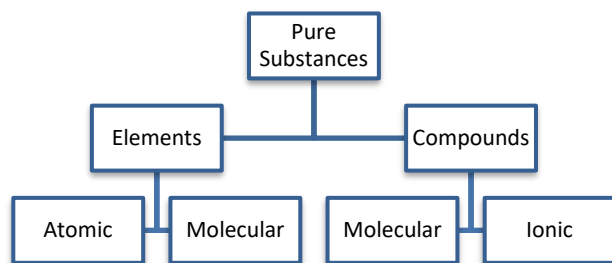


The Organizational Chart Of Matter



The Periodic Table of Elements

The periodic table is divided mainly by *Families*. Families are the elements in a column in the periodic table. The older International Union of Pure and Applied Chemistry (IUPAC) system would use Roman numerals and letters to differentiate the families; however the modern IUPAC makes use of Arabic numbers which simply numbers the columns 1 to 18.

- Group 1 – Alkali metals
- Group 2 – Alkali earth metals
- Group 13 – Boron group
- Group 14 – Carbon group
- Group 15 – Nitrogen group (Pnictogens)
- Group 16 – Oxygen group (Chalcogens)
- Group 17 – Halogens
- Group 18 – Noble gases

Biochemical Reactions

New compounds are formed through a chemical reaction. To understand how the reaction took place, a chemical equation is written to see which elements were transformed and affected.

In writing a chemical equation, the *reactants* are written on the left-hand side,

while the *products* are written on the right-hand side. The two (2) are separated by an arrow which shows the direction of the reaction. An arrow pointing to the right is known as a forward reaction, while an arrow pointing to the left is known as a reverse reaction. If two (2) arrows (\rightleftharpoons) are placed between the reactants and products, this shows that the reaction is *reversible*. Some reactions include a word or symbol above the arrow. This indicates a condition or influencing factor is being added to execute the reaction.

Things to Remember when Writing Reactions

- Use state symbols in parentheses to indicate the physical state of the compound: (s) for solid, (l) for liquid, (g) for gas, and (aq) for aqueous solution.
- Be mindful of capitalization in elements. NI (Nitrogen iodide) is different from Ni (Nickel).
- Don't forget to add all the compounds and elements involved in the reaction.
- Coefficients indicate how much of that compound is involved in the reaction. Subscripts indicate the charge.



Equation 1.0 Sample Chemical Equation

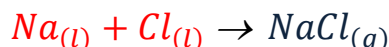
Photosynthesis involves the interaction of carbon dioxide (in gaseous) form and water to synthesize glucose (in solid form) and oxygen (in gaseous form). The elements in red are the reactants, while those in blue are the products.

Types of Reactions

The products formed will depend on the type of reaction occurring. Generally speaking, there are four (4) main types of chemical reactions:

- Composition/Synthesis Reactions

These are reactions where multiple reactants, such as element A and B, interact with each other to form element a single product, compound AB. Energy is required for composition reactions to occur. The general formula for composition reactions is: $A + B = AB$.



Equation 1.1 Example of a Composition Reaction
Used in various industries, salt (NaCl) is a common example of a composition reaction. The elements sodium and chlorine are present in both liquid forms when they interact. Once they interact, they form salt in an aqueous solution. Salt farms, such as those seen in Pampanga or Parañaque, use this to create salt. As the salt farm dries, the salt suspended in the aqueous solution is left behind while the water evaporates.

- Decomposition Reactions

These are reactions where one (1) compound undergoes changes due to an external factor that initiates the reaction (temperature, Ph). It is broken down into its constituents and releases energy as the bonds are broken.



Equation 2.0 Sample Chemical Equation
Hydrogen peroxide is used as a disinfectant for minor wounds and is usually stored in a tinted bottle. This is to prevent the compound to decompose into water (H_2O) and air (O_2).

- Displacement Reactions

These are reactions where the reactants are have more than one (1) element, such as element A and BC, interact with each other by swapping one (1) of the elements. The general formula for composition reactions is: $A + BC = AB + C$.

- Reduction-Oxidation (Red-Ox) Reactions

DEFINITIONS BOX

Carbon	Biochemistry
Ionic	Covalent
Hydrogen bonds	IUPAC
Cation	Anion
Products	Reactants
Composition	Decomposition
Displacement	Oxidation
Reduction	

References

- Hoefnagels, M. (2016). *General biology books I and II*. Quezon City: McGraw-Hill Education.
- Mason, K. A., Losos, J. B., & Singer, S. R. (2017). *Biology* (11th ed.). New York: McGraw-Hill Education.
- Tro, N. J. & Au-Yeung, H. Y. (2015). *Introductory chemistry*. Singapore: Pearson Education Limited.