Mr. Bracken
AP Chemistry

Name Bracken Key
Period ______

Molarity Madness #2

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

Beaker A: 180 mL of 0.10 M Li_2SO_4 — (.10)(.180) = .018 moles Li_2SO_4 — .036 moles Li^+

Beaker B: 120 mL of 0.20 M LiOH — (.20)(.120) = .024 moles LiOH — .024 moles Li^+

Beaker C: 75 mL of 0.10 M Li_3PO_4 — (.10)(.075) = .0075 moles Li_3PO_4 × 3 = .0225 moles Li^+

Beaker D: 140 mL of 0.10 M $LiNO_3$ — (.10)(.140) = .014 moles $LiNO_3$ = .014 moles Li^+

2. What is the molarity of a solution if 29 grams of NaCl is dissolved into 1.50 Liters of water?

$\frac{29}{58}$ = .50 moles

$\frac{.50}{1.50}$ = .33M

[NaCl] .33 M

3. What is the final molarity if 120 mL of 1.0 M KCl is diluted to a final volume of 600 mL?

$(1.0)(120) = (M_2)(600)$

$M_2 = .20$

[KCl] .20 M

4. A 250 mL sample of 0.30 M Na_2SO_4 solution is added to 350 mL of 0.20 M $CaCl_2$ solution. What are the concentrations of the ions remaining dissolved in solution?

$Na_2SO_4 + CaCl_2 \longrightarrow CaSO_4 + 2\,NaCl$

(.30)(.25) (.20)(.350)

.075 moles Na_2SO_4 .070 moles $CaCl_2$

.150 moles Na^+ .070 moles Ca^{2+}

.075 moles SO_4^{2-} .140 moles Cl^-

$[Na^{1+}]$ $\frac{.150}{.600}$ = .25M

$[SO_4^{2-}]$ $\frac{.005}{.600}$ = .0083M

$[Ca^{2+}]$ 0

$[Cl^{1-}]$ $\frac{.140}{.600}$ = .23 M

.005

5. What is the molarity of a solution if 53 grams of K_2SO_4 is dissolved into 0.50 Liter of water?

$\frac{53}{174}$ = .305 moles K_2SO_4

$\frac{.305}{.50}$ = .61 M K_2SO_4

$[K_2SO_4]$ .61 M

$[K^{1+}]$ 1.22 M

$[SO_4^{2-}]$ .61 M

6. If 125 grams of $MgCl_2$ is mixed with 750 mL of water containing 47 grams of KCl, what are the final concentrations of the ions?

Moles $MgCl_2$ = $\frac{125}{95}$ = 1.32 moles $MgCl_2$ 2.64 moles Cl^-

Moles KCl = $\frac{47}{74.5}$ = .63 moles KCl

$[Mg^{2+}]$ $\frac{1.32}{.75}$ = 1.8 M

$[Cl^{1-}]$ $\frac{3.27}{.75}$ 4.4 M

$[K^{1+}]$ $\frac{.63}{.75}$ = .84 M

7. A 225 mL sample of 0.10 M $AgNO_3$ solution is added to 110 mL of 0.10 M $AlCl_3$ solution. What are the final concentrations of the ions that remain dissolved in solution?

$3\,AgNO_3 + AlCl_3 \rightarrow 3\,AgCl + Al(NO_3)_3$

(.10)(.225) (.10)(.110)

.0225 moles $AgNO_3$

.0110 moles $AlCl_3$

.011 moles Al^{3+}

.0225 moles Ag^+

.033 moles Cl^-

.0225 moles NO_3^-

.033
− .0225
.0105

$[Ag^{1+}]$ 0

$[NO_3^{1-}]$ $\frac{.0225}{.335}$ = .067M

$[Al^{3+}]$ $\frac{.011}{.335}$ = .033 M

$[Cl^{1-}]$ $\frac{.0105}{.335}$ = .031M