CHEMISTRY 31
Quiz 3
Spring, 2017
Solutions

1. The concentration of iron(III) in a solution can be determined by adding SCN^- to form the colored metal ligand complex, $FeSCN^{2+}$. The K value for $Fe^{3+} + SCN^- \leftrightarrow FeSCN^{2+}$ is 1050. NaSCN is added to an Fe^{3+} containing sample to create the complex. If after mixing, the concentration of the complex is measured to be 3.1×10^{-4} M (based on absorption of light) and the equilibrium concentration of SCN^- is 0.20 M, calculate the concentration of Fe^{3+} in equilibrium with SCN^- and the complex. (6 pts)

K_f (f for formation of complex) = 1050 = $[FeSCN^{2+}]/[Fe^{3+}][SCN^-]$
= $(3.1 \times 10^{-4}$ M$)/\{[Fe^{3+}](0.20$ M$)\}$ or $[Fe^{3+}] = (3.1 \times 10^{-4}$ M$)/[(1050)(0.20)]$ = ***1.5×10^{-6} M***

2. Based on the K_a values listed in the table below, rank the following solutions from most basic to least basic (when the salts are dissolved in water). (4 pts)
Salts: 0.1 M NaF, 0.1 M KBr, 0.1 M NaClO

Most Basic Least Basic

NaClO > NaF > KBr

Compound	HBr	HF	HClO
K_a	>1 (large)	6.8×10^{-4}	3.0×10^{-8}

All salts above have an alkaline metal cation which are neutral. So whether the salt is neutral or basic will just depend on the anion. The stronger the acidity of the acid (e.g. HBr), the weaker its conjugate base will be