# **Solution Chemistry continued**

When something dissolves, its ions completely separate (dissociate) from each other:

Not only can we find the concentration of a salt in a solution, we can also find the concentration of each ion in that solution.

Eg. Find the concentration of each ion in a 0.25M solution of calcium chloride.

* First, identify the ions
* Then, find the ratio between the ions
* Thirdly, multiply the original concentration by the ratio to get the concentration of each ion.

**Try these:**

1. Find the concentration of each ion in a 1.2M solution of ammonium sulphate.
2. 3.5 g of sodium sulphide is dissolved and diluted to 200.0mL. Find the concentration of each ion in the solution.
3. Calculate the concentration of each ion present in a 0.012M solution of vanadium (III) hydroxide.
4. Find the concentration of each ion when 25 mL of 0.10M NaCl is added to 12mL of 0.20M CaCl2.

Ionic Concentration Work Sheet

**A)**  **Write the equation as the solute is dissolved in water and then calculate the concentration of each ion in the following solutions.**

1. 0.50 M HCl

2) 3.00 M H2SO4

1. 6.42 g Na3PO4 dissolved in water to make 25.5 mL of solution.
2. 1.00 g CuSO4.5H2O dissolved in water to make 50.0 mL of solution.

 **Calculate** a) how many moles of solute b) how many moles of each ion are in the following solutions.

1. 25.0 mL of 2.50 M NaOH
2. 10.0 mL of 0.0500 M CoCl2
3. 117 mL of 14.6 M H3PO4

7) 11.3 mL of 0.512 M Ca(OH)2

**B) Dilution Problems**. Calculate the concentration of a) each solute and b) each ion when the following are mixed.

1. 25.0 mL of 18.0 M H2SO4 and 130.0 mL water
2. 110.0 mL of 3.00 M HCl and 25.0 mL water
3. 50.0 mL of 0.750 M KOH and 25.0 mL of 0.500 M KOH

 12) 75.0 mL of 1.00 M LiNO3 and 115 mL of 2.50 M FeCl3

 C) Some chemicals come from suppliers as highly concentrated solutions. In order to use them properly (and safely) they need to be diluted. Describe how you would make the following solutions given the strength of the initial solution. (State the volume of the stock solution needed.)

1. 250.0 mL of 3.00 M HCl using 12.0 M HCl
2. 50.0 mL of 1.00 M H2SO4 using 18.0 M H2SO4
3. 100.0 mL of 0.500 M CH3COOH using 15.0 M CH3COOH

 16) 500.0 mL of 1.50 M NH3 using 15.0 M NH3

**Answers :**

  1) [H+] = 0.50 M [Cl-] = 0.50 M 2) [H+] = 6.00 M [SO42-] = 3.00 M

  3) [Na+] = 4.61 M [PO43-] = 1.54 M 4) [Cu2+] = 0.0801 M [SO42-] = .0801 M

 5) a) 0.0625 mol NaOH b) 0.0625 mol Na+ 0.0625 mol OH-

6) a) 5.00 x 10-4 mol CoCl2 b) 5.00 x 10-4 mol Co2+ 1.00 x 10-3 mol Cl-

  7) a) 1.71 mol H3PO4 b) 5.12 mol H+ 1.71 mol PO43-

  8) a) 5.79 x 10-3 mol Ca(OH)2 b) 5.79 x 10-3 mol Ca2+ 1.16 x 10-2 mol OH-

  9) a) 2.91 M H2SO4 b) [H+] = 5.81 M [SO42-] = 2.91 M

 10) a) 2.44 M HCl b) [H+] = 2.44 M [Cl-] = 2.44 M

 11) a) 0.667 M KOH b) [K+] = 0.667 M [OH-] = 0.667 M

 12) a) 0.395 M LiNO3 1.51 M FeCl3 b) [Li+] = 0.395 M [NO3-] = 0.395 M [Fe3+] = 1.51 M [Cl-] = 4.54 M

 13) 62.5 mL of 12.0 M HCl mixed with water to raise volume to 250.0 mL

 14) 2.77 mL of 18.0 M H2SO4 mixed with water to raise volume to 50.0 mL

 15) 3.33 mL of 15.0 M CH3COOH mixed with water to raise volume to 100.0 mL

 16) 50.0 mL of 15.0 M NH3 mixed with water to raise volume to 500.0 mL