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STUDY MATERIAL SCIENCE
CLASS-VIII

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Combustion :

Invention of the safety match :

Matches that ignite only when struck on a specially prepared surface are called safety matches.

The discovery of fire was a significant turning point in human history. It is not known when exactly humans first start making fire by rubbing sticks or stones together. More than 5,000 years ago, sticks with sulphur at one or both ends were used to carry fires from a source to light chandeliers. In 1680, an Irishman named Robert Boyle discovered that if phosphorus and sulphur were rubbed together, they would instantly burst into flames.

In the nineteenth century, it was discovered that certain chemicals when subjected to friction created fire. This idea was then used in making matches. The phosphorus match was invented in 1820. The early matches could be struck against any type of a surface to light them. This made them catch fire very easily and were, therefore, dangerous

Safety matches, which were invented in 1844, are so named as they do not catch fire spontaneously by friction. They have to be struck against a special surface in order to be ignited.

Constituents :

i. The match head contains a mixture of antimony trisulphide, potassium chlorate, powdered glass and a binder made of glue and starch.

ii. The striking surface is coated with a mixture of powdered glass and red phosphorus.

iii. When a safety match is struck, the glass-on-glass friction generate heat, converting a small amount of red phosphorus to white phosphorus vapour.

iv. The white phosphorus ignites sponta us, decomposing potassium chlorate and liberating oxygen At this point, the sulphur starts to burn, which ignites the wood of the match.

Fuels : When a combustible substance burns, heat is produced, which can be used in a variety of ways for domestic and industrial purposes. Such substances that produce heat are called fuels. Common fuels include wood, coal, petrol, kerosene, cooking gas, etc. But all fuels are not alike and differ widely in the way they burn and in the amount of heat they produce. Some fuels leave behind residues after burning. For example, wood and coal when burnt leave behind ash, which has to be disposed of.

The amount of energy produced by the complete combustion of 1 kg of a fuel is called its calorific value. The calorific value of a fuel is expressed in a unit called kilojoule per kg (kJ/kg). The higher the calorific value, the larger is the amount of heat produced by burning the same quantity of a fuel.

Type of fuel	Fuel	Calorific value (kJ/kG)
Solid	Dung cake	6000-8000
	wood	17,000
	Coal	25,330
	charcoal	33,000
Liquid	Kerosene	48,000
	petrol	50,000
	diesel	45,000
	Ethanol	30,000
Gas	Biogas	35,000-40,000
	LPG	50,000
	Methane	55,000
	Hydrogen	150,000