

CHEMISTRY 12 – UNIT III – Solubility Equilibrium

G: Solubility Equilibrium (Concept of Solubility)

It is expected that students will be able to...

G1: Classifying solutions as ionic or molecular

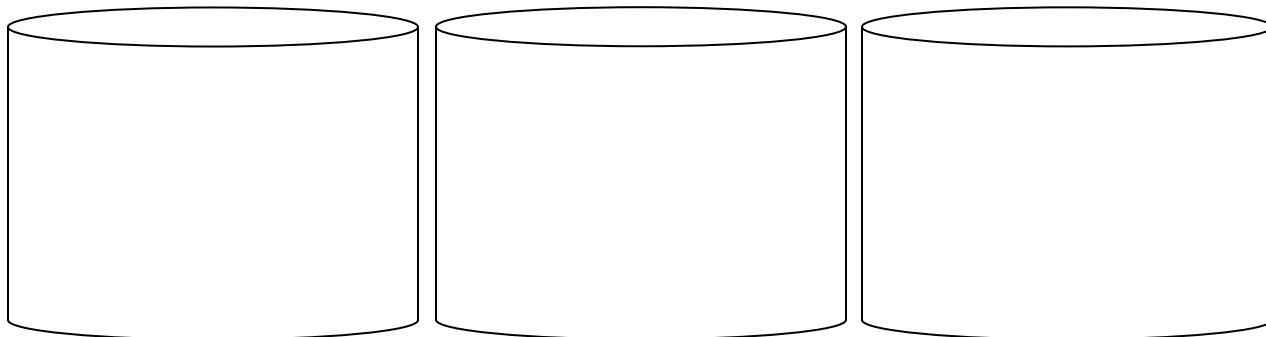
- 1) Write the dissolving reaction if 1.0 mol of the following particles are added to 1.0 L of water; and classify each solution as ionic or molecular:
 - a) Solid hydroiodic acid
 - b) Solid sulphur tetrafluoride
 - c) Solid potassium phosphate
 - d) Solid calcium phosphate

G2: Important solution terms

- 1) Define the following terms: **solution, solute, solvent, unsaturated, saturated, supersaturated**. You must use the salt solution, $\text{NaCl}_{(\text{aq})}$, in each of your definitions.
Ex) In a NaCl solution, the salt ($\text{NaCl}_{(\text{s})}$) is the solute which has been dissolved.

G3: Understanding the dissolving reaction

- 1) Sketch a pictorial transformation of an ionic compound (use lithium fluoride) being dissolved by water. Use the following 3 beakers to show the solid LiF being broken apart by the water into ions.



G4: Define Solubility

- 1) List appropriate units that can be used to express solubility.
- 2) 1.0 mol of the solid ionic compound, $\text{AB}_{(\text{s})}$, is added to 1.0 L of water and produces a concentration of 0.034M. What can be said about the solubility of the compound? Show the reaction for this.

G5: Stoichiometric Calculations involving Soluble Salts

- 1) What is the concentration of nitrate ions if 5.00g of chromium (III) nitrate is dissolved in distilled water to make a 250.0mL solution?

- 2) In an experiment, a student decants a sample of saturated MgBr_2 solution into a beaker and evaporates the sample to dryness. He recorded the following data:

Volume of saturated $\text{MgBr}_{2(\text{aq})}$	25.00 mL
Mass of beaker	89.05 g
Mass of beaker and residue	93.47 g

Calculate the solubility of MgBr_2 in moles per litre.

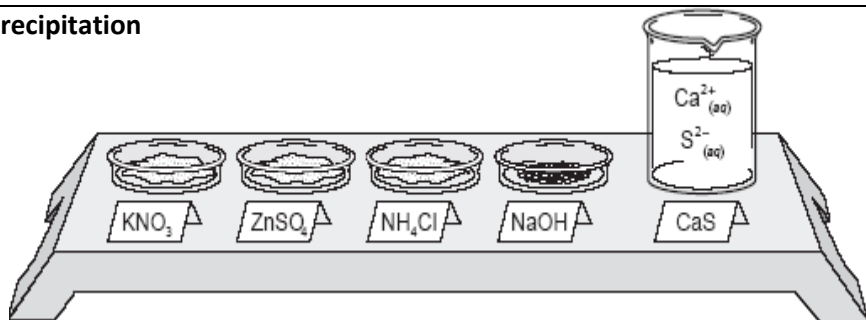
- 3) What is the concentration of sodium ions after 120.0mL of a 0.225M Na_3N solution is mixed with 80.0mL of a 0.350M Na_2CO_3 ?

G6: Precipitates and a solution reaction

- 1) When two solutions are mixed together, what must be produced to have a reaction occur?
- 2) Describe what will happen when equal volumes of 0.2 M K_2CO_3 and 0.2 M Na_3PO_4 are mixed.
- 3) What is the **complete ionic equation** and the **net ionic reaction** for the following mixtures?
 - a) 0.2 M $\text{K}_2\text{CO}_{3(aq)}$ and 0.2 M $\text{Na}_3\text{PO}_{4(aq)}$
 - b) 0.2 M $\text{Na}_2\text{S}_{(aq)}$ and 0.2 M $\text{CuCl}_{2(aq)}$
- 4) For each of the mixtures in **3)** write a list of spectator ions for each.

G7: Separation of ions using precipitation

- 1) Consider the following:



Which two solid samples could be added to the calcium sulphide solution in order to remove first one ion then the other ion from the solution. Indicate the order in which to add them and determine what will be formed in each case.