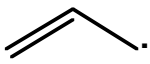
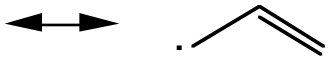
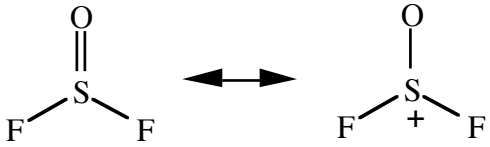
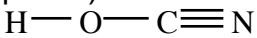
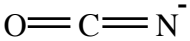
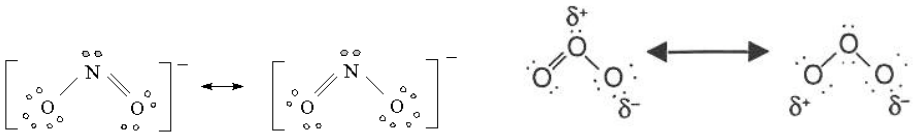
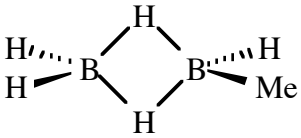
Chem 360 Problems
Answers

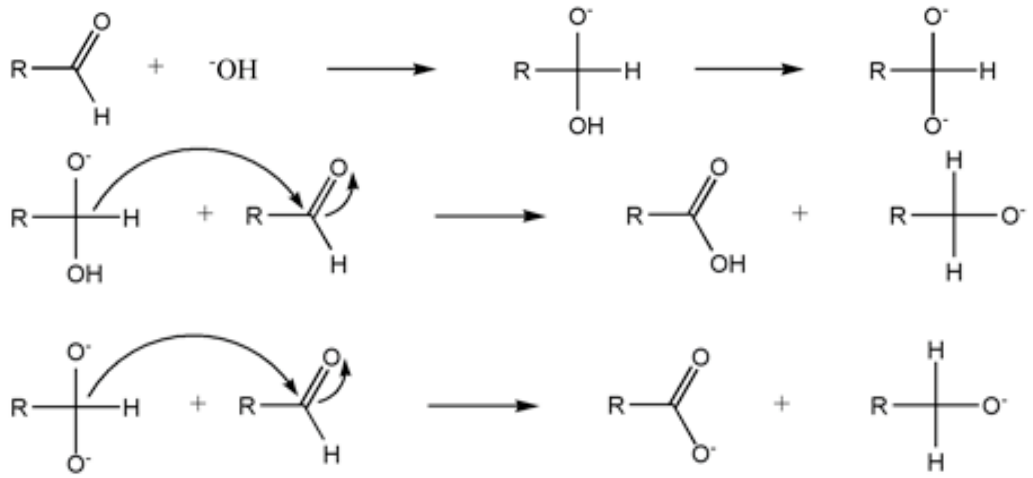
1. Zn has a higher nuclear charge but no additional shells to shield the valence electrons (5 points)
2. (a) S < P – P is 1/2 filled p shell, S is p^4 (b) K < Cu higher nuclear charge both come out of s (c) Al < Mg – Mg is from filled s, Al from s^1 (3 point each)
3. (a) H_3NO – tetrahedral H-N-H < 109.5° (b) SF_4 trigonal bipyramid with 1 lone pairs *cis*, trans angle = 173.1°, cis F-S-F angle = 1-1.6° (10 points)
4. (a)   (b)  (10 points)
5.   (10 points)
6. (a) CH_4, (b) NO_2^- (115 °) or O_3 (116°)



(10 points)

7. (a) $CaCl_2$ (b) ZnO (c) $MgCl_2$ (15 points).
8. (a) H_2O > NH_3 – stronger H-bonds (b) CH_3OH (-97 °C) > CF_3CH_2OH (73.6 °C) > $(CF_3)_2CHOH$ > $(CF_3)_3COH$ (45°). – oops signs wrong! (10 points)
9.  (10 points)
10. e.g., $TiCl_4 + D_2O \rightarrow DCl + TiO_2$ (10 points).
11. (a) SiH_4 - reduction, (b) HCl – direct combination, (c) PH_3 - hydrolysis of Ca_3P_2 (10 points)
12. 5256.74 $kJ.mol^{-1}$. (10 points)

13. C a n n i z z a r o r e a c t i o n



(15 points)

14. (10 points)