

Calculations:

(1) Consider the addition of 2.3 g of CaCl_2 to water to produce 500. mL of solution.

a) What is the concentration of the CaCl_2 solution?

b) What is the dissociation equation?

c) What is the concentration of each ion in the solution?

(2) Calculate the concentration of each ion in a solution formed with 25 mL of 0.50 M MgCl_2 is mixed with 10. mL of 0.60 M AlCl_3 .

- What is the final volume?
- When one solution is added to another solution, both are diluted. What is the diluted concentration of each solution?
- What is the concentration of the ions in each solution? (You will need a dissociation equation).
- What is the final concentration of each of the ions?

(3) Calculate the molar solubility of lead (II) sulphate if 500. mL of saturated solution contains 0.0200 g of lead (II) sulphate.

(4) The molar solubility of lead (II) chloride is 0.014 M at 25°C. What is the solubility in g/mL?

(5) The solubility of lead (II) iodate is 4.5×10^{-5} M. What mass of lead (II) iodate is dissolved in 300. mL of saturated solution?

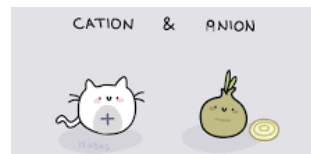
Solubility Calculations Worksheet

Predicting Solubility

SOLUBILITY OF COMMON COMPOUNDS IN WATER

The term *soluble* here means $> 0.1 \text{ mol/L}$ at 25°C .

Negative Ions (Anions)	Positive Ions (Cations)	Solubility of Compounds
All	Alkali ions: Li^+ , Na^+ , K^+ , Rb^+ , Cs^+ , Fr^+	Soluble
All	Hydrogen ion: H^+	Soluble
All	Ammonium ion: NH_4^+	Soluble
Nitrate, NO_3^-	All	Soluble
Chloride, Cl^- or Bromide, Br^- or Iodide, I^-	All others	Soluble
	Ag^+ , Pb^{2+} , Cu^+	Low Solubility
Sulphate, SO_4^{2-}	All others	Soluble
	Ag^+ , Ca^{2+} , Sr^{2+} , Ba^{2+} , Pb^{2+}	Low Solubility
Sulphide, S^{2-}	Alkali ions, H^+ , NH_4^+ , Be^{2+} , Mg^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+}	Soluble
	All others	Low Solubility
Hydroxide, OH^-	Alkali ions, H^+ , NH_4^+ , Sr^{2+}	Soluble
	All others	Low Solubility
Phosphate, PO_4^{3-} or Carbonate, CO_3^{2-} or Sulphite, SO_3^{2-}	Alkali ions, H^+ , NH_4^+	Soluble
	All others	Low Solubility



Remember...

Soluble = dissolves

- Aqueous
- Cation and anion DO NOT form a precipitate

Low Solubility = does not dissolve

- Solid
- Cation and anion DO form a precipitate

How to read the table:

- ⇒ Identify ANION
- ⇒ Identify CATION
- ⇒ Soluble (aq) or Low Soluble (s)

Practice:

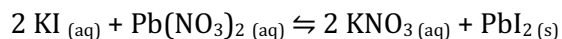
1. Classify the following salts as being soluble or having low solubility in water:

- Copper (II) chloride
- Aluminum hydroxide
- Sodium phosphate
- Calcium sulphate
- Iron (II) sulphide
- Strontium hydroxide
- Zinc bromide
- Cesium sulphite
- Potassium chromate

2. Write the formula for the following:
- A salt containing carbonate that is soluble
 - A salt containing sulphate with low solubility
 - A cation that forms a salt with low solubility with both chloride and sulphate ions
 - An anion that forms soluble salts with all cations.
3. A student is given a sample of either magnesium nitrate or strontium nitrate. When a few drops of a solution of sodium hydroxide is added to the sample, no precipitate forms. Does the sample contain magnesium nitrate or strontium nitrate? Explain your reasoning.

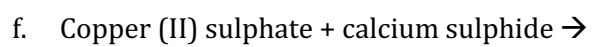
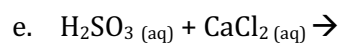
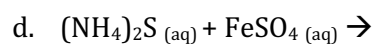
Types of chemical equations:

Formula Equation: shows the chemical formulas of the compounds and their states



Complete Ionic Equation: shows the soluble salts represented in their dissociated form.

Net Ionic Equation: shows only the ions that take part in the reaction. Ions that are the same on both sides of the equation are called **spectator ions**.



Hebden Workbook Pg. 81 #18-20, Pg. 87 # 25