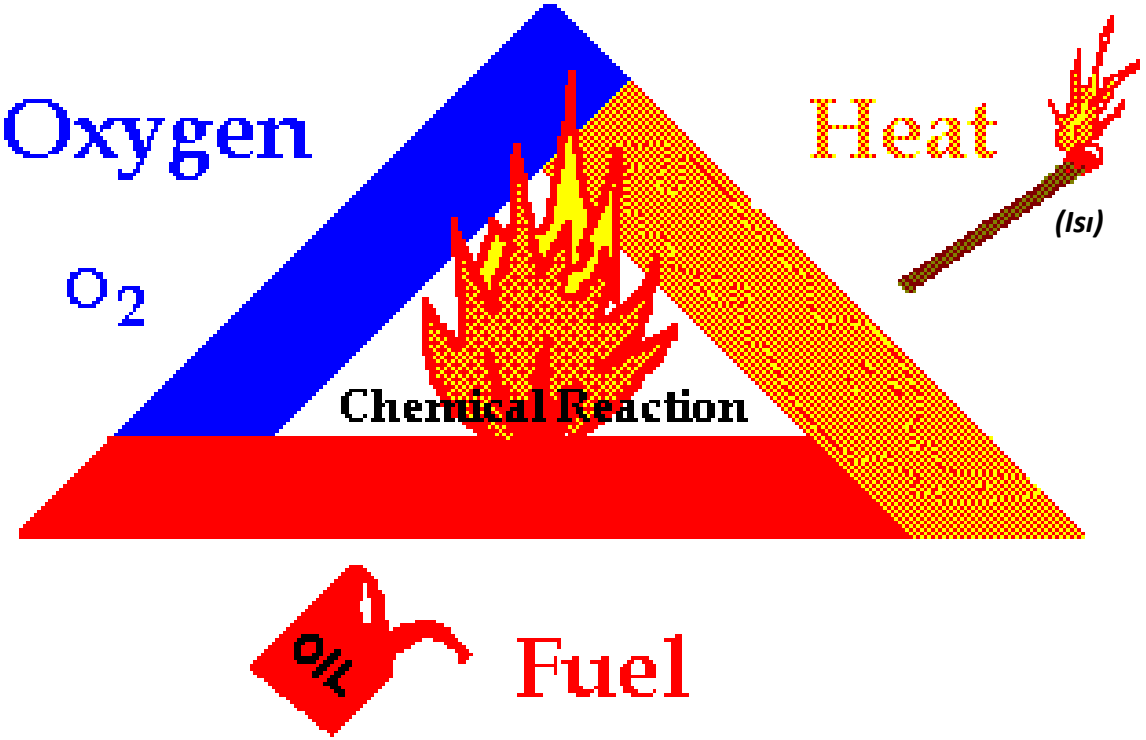
FIRE

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

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

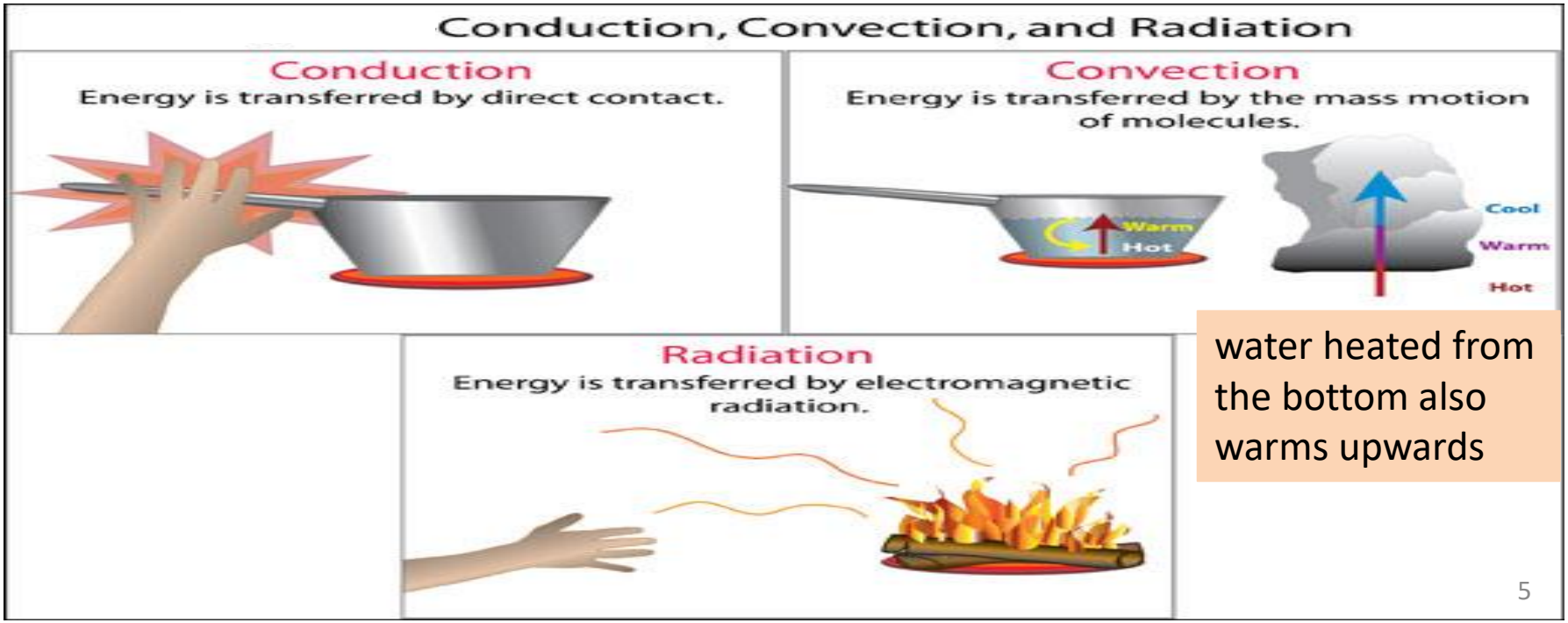
Rapid combustion

Spontaneous combustion

Explosion

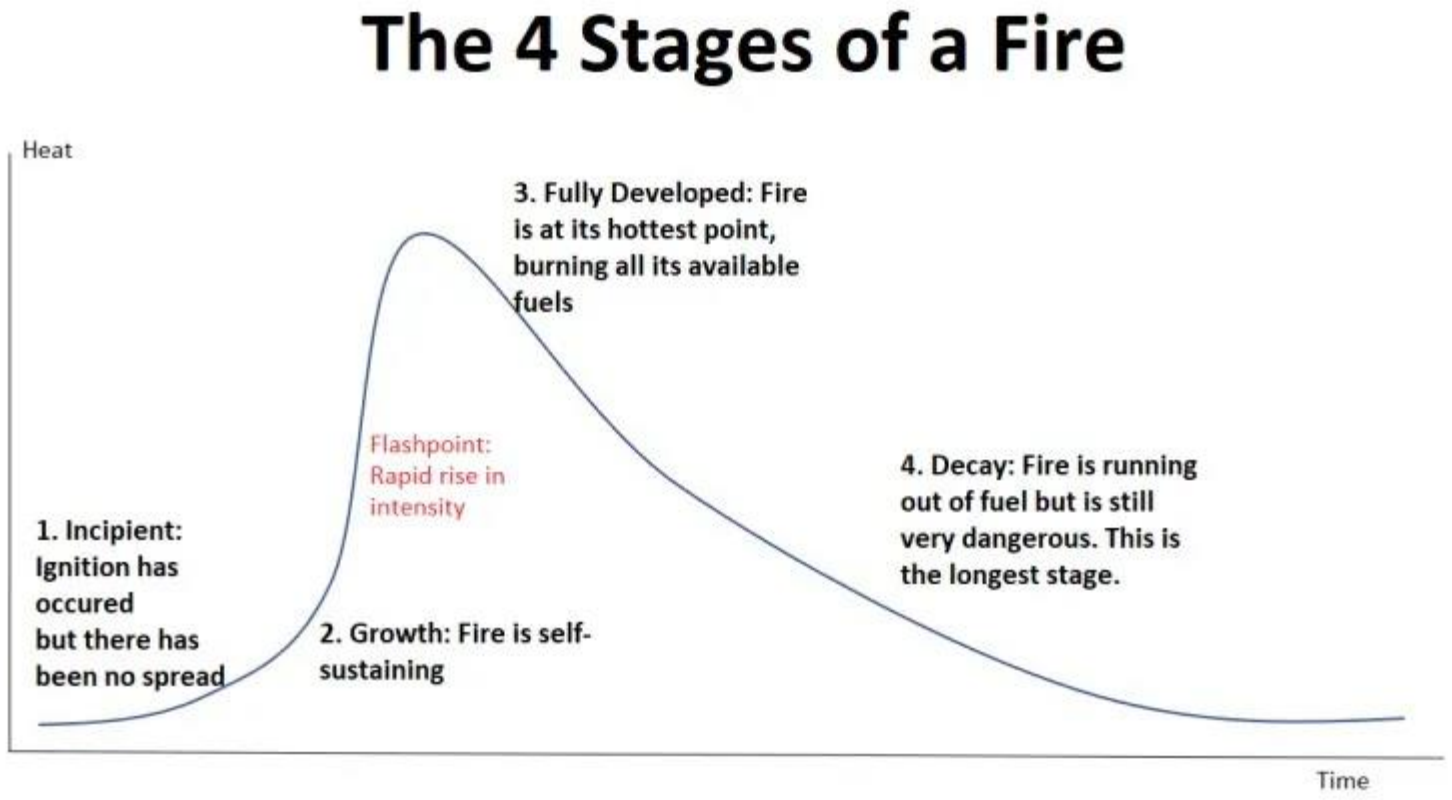
The spreading of fire

CONDUCTION	CONVECTION	RADIATION
▪ Transfer of heat by means of solid objects	▪ Transfer of heat by air circulation	▪ Beam transfer



water heated from the bottom also warms upwards

FIRE STAGES


The 4 Stages of a Fire
Heat
3. Fully Developed: Fire is at its hottest point, burning all its available fuels
Flashpoint: Rapid rise in intensity
4. Decay: Fire is running out of fuel but is still very dangerous. This is the longest stage.
1. Incipient: Ignition has occured but there has been no spread
2. Growth: Fire is self-sustaining
Time

GROWTH


Incipient
Neutral Plane
0:41
Growth
Neutral Plane
1:24
Growth
Neutral Plane
2:18
Fully Developed
Neutral Plane
2:45


FLASHOVER
Fully developed
Growth
Decay
Incipient
Temperature
Time

Fire Stages

INCIPIENT Stage

- First stage of fire
- It is limited to first ignition materials.
- Small amounts of gases are released.
- Little amount of heat is generated

GROWTH Stage

- The stage of steady combustion.
- There is plenty of oxygen.
- There is flame and head spreading
- Plenty of flammable and toxic gases are released.
- Places close to the ground are less dangerous, because heat goes up.

FLASH OVER

- There are non-flammable gases in this stage.
- When they reach the ignition temperature, they ignite suddenly.

Fire Stages

FULLY DEVELOPED & DECAY Stages

- Fire is at its hottest point
- Burning all its available

Then,

- Decreasing flames.
- More smoke and gases release
- Fire begins to extinguish as the oxygen decreases gradually.
- BACK DRAFT can occur!

BACKDRAFT

- Opening a window or door results in a oxygen re-entry
- Rapid or explosive burning via oxygen re-entry

Attention!

BE CAREFUL WHEN OPENING THE DOORS!

Oxygen is sufficient but there is not enough heat

Incipient Stage

As the heat rises, flames goes up =Flame-over

Growth Stage

Firefighters must fight by leaning or even crouching.

Flash over

All furnitures are ignited via convection

Decay & Backdraft

the door window is opened, oxygen enters and the room explodes = Backdraft

http://vimeo.com/28663483


15:44:34


15 second later
15:44:49


1 minute
12 second later
15:46:01


28 second later
15:46:29


15 second later
15:47:12


7 second later
15:47:19


1 minute later
15:48:19


26 second later
15:48:45


1 minute later
15:49:45
5 minutes after

FIRE TRAINING

- BEFORE FIRE FIGHTING,

- WE SHOULD KNOW WHAT WE ARE FIGHTING !
  - WHAT IS BURNING ?
  - WHAT TYPE OF FIRE ?

- WE SHOULD KNOW THE BEST WAYS OF FIGHTING CORRECTLY !

FLAMMABLE MATERIALS

GASES

Natural gas,
Propane,
Butane,
Hydrogen,
Acetylene,
Carbon monoxide
and others

LIQUIDS

Gasoline,
Oil,
Alcohol,
Paint,
Varnish,
Olive oil,
Diesel
and others

SOLIDS

Coal,
Plastic,
Wood,
Sugar,
Paper,
Cotton

C - Class

B- Class Fire

A- Class Fire

There are 5 different classes of fires that can pose a threat in the workplace.
**** Each of which have a different fire extinguisher to be used****

Classes		Materials
 Ordinary Combustibles. Which are fires such as wood fires or any other ordinary material that can catch on fire.	**Solid fires**	Paper, wood,cloth, coal, rubber, and many plastics
 Flammable liquids	**Liquid fires**	Alcohol, gasoline, katran,asfalt, Oil-based paints, lacquers
 Flammable gases	**Gas fires**	Metane, Butane, Propane, Hydrogen, Acetylene,LPG
 Flammable metals	**Metal fires**	magnesium, titanium, and sodium, potassium etc

E CLASS FIRE — **Energized electrical equipment**

Burning type of solids: It can be flamed, embers or both flamed and embers.

Burning type of liquids: They burn with a faster flame than solids.

Most liquid flammable substances have vapors that are heavier than air. It spreads on the floor. It starts to get up from the floor.

Burning type of gases: They burn in very fast flame

.

Burning type of metals: They are ember fires. They do not create a flame.

FIRE EXTINGUISHING METHODS

«Fire Triangle» If you break this traingle !

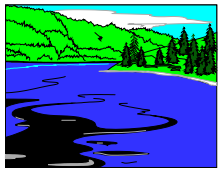
- **REMOVE THE HEAT BY COOLING.** The physical-chemical properties of water asphyxia the flammable material and absorb heat from the flammable material, allowing the fire to extinguish.

- **ASPHYXIA OXYGEN.** It is the event of disconneting or reducing the relation of fire with oxygen. So, you increase the CO_2.

- **DISCONNECT THE FLAMMABLE MATERIAL FROM THE SOURCE.** So fire gradually goes away. But, this type of extinguishing is not applied in fuel fires.

TYPES OF FIRE EXTINGUISHERS

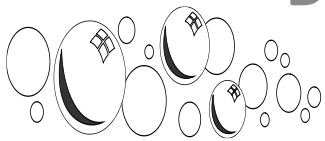
«ANY MATERIAL, VEHICLE AND EQUIPMENT USED FOR CONTROL OR EXTINGUISHING A FIRE»



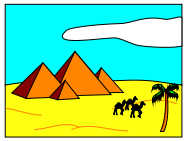
- WATER

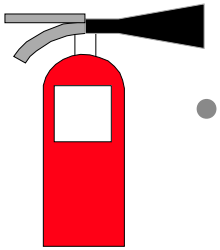
- DRY CHEMICAL POWDER

- FOAM

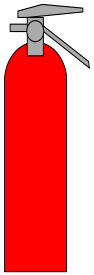


- SAND





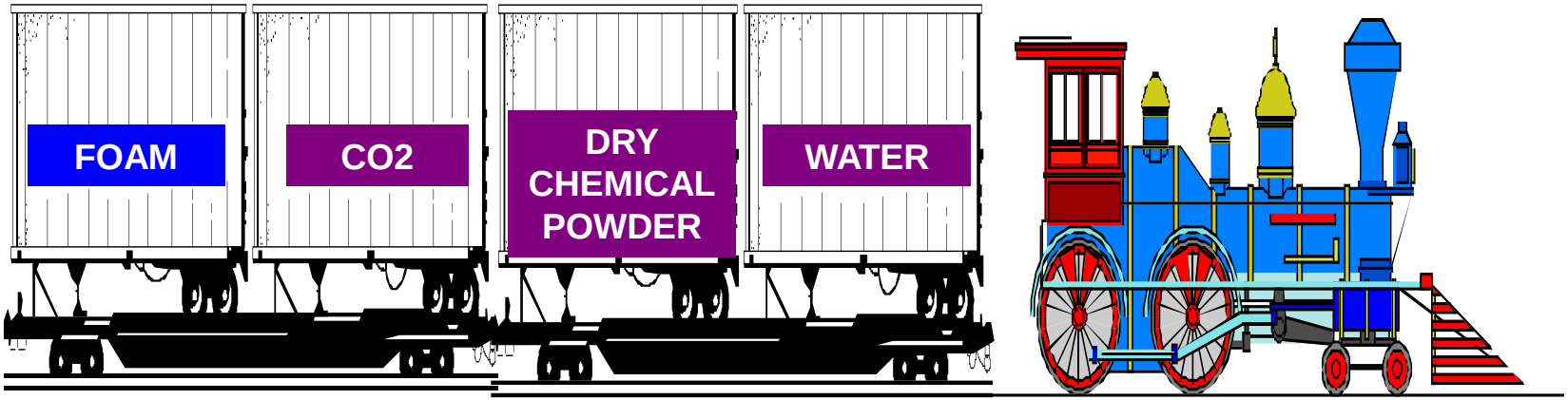
- CO_2



- HALON GAS

- FIXED FIRE EXTINGUISHING SYSTEMS Etc.

TYPES OF FIRE EXTINGUISHERS



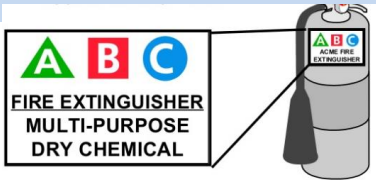
TYPES OF FIRE EXTINGUISHERS

WATER

It is cheap and easily provided.
It is easy to store.
It has a cooling effect.
It prevents the fire from expanding.
Disadvantage: Electricity conduction

DRY CHEMICAL POWDER

ABC type: Ammonium phosphate
BC type: Sodium bicarbonate
It covers the environment like fog, the vision is reduced.
It is not toxic.
It melts in a hot surface,
It turns off the burning material.



CO_2

Heavier than air
Colorless to odorless
Simple asphyxiant
Therefore,
it is not right to use this method in kindergardens and shopping malls.

It is liquefied and put inside the tube.

When the trigger is pressed, it drops from 30 ATm to 1 Atm.

It suddenly turns from liquid to gas. It turns off the fire like snowflakes.

It can cause a cold burn.

FOAM

For paint stores, fuel oil tankers, places like airports

Asphyxiant

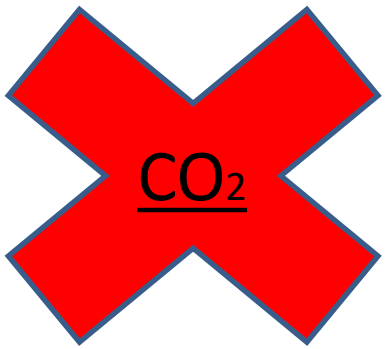
Extinguished by asphyxiant

FIRE EXTINGUISHERS

In places where **Class A fire** is likely to occur,

primarily

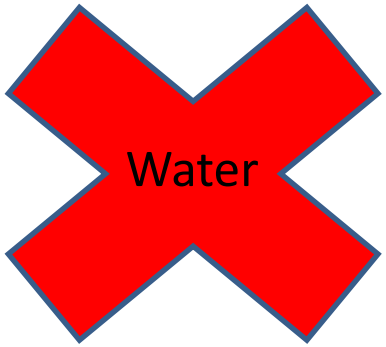
1.Multi-purpose dry chemical powder,
2. Foam,
3. Water



- In places where **Class B fire** is likely to occur,

primarily

1. Foam
2. Dry Chemical Powder
3. CO_2



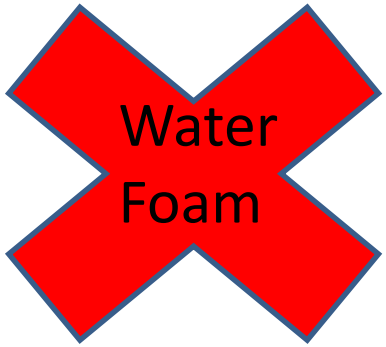
- In places where **Class C fire** is likely to occur,

primarily

1. Dry chemical powder

or

2. CO_2



C- Class Fire

Natural gas, Propane, Butane, Hydrogen, Acetylene, Carbon monoxide etc

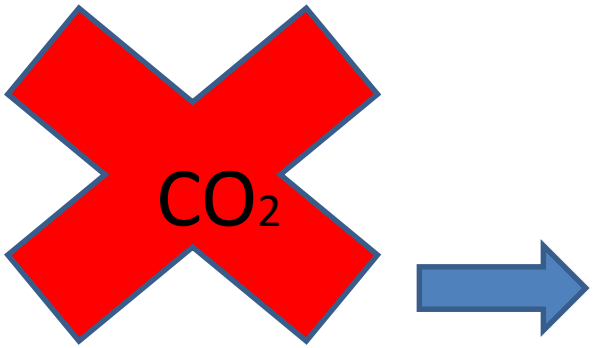
Liquids

- In places where **Class D fire** is likely to occur,

primarily

<u>Dry metal powder</u>

(Most common: Trimotoksinboraksin)



$CO_2 + 4Na \longrightarrow Na_2O + C$

(Coal)

- In places where **Class E fire** is likely to occur;

✓ **CO_2** is liquefied and put inside the tube.

When the trigger is pressed, it drops from 30 Atm to 1 Atm.

It suddenly turns from liquid to gas. It turns off the fire like snowflakes.

It does not create any pollution. But, it can cause a cold burn.

✓ In addition, **HALON GAS**, which absorbs the heat and cools the flame, is also used.

It is used in data processing centers, electronic device fires, telecommunication centers.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SAFETY INTERNATIONAL INC