Mr. Bracken
AP Chemistry

Name BRACKEN KEY
Period ____

Molarity Madness #3

1. Which beaker described below contains the greatest number of moles of Ca^{2+}?

Beaker A: 150 mL of 0.10 M $CaCl_2$ $(.10)(.150) = .0150$ moles Ca^{2+}

Beaker B: 120 mL of 0.20 M $Ca(NO_3)_2$ $(.20)(.120) = .024$ moles Ca^{2+}

Beaker C: 24 grams of solid $CaCl_2{\bullet}2H_2O$ dissolved in 500 mL of tap water

$\frac{24}{147.03} =$ .163 moles Ca^{2+} largest # moles

2. What is the molarity of a solution if 132 grams of KNO_3 is dissolved into 0.650 Liters of water?

$\frac{132}{101.11} =$ 1.31 moles KNO_3

$[K^{1+}]$ $\frac{1.31}{.650} = 2.02\ M$

$[NO_3^{1-}]$ $\frac{1.31}{.650} = 2.02\ M$

3. What is the final molarity if 300 mL of 1.2 M HCl is diluted to a final volume of 600 mL?

$(1.2)(.300) = (M)(.600)$

$M = .60\ M$

[HCl] .60 M

4. A 150 mL sample of 0.10 M $Pb(NO_3)_2$ solution is added to 360 mL of 0.15 M NaI solution. What are the concentrations of the ions remaining dissolved in solution?

$Pb(NO_3)_2 + 2\ NaI \longrightarrow PbI_2 + 2\ NaNO_3$

$(.10)(.150)$ — .015 moles $Pb(NO_3)_2$
.015 moles Pb^{2+}
.030 moles NO_3^-

$(.15)(.360)$ — .054 moles NaI
.054 moles Na^+
.054 moles I^-

.054
− .030
.024 moles excess I^-

$[Pb^{2+}]$ 0

$[NO_3^{1-}]$ $\frac{.030}{.510} = .059\ M$

$[Na^{1+}]$ $\frac{.054}{.510} = .11\ M$

$[I^{1-}]$ $\frac{.024}{.510} = .047\ M$

5. A person seeks to prepare 750. mL of 0.300 M $CuSO_4$ solution from the solid hydrate, $CuSO_4{\bullet}5H_2O$. How many grams of the hydrate should be added to prepare the desired solution?

$.300 = \frac{x}{.750}$

X= .225 moles hydrate needed

$.225 = \frac{x}{249.71}$

X= 56.2 g $CuSO_4 \cdot 5H_2O$

6. If 15 grams of KCl is mixed with 350 mL of water containing 80 grams of K_2SO_4, what are the final concentrations of the ions?

$\frac{15}{74.55}$ = .20 moles KCl → .20 moles K^+, .20 moles Cl^-

$\frac{80}{174.26}$ = .46 moles K_2SO_4 → .92 moles K^+, .46 moles SO_4^{2-}

$[K^{1+}]$ $\frac{.20 + .92}{.350}$ = 3.2 M

$[Cl^{1-}]$ $\frac{.20}{.350}$ = .57 M

$[SO_4^{2-}]$ $\frac{.46}{.350}$ = 1.3 M

7. A 160 mL sample of 0.10 M $Ca(NO_3)_2$ solution is added to 90 mL of 0.20 M Na_2CO_3 solution. What are the final concentrations of the ions that remain dissolved in solution?

$Ca(NO_3)_2 + Na_2CO_3 \rightarrow CaCO_3 + 2\,NaNO_3$

(.10)(.160) = .016 moles $Ca(NO_3)_2$

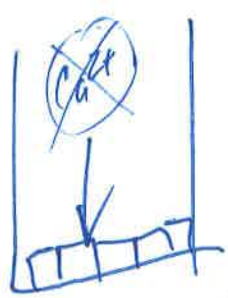
.016 moles Ca^{2+}

.032 moles NO_3^-

(.20)(.090) = .018 moles Na_2CO_3

.036 moles Na^+

.018 moles CO_3^{2-}



.018 − .016 = .002 moles excess CO_3^{2-}

$[Ca^{2+}]$ 0

$[NO_3^{1-}]$ $\frac{.032}{.25}$ = .13 M

$[Na^{1+}]$ $\frac{.036}{.25}$ = .14 M

$[CO_3^{2-}]$ $\frac{.002}{.25}$ = .0080 M

8. What is the final molarity if 155 grams of $MgSO_4{\bullet}7H_2O$ is dissolved to prepare 850 mL of water?

$\frac{155}{246.5}$ = .629 moles hydrate

$\frac{.629}{.85}$ = .74 M

$[MgSO_4]$ .74 M