercury (I), strontium, barium, or lead ( $\text{Ca}^{2+}$ ,  $\text{Ag}^+$ ,  $\text{Hg}_2^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Pb}^{2+}$ ) which are NOT soluble.

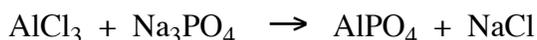
#### Not Soluble Ionic Compounds

5. Hydroxide ( $\text{OH}^-$ ) and oxide ( $\text{O}^{2-}$ ) compounds are NOT SOLUBLE -- EXCEPT those also containing: sodium, potassium, or barium ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ba}^{2+}$ ) which are soluble.
6. Sulfide ( $\text{S}^{2-}$ ) salts are NOT SOLUBLE -- EXCEPT those also containing: sodium, potassium, ammonium, or barium ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{NH}_4^+$ ,  $\text{Ba}^{2+}$ ) which are soluble.
7. Carbonate ( $\text{CO}_3^{2-}$ ) and phosphate ( $\text{PO}_4^{3-}$ ) salts are NOT SOLUBLE -- EXCEPT those also containing: sodium, potassium, or ammonium ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{NH}_4^+$ ), which are soluble.

22. Mixing  $\text{Na}_2\text{CO}_3$  with  $\text{KCl}$  in water leads to precipitation of:

- 1) a  $\text{CO}_3^{2-}$  salt                      2) a  $\text{Na}^+$  salt                      3) a  $\text{Cl}^-$  salt  
 4) everything precipitates            5) no precipitation

23. Write the balanced, *net ionic equation* corresponding to the unbalanced equation:



The coefficient in front of  $\text{Na}^+$  (aq) is:

- 1) 1                      2) 2                      3) 3                      4) 4  
 5) 0 ( $\text{Na}^+$  doesn't occur in the net ionic equation)

