



What is Chemistry?

Chemistry is the branch of science that deals with the study of matter. It also deals with the processes and the changes that

matter undergoes and is the basis of other engineering sciences such as biology, physics, thermodynamics, just to name a few. The concepts and principles in chemistry are integral to modern-day applications such as health and medicine, alternative energy sources, development of new materials and technologies, and food and agriculture, even though its roots can be traced to hundreds of years as one of the earliest, if not the earliest branch of science. *Excel Review Center*

Chemistry comes from the Arabic word *kimia*, which means alchemy.



Alchemy is usually considered as the earliest form of chemistry.

Branches of Chemistry

- Organic Chemistry** – It deals with the study of the chemical substances that contains carbon-carbon bonds.
Examples: Pharmaceuticals, plastics
- Inorganic Chemistry** – It deals with the study of the chemical substances that do not contain carbon-carbon bonds.
Examples: Studying metals, minerals, semiconductors
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- Physical Chemistry** – It deals with the behavior and changes of matter and the related energy changes.
Examples: Reaction rates, reaction mechanisms
- Analytical Chemistry** – It deals with the study of the different components and composition of substances.
Examples: Food nutrients
- Biochemistry** – It deals the study of matter and processes in living organisms.
Examples: Metabolism, Fermentation

The Scientific Method

It is a systematic approach to research used in almost all types of engineering sciences. This is the way scientists, chemists, physicists and biologists study everything around them.

The **scientific method** is a process of defining a problem, making experiments, collecting data, interpreting the data, formulating a hypothesis, and summarizing the data in a way that is simple and precise.

Any test or trial that is used to collect information or data to answer a specific set of questions or inquiries is called an experiment. *Excel Review Center*

Data

Data refers to the raw information collected from the experiments. Once the data are organized, they are now referred to as results. If one makes deductions from the results, they are now referred to as conclusions.

Two Types of Data:

- Qualitative Data** – general statements about one's observation on the system
Examples: color, odor, shape
- Quantitative Data** – numbers obtained by measuring certain parameters of the system
Example: mass, length, volume

Four Ways to Summarize the Data:

- Hypothesis** – it is a statement produced out of few observations without much experimental evidence. It is a possible explanation for what has been observed.
- Law** – it is a statement produced out of thorough research and experimentation that indicates the relationships between different phenomena that is always the same under the same conditions (e.g. Newton's Law of Motions, Ideal Gas Law, etc.). Scientific laws stand the test of time. *Excel Review Center*
- Theory** – it is a unifying principle that explains a body of facts and/or

are based on them (e.g. Big Bang Theory). Theories can be proved or disproved in new experiments. In other words, it is flexible enough to be modified if new experiments and findings are introduced

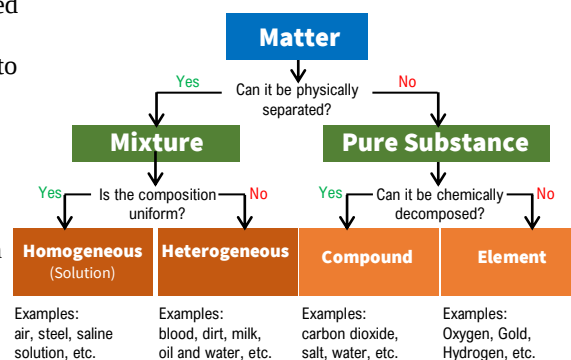
- Model** – it is a visual, verbal, or mathematical explanation of experimental results that is only accurate under certain conditions and in certain environments. Unlike scientific laws, models are not universal. *Excel Review Center*



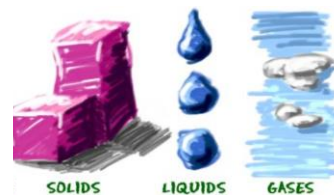
Matter

It is anything that has mass and occupies space.

Mass is a measurement of the amount of matter in a certain object.



States of Matter



- Solid** – molecules of matter at this state are closely held together in an orderly sequence such that they are not free to move. Solids are rigid and are almost incompressible.
- Liquid** – molecules of matter at this state are farther apart compared to molecules of solid. Liquids can flow and it follows the shape of its container. Like solids, they are hard to compress.
- Gas** – molecules of matter at this state are separated by large distances relative to the size of the molecules. Hence, molecules are free to move randomly at different directions. Gases also flow, and are easier to compress compared to solids and liquids. They follow the volume and the shape of their containers. In general, liquids and gases are classified as fluids, or substances that have the ability to flow.

