AP Chemistry Ch. 16 Acid/Bases Equilibrium Systems

I.....Section 16.6 *WEAK ACID Equilibrium Systems* page 681

A. This is not a difficult section when setting up and doing problems with "Weak Acid Equilibrium Systems".
[**You better know your Strong Acids, so can eliminate them
And thus have a weak acid which are two-way rxns in water
And thus setup an equilibrium systems with an equilibrium
Expression and a K_a value]

B. The setup of an "Weak Acid Equilibrium System is JUST like A Gas equilibrium system ...I C E it.....

**our objective to determine $[H_3O^+]$ and $[OH^{-1}]$ so we can calculate pH and pOH and % ionization.

C. Calculating K_a value from given data:
**Shaded problem page 682..
**Do practice problem pp. 683 in chapter bluebook

D. Calculating pH , pOH and % ionization page 684
(1)The math is very easy because we DO NOT have to use the quadratic equation..WHEW !!!!
(a) In determining 'x" which will be very small we can make and assumption in our setup which does away with using the quadratic equation ....again ..WHEW !!

Section 16.6 continued

(b) BUT (always a catch) we must calculate the % ionization of the acid and if its under 5% (5% Rule) then are making of the assumption is acceptable IF NOT we would have to use the quadratic equation (Pa Tooie) . On the AP Test you will NOT have to use the quadratic equation (WHEW !!) just indicate that your ionization % is greater than 5% so making an assumption is not acceptable.

Page 683 $\%\text{ionization} = \frac{[H_3O^+]_{equ}}{[\text{weak acid}]_I} \times 100$

**Shaded Problem page 684

***You do practice problem in chapter bluebook page 684

(c) calculating pH and/or pOH from given data:

**Sample problem page 685, 687 & 689,

**You do the practice problem on pages 686, 688 and 689 in your chapter Bluebook.

AP Chemistry Ch. 16 Acid/Base Equilibrium Systems

I. Section 16.8 Relationship between K_a and K_b

A. In a Weak acid equilibrium system the forward reaction has an equilibrium expression equal to K_a
B. For the same reaction in reverse the weak acids strong conjugate base has an equilibrium expression equal to K_b
C. Also, in the same reaction which involves water, a water equilibrium system exists So K_w is involved.

From this we obtain the following relationship:

$K_w = K_q \times K_b$

***This relationship also exists if we have a weak base equilibrium:

1. In a weak base equilibrium the forward reaction has an equilibrium Expression equal to K_b
2. In the same reaction the reverse reaction, the weak acids strong conjugate acid has an equilibrium expression equal to K_a
3. Water is also part of the system so we need to incorporate K_w

SO…. If a STRONG CONJUGATE BASE (which is a product particle coming from a weak acid losing a proton H^+) is anywhere …at the mall.. in the hall… in a Soluble Ionic salt which dissociates 100% in water will LOOK to attract a proton H^+ to become the weak acid and the water it took the proton from will be come OH^{-1}.

1) this salt that contains the strong conjugate base is called a base salt
2) there is NO K_b value for the strong conjugate base soooooooo, we need to calculate it using the following formula; $K_w = K_a \times K_b$
3) the problem will give you the K_a value of the weak acid so you can use the above formula.
4) an equilibrium equation can me made and thus an equilibrium expression
5) we can solve by I C E and utilizing the 5% rule

AND….If a STRONG CONJUGATE ACID (which is the product of a weak base taking a proton from water) is anywhere….at the mall…..in the hall… in a soluble Ionic salt which dissociates 100% in water will LOOK to give a water molecule its proton and form a hydronium ion.

1) this salt that contains the strong conjugate acid is called an acid salt
2) there is no K_a value for this strong conjugate acid sooooo, we need to calculate it using the formula; $K_w = K_a \times K_b$
3) the problem will give you the K_b value for the weak acid so you can use the formula above.
4) An equilibrium equation can be written and thus an equilibrium expression
5) We can solve by I C E and utilizing the 5% rule

***KNOW the rules on page 697
See sample problems pages 695, 698
***Do the practice problems on pages 695, 698

Read sections 16.10 & 16.11