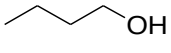
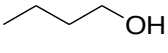
3A.1 a) HBr b) HCF_3 c) H_2O d) $ClCH_2CH_2OH$ e) HF f) HI g) H_2S

h) CCl_3OH i)  j)  k) CH_2ClCO_2H

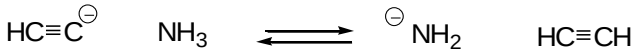
3A.2 a) H_2O b) F^- c) CH_3^- d) CH_3NH^- e) $H_2C{=}CH^-$ f) OH^- g) $CH_3CH_2^-$

h) NH_3 i) $CFH_2CH_2O^-$ j) $CH_2BrCO_2^-$

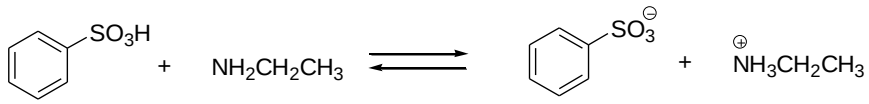
3A.3 The conjugate base of acetic acid has resonance, ethanol's conjugate base does not. Resonance stabilizes the conjugate base making acetic acid a stronger acid.

3B.1 Identify acids and bases in each equilibrium then predict the direction of equilibrium based on the given pKa information.

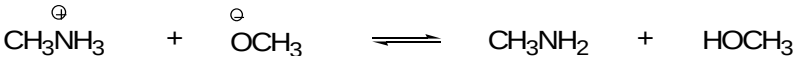
a) base acid conj. base conj. acid ; ←



b) acid base conj. base conj. acid; →



c) acid base conj. base cong. base; →

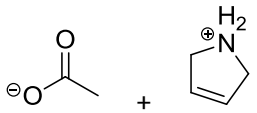


3B.2 acetylene

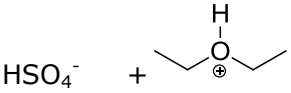
3B.3 a) → b) ← c) ← d) ←

3B.4

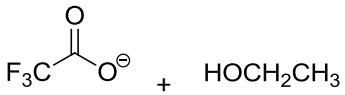
a)



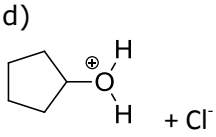
b)



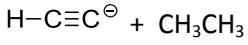
c)



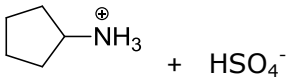
d)



e)

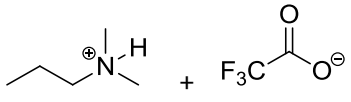


f)

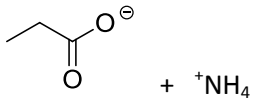


g) $CH_3OH_2^+ + Cl^-$

h)



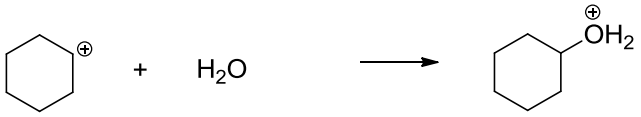
i)



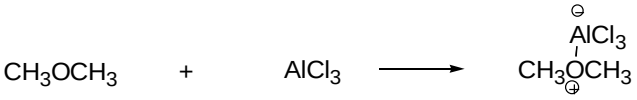
3B.5 a) malonic acid has an electron withdrawing group (CO_2H) which stabilizes the conjugate base making it more acidic than acetic acid. b) ←

3C.1

a) acid base

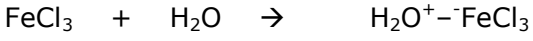


b) base acid

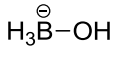


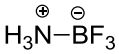
c) base acid

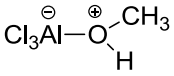
d) acid base

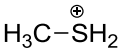


3C.2

a) 

b) 

c) 

d) 

e) $^-FeCl_4$ →