Chem 116 Lecture 19
11/18/08 (JL)

1. Identify the acid on the left and its conjugate base on the right. Similarly, identify the base on the left and its conjugate acid on the right.

$$\underset{\text{(a)}}{HPO_4^{2-}(aq)} + \underset{\text{(b)}}{HCO_3^{-}(l)} \leftrightarrows \underset{\text{(c)}}{CO_3^{2-}(aq)} + \underset{\text{(d)}}{H_2PO_4^{-}(aq)}$$

(a) and (d) goes together, and (b) and (c) goes together.
Acid: (b) and (d)
Base: (a) and (c)

2. Does equilibrium lies primarily to the right or to the left?

Question 2 data

HPO_4^{2-}	$K_a = 3.6 \times 10^{-13}$
HCO_3^{-}	$K_a = 5.61 \times 10^{-11}$
$H_2PO_4^{-}$	$K_a = 6.23 \times 10^{-8}$

…HPO_2^- is base. HCO_3^- and $H_2PO_4^-$ are acid

You need to know which acid is stronger.
-Bigger K_a on left => Equilibrium lies on the right.
-Bigger K_a on right => Equilibrium lies on the left.
Therefore, equilibrium lies primarily to the left.

- Equilibrium doesn't necessarily have to be at pH7. Equilibrium= moles of acid is equal to moles of base.

Example of strong base calculations

Similar to Practice Exercises, pp. 683-684

a) What is the pH of a 0.0012 M NaOH solution?

b) If the pH of a solution of the strong base $Sr(OH)_2$ is 10.46, what is the concentration of $Sr(OH)_2$ in mol/L?

(a) Strong base (Arrhenius base)
NaOH when added to water completely dissociates 1 mol NaOH to water -> 1 mol Na^+ and 1 mol OH^- 0.0012M OH^- solution.

$[OH^-]$ = 0.0012M
pOH = -log(0.0012) = 2.92
pH + pOH = 14
=>pH = 14 – 2.92 =11.08 …check sig.fig.

(b) pH = 10.46
Goal:
Get the concentration of $Sr(OH)_2$.
Find concentration of $[OH^-]$.
Get that from pOH
Get pOH from the pH

pOH = 14 – pH = 14 – 10.46 = 3.54
$[OH^-] = 10^{-pOH} = 10^{-3.54} = 0.000288M$
$0.000288 \text{ (mol } OH^- \text{ / L)} \times \frac{1 \text{ mol } Sr(OH)_2}{2 \text{ mol OH-}} = 0.00014M$ is the $Sr(OH)_2$ concentration.