Physics and Chemistry

Physics can be defined as the science of matter, motion, and energy. Its laws are typically expressed with economy and precision in the language of mathematics. Its goal is to understand the natural world.

In other words,it is the study of how matter interacts. Physicists observe, experiment, and collect data in order to find physical laws to explain how everything in the universe behaves and functions. Physics stems from ancient Greek philosophy and was commonly known as "natural philosophy" until the late 18th century. The ultimate goal of physics is to explain how everything in the universe functions and interacts. Using mathematical laws, physics strives to explain the entire universe in fundamental ways. Physics has two broad categories - classical physics and modern physics. *Classical physics* involves anything that was studied up until the 20th century. This includes topics such as force and motion, sound, astronomy, light, electricity, heat, and magnets, among others. *Modern physics* involves the study of anything that has developed since the beginning of the 20th century, basically matter on a smaller scale and more precise measurements. Topics such as atoms, lasers, astrophysics, the origins of the universe, relativity, and nanotechnology are a part of modern physics.

- Chemistry is the science that deals with the properties, composition, and structure of substances (defined as elements and compounds), the transformations they undergo, and the energy that is released or absorbed during these processes. Every substance, whether naturally occurring or artificially produced, consists of one or more of the hundred-odd species of atoms that have been identified as elements. Chemistry, therefore, is concerned with the properties of atoms and the laws governing their combinations and the reactions

of matter; meaning that when 2 different chemicals are mixed together to bring something new, this is labeled as a chemical reaction.

Namely, chemistry studies how different substances and chemicals react with one another, creating new solutions, atomic structures, and more.

Physics and chemistry

- Both physics and chemistry study matter and its properties. Physics tries to understand how everything in the universe functions and works. While, chemistry deals with how matter exists in the universe and how it changes over time like the chemical changes.
  - There are two distinct changes characterizing matter in the universe:

First: Physical change is a change in which **no** new substances are formed. That is, **no** change in the type of matter an object is made of. Material may change shapes or forms like size, shape…

e.g. broken glass/ pencil, ice water…

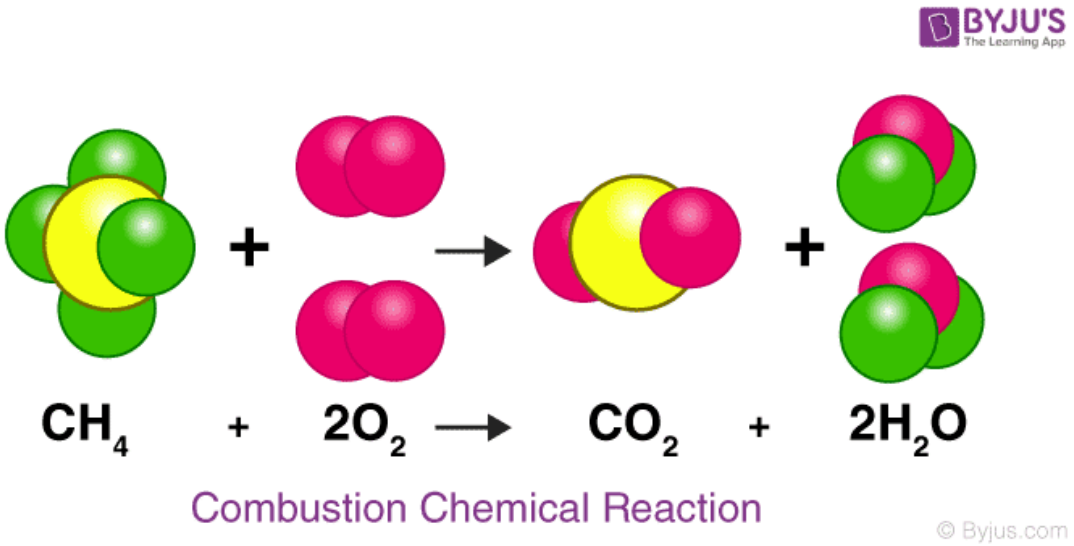
- **physical changes occur when**: cutting, breaking, dissolving, condensing, folding, bending, warming, evaporating, mixing, boiling, separating, freezing, cooling, tearing, crushing.

Second: Chemical change is a change in which **one or more new** types of matter form .That is, substances react to each other to form other new substances. **It is** a process in which one or more substances, the reactants, are converted to one or more different substances, the products.

The reactants are on the left-hand side whereas the products formed are on the right-hand side. The reactants and products are connected by a one-headed or two-headed arrows. For example, a reaction

A + B → C + D

Let us consider an actual chemical reaction between Methane(CH_4) and Oxygen (O_2),



Here we can see how the number of each atom on the left side is balanced on the right side, as stated by the law of conservation of mass.

- The table bellow summarizes the chemical changes with some examples.

Clue	Examples
Changes colour	Cake gets brown in the oven
Different ordor	Burning wood
Bubbles form	Bubbles form when vinegar is mixed with baking soda
Gives off gas	Burning wood gives off carbon dioxide CO2
New solid form	Rust is created

Activity one: classify the followings either as physical change or chemical change:

Slicing bread, frying an egg, fireworks, fresh juice, boiling water, digesting food, roasting a marshmallow, baking a cake, cracking an egg.

Correction

Physical change	Chemical change
Cracking an egg	*Frying an egg*
Slicing bread	*Baking a cake*
Boiling water	*Fireworks*
Fresh juice	*Digesting food*
	Roasting a marshmallow

- Matter: anything that occupies space and has weight.
- Composition of matter: it means that what the different materials are made of.

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- Structure of matter: meaning that how things are shaped.