



Guidelines

Dear Students

- The following lesson has been specifically created for you to get a head start to the current year's chemistry curriculum.
- Refer to the content below, view the link, and attempt the assignment provided at the end of this lesson in your chemistry notebook.
- Please read the NCERT before you begin to answer the questions.
- Link for the chapter :- <http://ncert.nic.in/textbook/textbook.htm?jesc1=1-16>

SUB TOPICS:

1. Introduction

A chemical change is one in which a new substance is formed which has properties totally different from the starting materials.

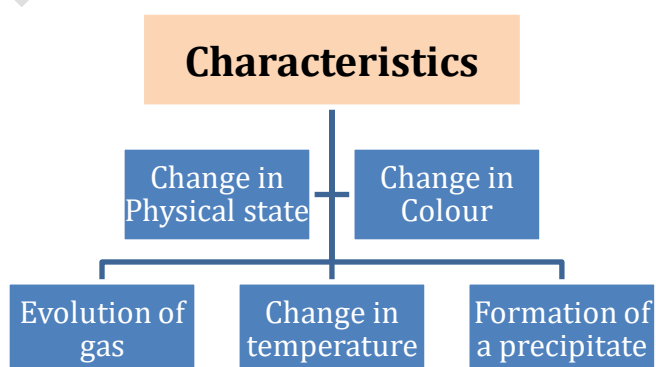
The starting materials are called as reactants and the new substances formed are called as products.

In such changes, the nature and identity of the products is completely changed.

Examples of chemical changes occurring in our daily life –

- Cooking of food
- Rusting of iron
- Digestion of food
- Respiration
- Souring of milk

2. Characteristics or Indicators of a chemical change

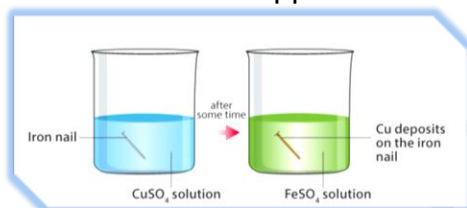


- **Change in Physical State (Examples)**

- Solid wax burns to form carbon dioxide and water vapour which are gaseous.
- Petrol which is a liquid burns to form carbon dioxide and water vapour which are gaseous.

- **Change in Colour (Examples)**

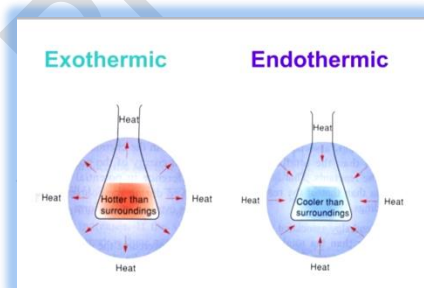
- Rusting of iron – Greyish-black iron changes to reddish-brown rust.
- Blue coloured copper sulphate solution reacts with iron filings to form green coloured ferrous sulphate solution and copper.



- **Evolution of a Gas (Examples)**

- Burning of coal leads to the formation of carbon dioxide gas.
- Reaction between calcium carbonate and hydrochloric acid results in the formation of carbon dioxide gas.
- Reaction between zinc dust and sulphuric acid leads to the formation of hydrogen gas.

- **Change in Temperature** – Reactions can be classified into two categories:



- Reactions accompanied by an increase in temperature due to the release of heat energy are called as **exothermic reactions**. For example when zinc dust is added to sulphuric acid, the beaker becomes warm.
 - Reactions which are accompanied by the decrease in temperature due to the absorption of heat energy are known as **endothermic reactions**. For example the reaction between barium hydroxide and ammonium chloride causes the beaker to become cold due to the endothermic reaction, leading to the formation of Barium Chloride and ammonium hydroxide.
- **Formation of a Precipitate** – An insoluble substance formed on mixing two salt solutions is a precipitate. For example:
 - In the reaction between lead nitrate and potassium iodide solutions, a yellow precipitate of lead iodide appears.

- Mixing sodium sulphate solution with barium chloride solution forms a white precipitate of barium sulphate solution.

Note: Many reactions involve more than one indicators. For example:

- When zinc reacts with dilute sulphuric acid, a gas is evolved namely hydrogen and also a rise in temperature takes place.
- When solid calcium carbonate is added to hydrochloric acid, the solid disappears and carbon dioxide gas is evolved along with rise in temperature.

3. Translating a Chemical Change into a Chemical Equation

A Chemical equation is a shorthand representation of a chemical change in terms of symbols and formulae of the reactants and the products.

Writing of a chemical equation involves the following steps:

Step 1 - The symbols and formulae of the **reactants** are written on the left hand side with a plus sign between them.

Step 2 - The symbols and formulae of the **products** are written on the right hand side with the Plus sign between them.

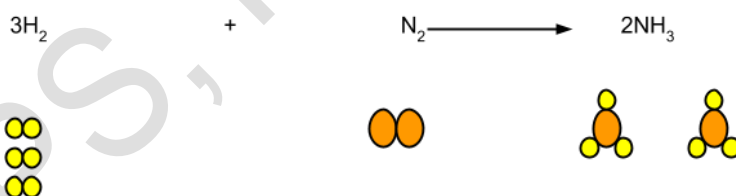
Step 3 - An arrow is put between the reactants and the products pointing from the reactants towards the products.

Step 4 – The number of atoms on both the sides of the equation should be made equal as all chemical reactions are governed by **Law of Conservation of Mass**. Such chemical equations are known as **balanced chemical equations**.

For example:

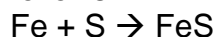
I) The reaction between hydrogen and nitrogen to produce ammonia can be written in the form of a balanced chemical equation as follows:

The reactants are hydrogen and nitrogen. The product is ammonia, NH₃.



The bonds between the 3 hydrogens are broken and they combine with 1 nitrogen. The same goes for the other molecule.

II) Heating of iron with sulphur forms iron sulphide which can be written as follows:



Now view the following link for a thorough reinforcement of the topic:

<https://www.youtube.com/watch?v=c4hGkVayhmU>

(watch the video till the twelfth minute.)

Key Terms

Chemical Reaction - the process by which one or more substances change to produce one or more different substances.

Chemical Equation - a representation of a chemical reaction that uses symbols to show the relationship between the reactants and the

	products.
Precipitate - a solid that is produced as a result of a chemical reaction in a solution.	Reactant - a substance that participates in a chemical reaction.
Exothermic Reaction - a chemical reaction in which heat is released to the surroundings.	Product - a substance that is formed in a chemical reaction.
Endothermic Reaction - a chemical reaction that requires heat.	Law of Conservation of Mass - the law that states that mass cannot be created or destroyed in ordinary chemical and physical changes.

ASSIGNMENT

Q 1) Which one of the following is not a chemical change ?

- a) Cooking of food
- b) Evaporation of water
- c) Digestion of food
- d) Burning of candle

Q 2) Respiration is:

- a) an exothermic process
- b) an endothermic process
- c) both a & b above
- d) neither of the above

Q 3) Why is boiling of water considered as a physical change while electrolysis of water is a chemical change ?

Q 4) In the given reaction, indicate the evidence of occurrence of a chemical change:
 Carbon + oxygen \rightarrow Carbon dioxide + heat (hint-release of heat)

Q 5) When copper articles are exposed to air, they undergo a chemical change. Which physical evidence proves this statement ?

Q 6) Translate the following reactions into chemical equations. Try to balance them. (You will be learning more about balancing of equations in the next lesson.)

- a) Reaction between nitrogen and hydrogen to form ammonia (In case of difficulty, you may refer to the above illustration)
- b) Reaction between sodium and chlorine to form sodium chloride.
- c) Reaction between magnesium and hydrochloric acid to form magnesium chloride and hydrogen gas.
- d) Reaction between sodium hydroxide and hydrochloric acid to form sodium chloride and water.
- e) Burning of magnesium ribbon in the air to form magnesium oxide.

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