**IB Chemistry Lab 1**

Determination of a Chemical Formula

**Learning Targets:**

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| **1.1 Mol concept & Avogadros Number** | |
| 1.1.1 | Apply the mole concept to substances. |
| 1.1.2 | Determine the number of particles and the amount of substance (in moles). |
| **1.2 Formulas** | |
| 1.2.1 | Define the terms *relative atomic mass* (*A* r) and *relative molecular mass* (*M* r). |
| 1.2.2 | Calculate the mass of one mole of a species from its formula. |
| 1.2.3 | Solve problems involving the relationship between the amount of substance in moles, mass and molar mass. |
| 1.2.4 | Distinguish between the terms *empirical formula* and*molecular formula.* |
| 1.2.5 | Determine the empirical formula from the percentage composition or from other experimental data. |
| 1.2.6 | Determine the molecular formula when given both the empirical formula and experimental data. |
| **1.3 Chemical Equations** | |
| 1.3.1 | Deduce chemical equations when all reactants and products are given. |
| 1.3.2 | Identify the mole ratio of any two species in a chemical equation. |
| 1.3.3 | Apply the state symbols (s), (l), (g) and (aq). |
| **1.4 Mass and gaseous volume relationships in chemical reactions** | |
| 1.4.1 | Calculate theoretical yields from chemical equations. |
| 1.4.2 | Determine the limiting reactant and the reactant in excess when quantities of reacting substances are given. |
| 1.4.3 | Solve problems involving theoretical, experimental and percentage yield. |
| **1.5 Solutions** | |
| 1.5.1 | Distinguish between the terms *solute*, *solvent*, *solution* and *concentration* (g dm–3 and mol dm–3). |
| 1.5.2 | Solve problems involving concentration, amount of solute and volume of solution. |

In this lab you will make an aqueous solution of an unknown copper chloride hydrate. You will react this solution with aluminum metal and using the information you can gather from the lab you should be able to address all of the learning targets listed above.

**Pre-Lab:**

1) Write a background discussion on the determination of chemical formulas.

2) Predict the unbalanced chemical equation for the reaction that you will perform.

[lab notes: Once the reaction is complete acidify the solution (~5 drops 6M HCl) to remove any unwanted salt precipitate. After filtering the precipitate rinse with ethanol 2X]

**IB Chemistry Lab 1**

Determination of a Chemical Formula

**Answer the following questions relating to Lab 1:**

What is the chemical formula of the hydrate you tested?

How many moles, and how many particles of the hydrate did you start with?

What is the relative molecular mass of the hydrate (Mr)?

What is the formula mass of the hydrate?

What percent by mass of the hydrate is water?

Write the balanced chemical equation for the reaction of the copper compound with the Aluminum.

Determine your theoretical yield and percent yield of copper for this reaction.

Discuss how the solution changed throughout the reaction, include the concepts of solute, solvent, and concentration.

**Lab Report:**

Write only the conclusion and evaluation section of a lab write up for this lab. Refer to the text “internal assessment” section for guidelines. Be sure to consider aspects 1-3.