Mr. Bracken
AP Chemistry

Name BRACKEN KEY
Period ____

Molarity Madness #1

1. What is the molarity of a solution if 21 grams of $NaHCO_3$ is dissolved into 0.50 Liter of water?

$\frac{21}{84} = .25$ moles $NaHCO_3$

$[NaHCO_3]$ $\frac{.25}{.50} = .50M$

2. What is the molarity of a solution if 53 grams of Na_2CO_3 is dissolved into 0.250 Liter of water?

$\frac{53}{106} = .50$ moles Na_2CO_3

$\frac{.50}{.25} = 2\ M$

$[Na_2CO_3]$ 2.0 M

$[Na^{1+}]$ 4.0 M

$[CO_3^{2-}]$ 2.0 M

3. What is the final molarity if 320 mL of 0.50 M HCl is diluted to a final volume of 480 mL?

~~$(.50)(.320) = (M)(.480)$~~

$(.50)(320) = (M)(480)$

$\frac{160}{480} = M(480)$

$[HCl]$ .33 M

4. What is the final concentration of K^{1+} ions if the following are mixed?

$[K^{1+}]$ .173 M

120 mL of 0.10 M K_2SO_4 $(.10)(.120) = .012$ moles $\times 2 = .024$

250 mL of 0.20 M KOH $(.20)(.250) = .05$ moles

180 mL of 0.10 M K_3PO_4 $(.10)(.180) = .0180 \times 3 = .054$ moles

450 mL of 0.10 M KNO_3 $(.10)(.450) = .045$ moles

total moles K = $\frac{.024 + .05 + .054 + .045}{1\ Liter}$

5. A 250 mL sample of 0.10 M Li_2SO_4 solution is added to 200 mL of 0.20 M $Ba(NO_3)_2$ solution. What are the concentrations of the ions remaining dissolved in solution?

$Li_2SO_4 + Ba(NO_3)_2 \rightarrow BaSO_4 + LiNO_3$

$(.10)(.250)$ $(.20)(.200)$

.025 moles .040 moles

.050 moles Li^+

.025 moles SO_4^{2-}

.040 moles Ba^{2+}

.080 moles NO_3^-

Limiting

$Ba^{2+} = .040 - .025 = .015$ moles Ba^{2+}

$[Li^{1+}]$ $\frac{.050}{.450} = .11$

$[SO_4^{2-}]$ 0

$[Ba^{2+}]$ $\frac{.015}{.450} = .033$

$[NO_3^{1-}]$ $\frac{.080}{.450} =$ ~~.178~~

.18 M

6. If 0.30 moles of solid $MgCl_2$ is mixed with 500 mL of water containing 0.40 moles of solid Na_2SO_4, what are the final concentrations of the ions?

$MgCl_2 + Na_2SO_4 \rightarrow MgSO_4 + 2NaCl$

Mg .30 moles Na^+ .80 moles

Cl^- .60 moles SO_4^{2-} .40 moles

No Rxn: All soluble

$[Mg^{2+}]$ $\frac{.30}{.500} = .6M$

$[Cl^{1-}]$ $\frac{.60}{.50} = 1.2M$

$[Na^{1+}]$ $\frac{.80}{.50} = 1.6M$

$[SO_4^{2-}]$ $\frac{.40}{.50} = .8M$

7. A 300. mL sample of 0.15 M $AgNO_3$ solution is added to 200. mL of 0.10 M $CaCl_2$ solution. What are the final concentrations of the ions that remain dissolved in solution?

$2AgNO_3 + CaCl_2 \rightarrow Ca(NO_3)_2 + 2AgCl$

$(.15)(.300)$ $(.10)(.200)$

.045 moles $AgNO_3$

.020 moles $CaCl_2$

.045 moles Ag^+

.045 moles NO_3^-

.020 moles Ca^{2+}

.040 moles Cl^-

Limit

Ag Moles

.045

$-.040$

.005 moles

$[Ag^{1+}]$ $\frac{.005}{.500} = .01M$

$[NO_3^{1-}]$ $\frac{.045}{.500} = .09M$

$[Ca^{2+}]$ $\frac{.020}{.500} = .04M$

$[Cl^{1-}]$ 0