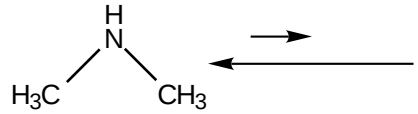
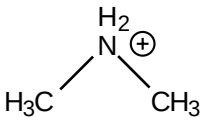
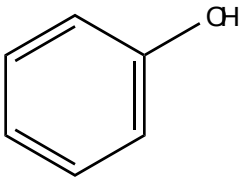
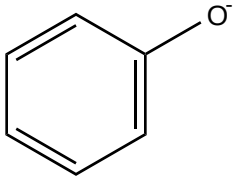
CH1010 Practice Exam 3 Fall 2000

In solving problems, you must show all work. Little or no credit will be given for a correct answer with no work shown.

1. In the following reactions, identify the acids (A), bases (B), conjugte acids (CA), and conjugate bases (CB) by putting the appropriate symbol under the reactant or product.

a. $HNO_3 + NH_3 \rightleftharpoons NO_3^- + {}^+NH_4$

b. $H_2O +$  $HO^- +$ 

c.  $+ H_2O$  $+ H_3O^+$

2. a. Calculate the ^-OH concentration in 1.2 $x10^{-3}$ M $Ca(OH)_2$.

b. Calculate the H_3O^+ concentration of the above solution.

c. Calculate the pH of the above solution.

3. Supply the missing reactants of products in the nuclear reactions below

a. $? \longrightarrow {}^{59}_{27}Co + {}^{0}_{-1}e$

b. ${}^{240}_{95}Am + ? \longrightarrow {}^{243}_{97}Bk + {}^{1}_{0}n$

c. ${}^{11}_{6}C \longrightarrow {}^{0}_{1}e + ?$

4. Briefly define the following terms:

a. Nuclear fission

b. Half-life

c. Buffer

d. Nuclear fusion

e. Positron

5. Draw 3 dimensional representations of all the isomeric bromo chloro cyclopentanes (don't forget cis and trans forms).

6. a. Propionic acid (CH_3CH_2-COOH) has $K_a = 1.34 \times 10^{-5}$. Write the equation for the acid-base reaction which occurs when propionic acid is dissolved in water.

b. Calculate the pK_a of propionic acid.

c. CH_3CH_2-COO^- is a base. Write the equation for its reaction with water.

d. Calculate the pK_b of CH_3CH_2-COO^-.

7. a. Calculate the molarity of a solution of 4.2 g KOH in 1 L water.

b. It requires 17.2 mL of the above solution to neutralize 25 mL of an HCl solution. Calculate the molarity of the HCl.

c. Write the equation for the above neutralization.

8. a. ^{40}K decays to ^{40}Ar with a half-life of 1.3 billion years. Write the equation for the nuclear reaction.

b. Calculate the ^{40}K remaining in a sample after 3.6 million years.