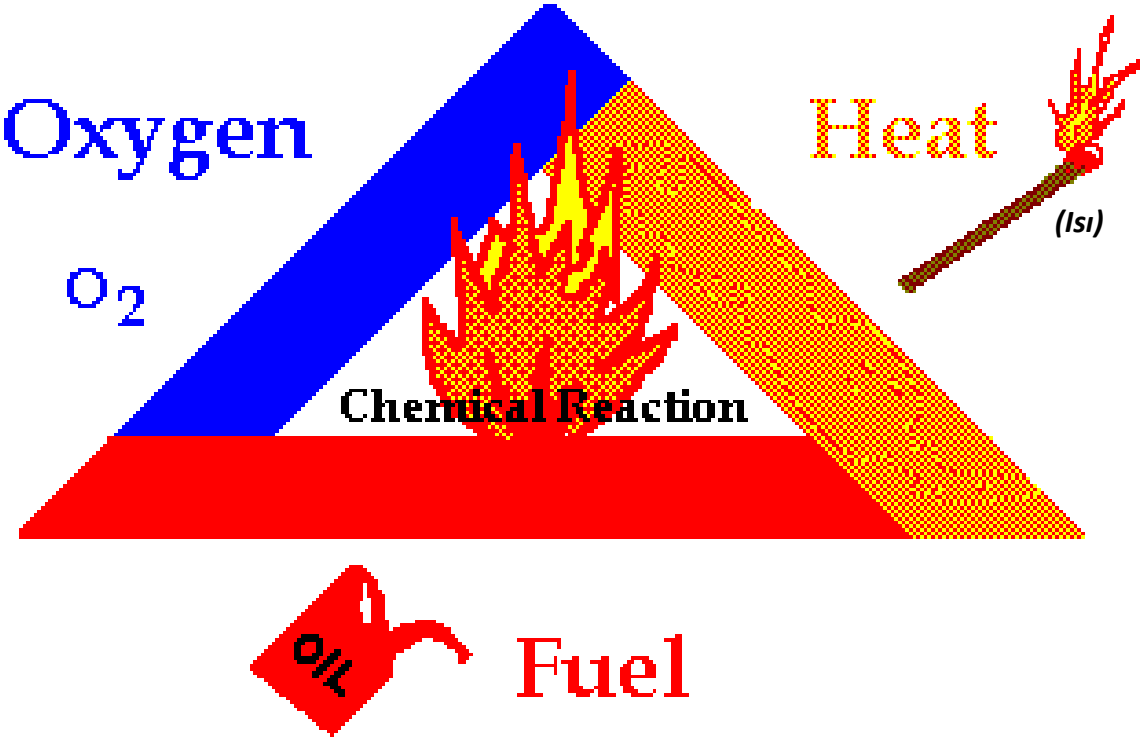
FIRE

What is Fire ?

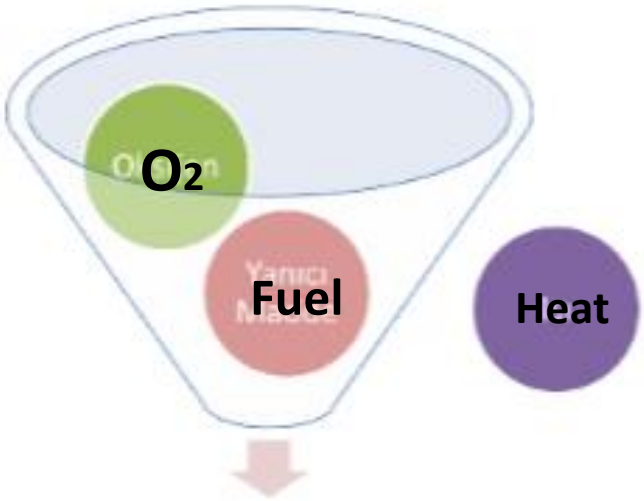
Combustion is a chemical reaction.

A heat source that heats the combustible material up to the ignition temperature in a sufficient oxygen environment triggers the combustion and heat energy is also released as a result of this exothermic chain reaction.

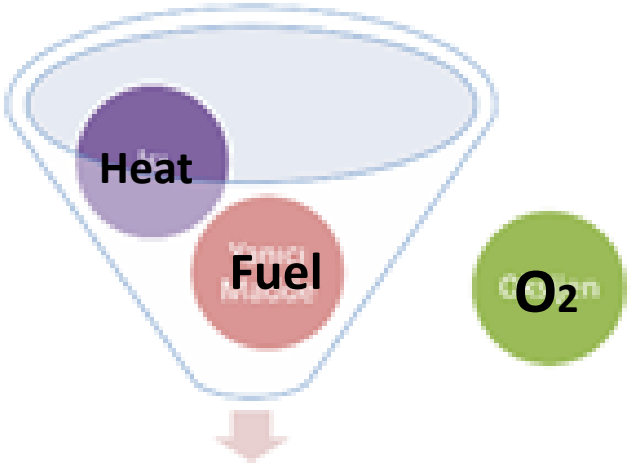
Fire Triangle



Oxygen - Heat - Fuel

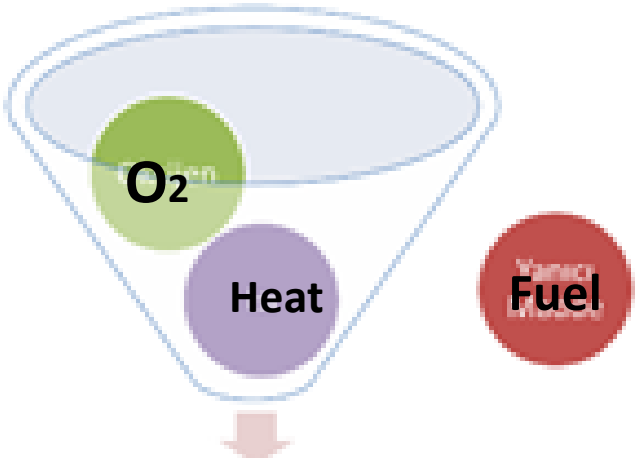


No Fire

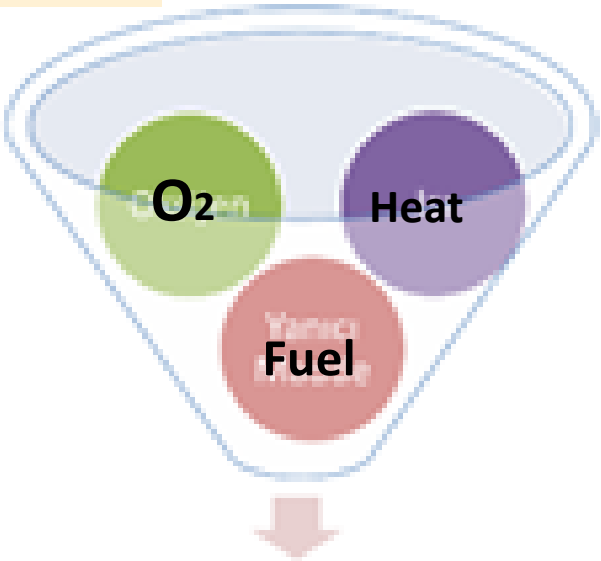


No Fire

All three elements are needed to start a fire. To extinguish a fire, one side must be removed.



No Fire



Fire !

Fire is the rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light, and various reaction products.

COMMON CAUSES OF FIRE

A — Failure to take fire protection measures,

B — Ignorance,

Incorrect placement of stove / heating systems, placing easily flammable liquids in the attic and roof, etc.) Stove chimneys should be cleaned twice a year, while heating chimneys once a year.

C — Negligence and carelessness,

Cigarette butts that are thrown out without deflating, iron that is forgotten in the socket, etc...)

D — Accidents, Faulty electrical equipment

(Fallings, impact etc..)

E — Splash,

(intentional fires, terror attacks etc..)

COMMON CAUSES OF FIRE

F — Sabotage, arson

G — Natural Disasters

(lightning, earthquake etc..)

H — Flammable and combustible materials,

I — Lack of staff training,

J — Lack of resources and equipment in place

1. Failure to take fire protection measures :

The main factors that cause fire are not choosing the right materials against burning and not taking protective measures properly:

- Insufficient installation and fuse systems related to the electrical system or overloading the installation,

- Roof beams and chimney relations are not properly arranged in buildings, chimneys are not plastered with sufficient care.

- Failure to take necessary precautions when using Liquid Petroleum Gas,

- Failure to periodic cleaning and maintenance of the chimneys, lack of fire partition walls, etc.

2- Ignorance

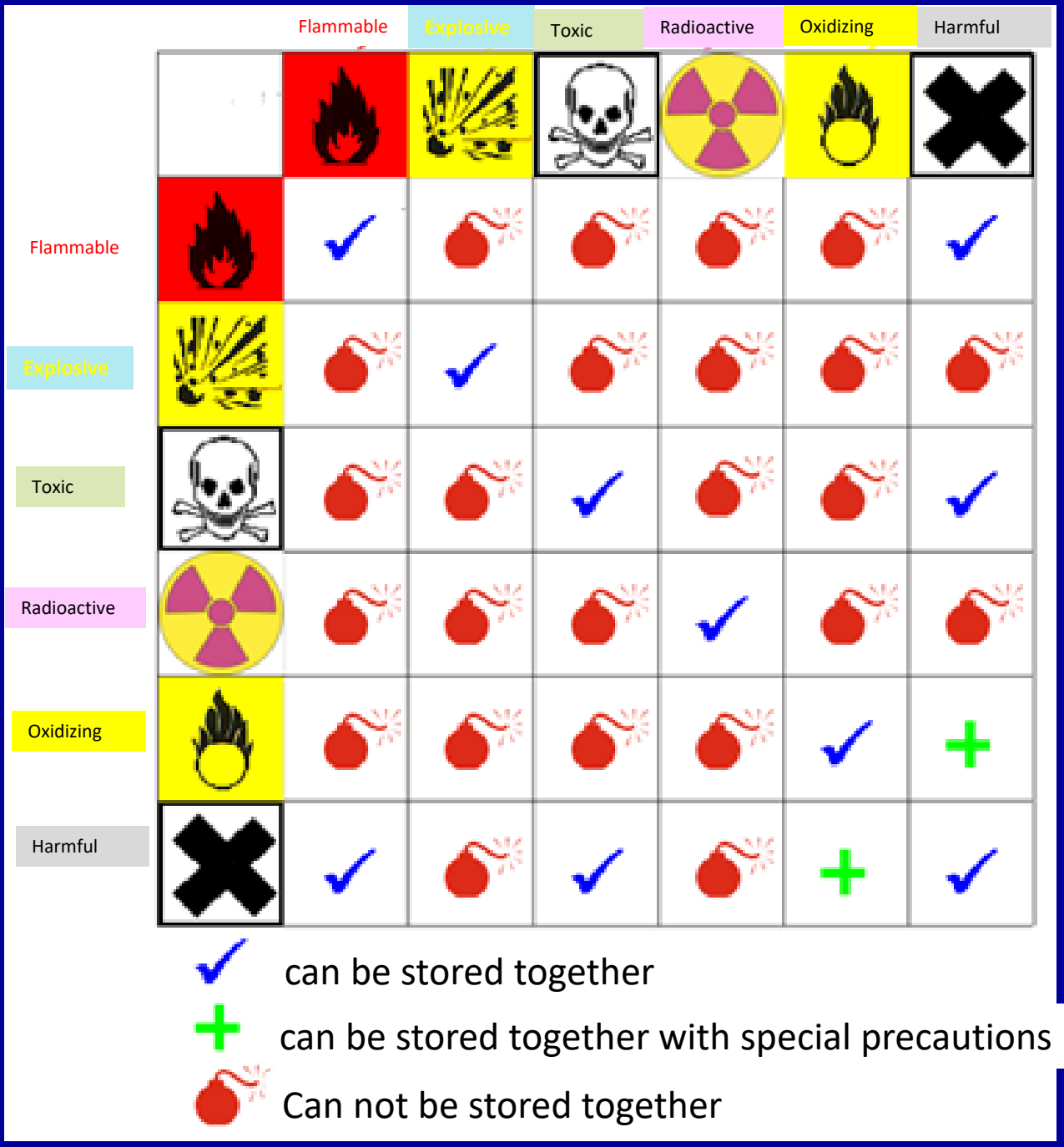
It is necessary to know how to take precautions against fire.

- Not knowing the properties of the materials and materials used that may cause fire,
- Not learning how to take fire precautions,

* Not knowing the factors that will cause spark in places such as fuel tanks,

* Lack of knowledge of the legislation on the storage and use of hazardous chemicals, etc...

Storage of Chemical Materials:



3- Negligence and carelessness

4- Accidents, Faulty electrical equipment

5- Splash

6- Sabotage, arson

7- Natural Disasters

Geological disasters

Meteorological disasters

Hydrological disasters

Space disasters

Average Fire Statistics in Turkey

Cigarette / Oakum (Tow)	5836	% 42
Electrical contact	3262	% 23
Chimney	1121	% 8
LPG	752	% 5,20
Arson	524	% 3,50
Splashing	445	% 3
Electrical devices	398	% 2,60
Fuel	154	% 1
Children	407	% 2,60
Others	1930	% 14

Combustion

- Combustion

- The chain exothermic (giving heat) chemical reaction that occurs as a result of the combination of the substance with free oxygen in the air at certain rates under heat is called COMBUSTION.

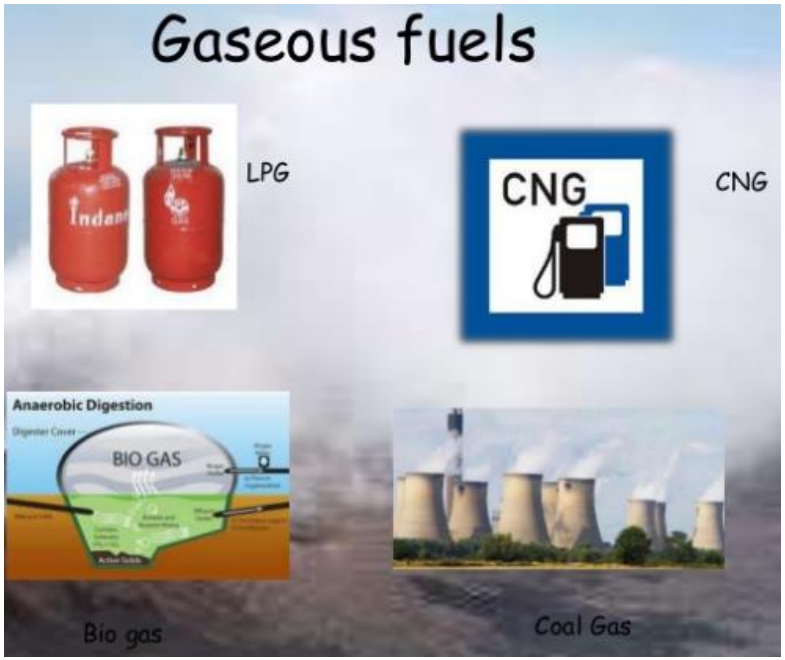
- The substance that undergoes combustion is called as COMBUSTIBLE. It is called a FUEL.

- Fuels exist in three states:

a) Solid,

b) Liquid,

c) Gaseous :



A chemical process in which a substance reacts with oxygen to give out heat is called Combustion.

Types of Combustion

- **Slow combustion**
- **Spontaneous combustion**
- **Rapid combustion**
- **Flashing and explosion**

İncreasing severity

Slow Combustion (Oxidation)

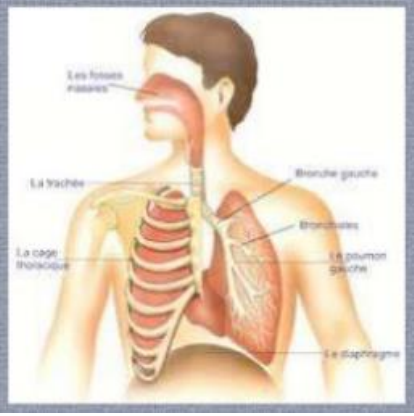
$4Fe + 3O_2 \rightarrow 2Fe_2O_3 + ISI$

Slow Combustion

- The type of combustion which takes place at a slow rate at low temperatures is called 'Slow Combustion.'
- Example:-

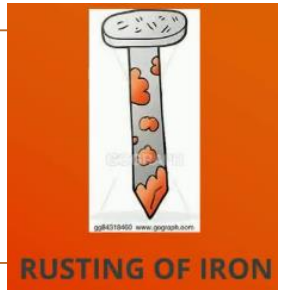
a) Respiration

b) Rusting of Iron.



~~heat and light exposure~~ ☹

oxidation-rust. ☺



Spontaneous combustion

- The type of combustion in which a material suddenly bursts into flames, without the application of any apparent cause is called 'Spontaneous Combustion'

- **Haystacks-** because of heat from produced by bacterial fermentation.
- **Linseed Oil-** can oxidize leading to a build up of heat.
- **Coal-** may spontaneously ignite when exposed to oxygen.
- **Pyrite-** oxidizes and causes spontaneous ignition in old mine tailings.
- **Pistachio-** when stored with lots of other pistachios, self heat can cause combustion.
- **Cow Poo-** extreme heat is the cause of spontaneous combustion.
- **Cotton/Linen-** being stored so the heat cannot escape. Once ignition temperature is reached, combustion occurs when oxygen is present.

Forest Fires caused by spontaneous combustion.

Spontaneous combustion of coal dust in coal mines.

Rapid Combustion

- Combustion in which a substance burns rapidly and produces heat and flame is known as rapid combustion, such as combustion of natural gas, LPG, petrol etc.
- This is usually attained by introducing external heat.
- Substances which undergo rapid combustion have lower ignition temperature

For example, Burning of LPG

FLASHING and EXPLOSION

FLASHING

- Flash fires are sudden, intense fires caused by ignition of flammable substances in air.

EXPLOSION is a sudden reaction that takes place with the evolution of **heat, light, and sound** with the help of **pressure.**

For example, firecrackers and bombs are the substances which show explosion.

- An explosion is a very fast chemical reaction that can form high heat energy in a short time (1/700-1/1000 second)

Rapid combustion

Spontaneous combustion

Explosion