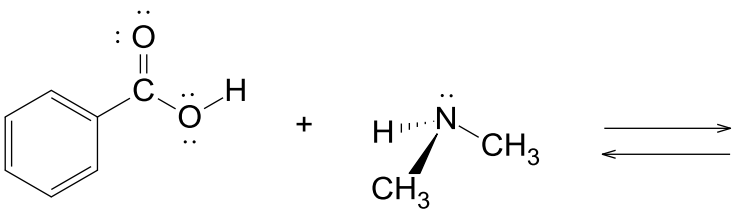
CHM 201 Exam I practice

1.(10) In the following reaction, benzoic acid reacts with methylamine in a Bronsted-Lowry acid/base reaction.



a) Provide arrows on the reactants side that show the flow of electrons in this proton transfer reaction.

b) Draw and label the conjugate acid and conjugate base (draw them as Lewis structures and show any *formal charges*).

2.(10) Identify the acid, base, conjugate acid and conjugate base in the following Bronsted-Lowry acid base reactions. Note the following pKa values:

$CH_3CH_2CO_2H = 5$; $HCN = 9$; $CH_3C\ CH = 25$; $NH_3 = 32$.

Also, determine whether the reactions below favor the products or reactants.

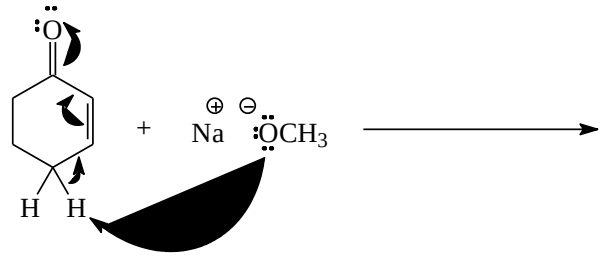
a) $KCN + CH_3CH_2\overset{\overset{O}{\|}}{C}OH \rightleftharpoons CH_3CH_2\overset{\overset{O}{\|}}{C}O^{\ominus}\ K^{\oplus} + HCN$

b) $CH_3C{\equiv}C{:}^{\ominus}\ Na^{\oplus} + NH_3 \rightleftharpoons CH_3C{\equiv}CH + Na^{\oplus}\ NH_2^{\ominus}$

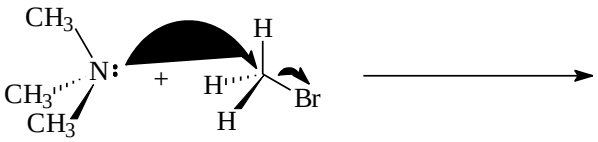
3.(10) Propose two Lewis structures of $C_2H_2Cl_2$, one with a dipole moment and one with a dipole moment of zero. Use an arrow to show the direction of the dipole in the polar compound.

4.(10) Using the arrows provided, draw the products resulting from the following reactions. Be sure to include any formal charges in the products (each reaction has two products). **Also**, label the base and the acid in each reaction.

a)

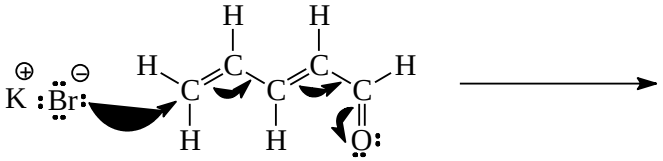


b)

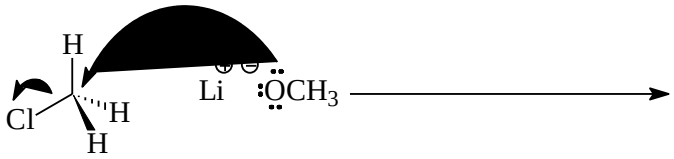


5.(10) For the following Lewis acid-base reactions, draw the products indicated by the arrows shown. Also, label the acid and the base.

a)

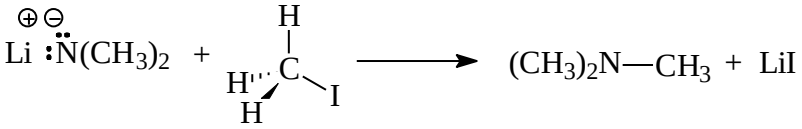


b)

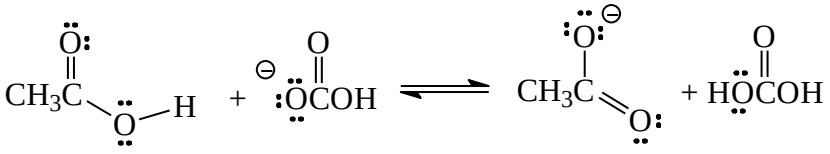


6.(10) In the following reactions, **identify the acid and the base**. Also show the electron flow in the reactants with **curved arrows**.

a)



b)



4.(10) Using CH_3CO_2H (acetic acid) and water, one as the acid and one as the conjugate acid, together with their corresponding conjugate bases, set up a Bronsted-Lowry acid-base reaction that proceeds to the right as written. The pKa of water is 15.7, the pKa of acetic acid is 4.75. Use Na^+ as the cation in the bases.