Unit 5 Study Guide – Honors Chemistry

1. Use the formula for molarity to calculate moles, liters or molarity if given information about a solution (note: you may have to convert grams to moles or mL to liters). Perform problems below:

p. 508 #71

$\frac{15.7g}{100.09g} = .15 moles$

$M = \frac{.15 moles}{.275 L} = .57 M$

p. 508 #73

$10M = \frac{X}{1.5L}$

$X = 15 moles$

p. 508 p. 74

$3.5M = \frac{X}{2.0L}$

$x = 7 moles \left(\frac{111g}{1 mole}\right) = 777g$

2. Describe the difference between a saturated and unsaturated solution (p. 493).

Saturated means the solution contains the maximum amount of solute it can

Unsaturated means the solution can hold more solute

3. Solve for pH, pOH, [H+], or [OH-]. Perform problems below: *ignore temperatures given in problems

p. 654 # 27 a-d

a) $pOH = -\log(1.0\times10^{-6}) = 6$ $pH = 14 - 6 = 8$

b) $pOH = -\log(6.5\times10^{-4}) = 3.2$ $pH = 14 - 3.2 = 10.8$

c) $pH = -\log(3.6\times10^{-9}) = 8.4$ $pOH = 14 - 8.4 = 5.6$

d) $pH = -\log(2.5\times10^{-2}) = 1.6$

$pOH = 14 - 1.6 = 12.4$

p. 655 #30 a-d

a) $[H^+] = 10^{-6.5} = 3.2\times10^{-7} M$

$pOH = 14 - 6.5 = 7.5$

$[OH^-] = 10^{-7.5} = 3.2\times10^{7} M$

b) $[H^+] = 10^{-2.37} = 4.3\times10^{-3} M$

$pOH = 14 - 2.37 = 10.6$

$[OH^-] = 10^{-10.6} = 2.5\times10^{-11} M$

c) $[H^+] = 10^{-10.5} = 3.2\times10^{-11} M$

$pOH = 14 - 10.5 = 3.5$

$[OH^-] = 10^{-3.5} = 3.2\times10^{-4} M$

d) $[H^+] = 10^{-11.9} = 1.3\times10^{-12} M$

$pOH = 14 - 11.9 = 2.1$

$[OH^-] = 10^{-2.1} = 7.9\times10^{-3} M$

4. Describe the three factors that affect solvation (p. 492)

① Agitation

② Surface area → smaller pieces

③ temperature

5. Look back at your diagram on the back of the titration lab. Draw the picture at where acid = base (equivalence). Which ions were spectator ions?

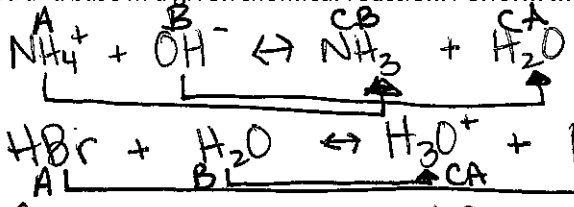
Na^+ & Cl^- b/c they did NOT participate in reaction.

6. Identify the acid and base in a given chemical reaction. Perform the problems below:

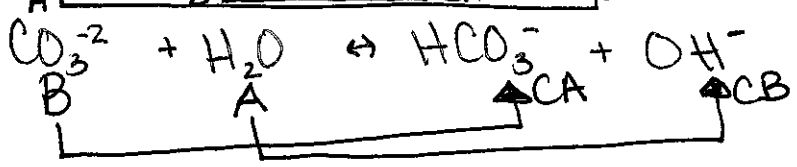
Acid → gives up H^+

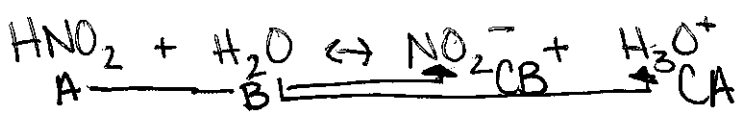
Base → accepts H^+

p. 640 #3 a-c



p. 643 #9





7. Relate the Ka of an acid to it's strength (remember- larger Ka means more acid particles dissociate).

p. 676 #5 The Higher the Ka, the higher the Strength

Lutidinic Acid

B/c largest Number

8. Describe the physical properties of acids and bases (taste, feel) and define acid and base. p. 634-636

Properties:

Defintions:

9. Define Arrhenius acids and bases. p. 637

10. What are the products of a neutralization reaction? p. 659

Salt + H_2O

11. What is a strong acid and a strong base?- make sure to describe how much they dissociate. p 644, 648

Completely dissociate (Break apart)

12. Use a BCA table to perform neutralization calculations – remember – moles of acid have to equal moles of base at equivalence. Remember, to solve for unknown molarities, you solve for moles of unknown and divide by volume of unknown in liters because M = mol/L

p. 664 #44 $.100M = \frac{X}{.04333L}$ $X = .004333\ mol = moles\ of\ OH^-$

When neutral, moles of H^+ = moles of OH^-

Moles of H^+ = .004333 moles $M = \frac{.004333\ moles}{.02\ L}$

$= .22\ M$

p. 673 #93- The reaction is $H_2SO_4 + NaOH \rightarrow H_2O + NaHSO_{4\,(aq)}$

$.4388\ M = \frac{X}{.07430L}$ $X = .0326\ moles\ of\ OH^-$

$M_{acid} = \frac{.0326\ moles}{.04578\ L} = .71\ M$

13. Explain the affect of concentration on the rate of a reaction. p. 569

14. Draw Figure 4 on p. 564 and explain the importance of orientation AND sufficient energy (temperature) for collisions.

15. Explain equilibrium in terms of the rate of the forward and reverse reaction AND in terms of the concentrations of the reactants and products. P. 596-597

16. Use LeChatelier's Principle to explain the shift in equilibrium that occurs when changing concentration, temperature, and pressure.

p. 626 #55a,b,d,e $CO(g) + 2H_2(g) \rightleftharpoons CH_3OH(g) + heat$

a) add CO - shifts right
b) cooling - shifts right
d) removing CH_3OH - shifts right
e) decreasing volume (increases pressure) - shifts right

~~p. 627 #55~~ oops ☺ p. 627 #60

a) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

4 mol gas | 2 mol gas

b) $H_2(g) + Cl_2(g) \rightleftharpoons 2HCl(g)$

2 mol gas | 2 mol gas

Changing the volume (pressure) of b) would have no effect b/c there are same moles of gas on each side

17. Draw Figure 5 on p. 565 and label the activated complex, the activation energy, the ΔH (energy released or absorbed) and state whether the reaction is endothermic or exothermic

18. Draw Figure 6 on p. 565 and label the activated complex, the activation energy, the ΔH (energy released or absorbed) and state whether the reaction is endothermic or exothermic

19. Describe the changes in boiling point and freezing point that occur when a solute is added to a solvent and describe the intermolecular forces at work to change these values. p. 501 – You may want to use the graphic organizer we did together in class with the pictures we drew ☺