

Name: Key
 Pd: _____ Date: _____

REVIEW OF CHEMISTRY 11 FOR CHEMISTRY 12
 DAY 3: DILUTIONS

The DILUTION EQUATION is: $M_I V_I = M_F V_F$

M_I = initial concentration M_F = final concentration
 V_I = initial volume V_F = final volume (usually "total" volume)

Example A:

What is the final concentration for the chloride ion when 50.0 mL of 2.0 M Iron (III) chloride is mixed with 250.0 mL of water?

Step 1. Write out the **balanced equation**:



Step 2. Use the **dilution equation**:

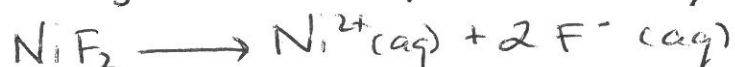
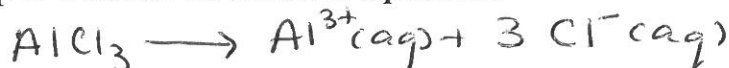
if $M_I V_I = M_F V_F$; then $M_F = \frac{M_I V_I}{V_F}$

$$[\text{FeCl}_3]_F = \frac{2.0\text{ M} \times 0.0500\text{ L}}{(0.0500 + 0.2500)} = \boxed{0.33\text{ M FeCl}_3}$$

= 0.300 L

Example B: What is the final concentration for all ions when 50.0 mL of 0.200 M Aluminum chloride is mixed with 25.0 mL of 0.300 M Nickel (II) fluoride?

Step 1. Write out the **balanced equations**:



Step 2. Use the **dilution equation** to first solve for the **compound concentrations**.

$$[\text{AlCl}_3]_F = \frac{0.200\text{ M} \times 0.0500\text{ L}}{(0.0500 + 0.0250\text{ L})}$$

= 0.0750 L

$$= \boxed{0.133\text{ M AlCl}_3}$$

$$[\text{NiF}_2]_F = \frac{0.300\text{ M} \times 0.0250\text{ L}}{0.0750\text{ L}}$$

$$= \boxed{0.100\text{ M NiF}_2}$$

Step 3. Use the **balanced equations** to solve for the **individual ion concentrations**.

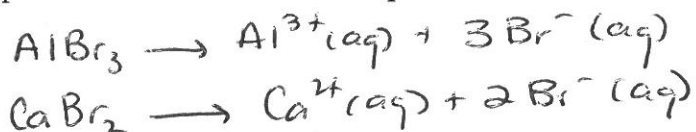
$$[\text{Al}^{3+}] = \frac{0.133\text{ mol AlCl}_3}{\text{L}} \times \frac{1\text{ mol Al}^{3+}}{1\text{ mol AlCl}_3} = \boxed{0.133\text{ M Al}^{3+}} \quad \therefore [\text{Ni}^{2+}] = 0.100\text{ M}$$

$$[\text{Cl}^-] = \frac{0.133\text{ mol AlCl}_3}{\text{L}} \times \frac{3\text{ mol Cl}^-}{1\text{ mol AlCl}_3} = \boxed{0.400\text{ M Cl}^-} \quad [\text{F}^-] = 0.200\text{ M}$$

Example C.

What is the final ion concentrations for all of the ions when 25.0 mL of 2.50 M Aluminum bromide is mixed with 25.0 mL of 0.150 M Calcium bromide?

Step 1. Write out the **balanced equations**:

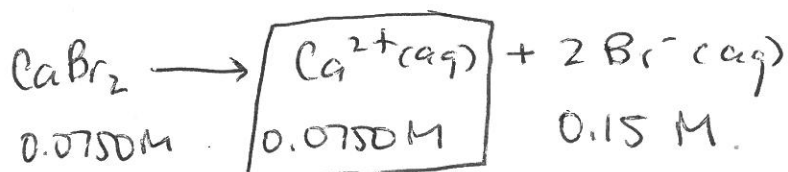
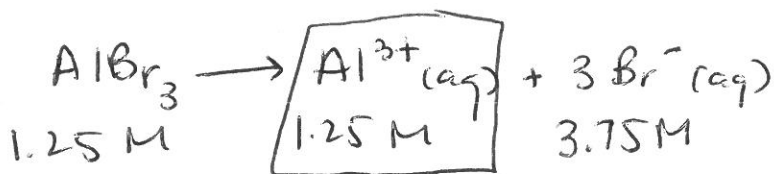


Step 2. Use the **dilution equation** to first solve for the **compound concentrations**.

$$[\text{AlBr}_3]_F = \frac{2.50 \text{ M} \times 0.0250 \text{ L}}{0.0500 \text{ L}}$$
$$= 1.25 \text{ M AlBr}_3$$

$$[\text{CaBr}_2]_F = \frac{0.150 \text{ M} \times 0.0250 \text{ L}}{0.0500 \text{ L}}$$
$$= 0.0750 \text{ M CaBr}_2$$

Step 3. Use the **balanced equations** to solve for the **individual ion concentrations**.



Step 4. Now **ADD** together the **common ion's concentrations**

$$[\text{Br}^{-}] = 3.75 \text{ M}$$
$$0.15 \text{ M}$$

$$3.90 \text{ M Br}^{-}$$

WORK ON Chemistry 11 review package