

# **FIRE PREVENTION TECHNIQUE**

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× Who is responsible for Fire prevention?

× Fire in race car

× Birthday party





# Defence-In-Depth In Fire Safety:

<b>Level</b>	<b>Principal Objective</b>	<b>Means</b>
<b>Level -1</b>	<b>Prevention of fires from starting</b>	<b>Design provisions &amp; administrative controls</b>
<b>Level-2</b>	<b>Fire detection and extinguishing</b>	<b>Active fire protection systems</b>
<b>Level-3</b>	<b>Mitigation of fire effects</b>	<b>Passive fire protection systems</b>
<b>Level-4</b>	<b>Manual fire fighting capability</b>	<b>Fire emergency preparedness</b>

## 1<sup>ST</sup> LEVEL OF DEFENCE

- **Explosion proof fittings in H<sub>2</sub> addition area / chemical store area /battery room etc.**
- **Diesel tanks under ground.**
- **Non use of wooden doors and windows inside factory.**
- **Alarm for decrease in hydrogen concentration in generator.**
- **Calcium silicate insulation below oil leak prone areas**
- **Installation of flame, lightning arrestors**
- **Hydrogen leak detector**

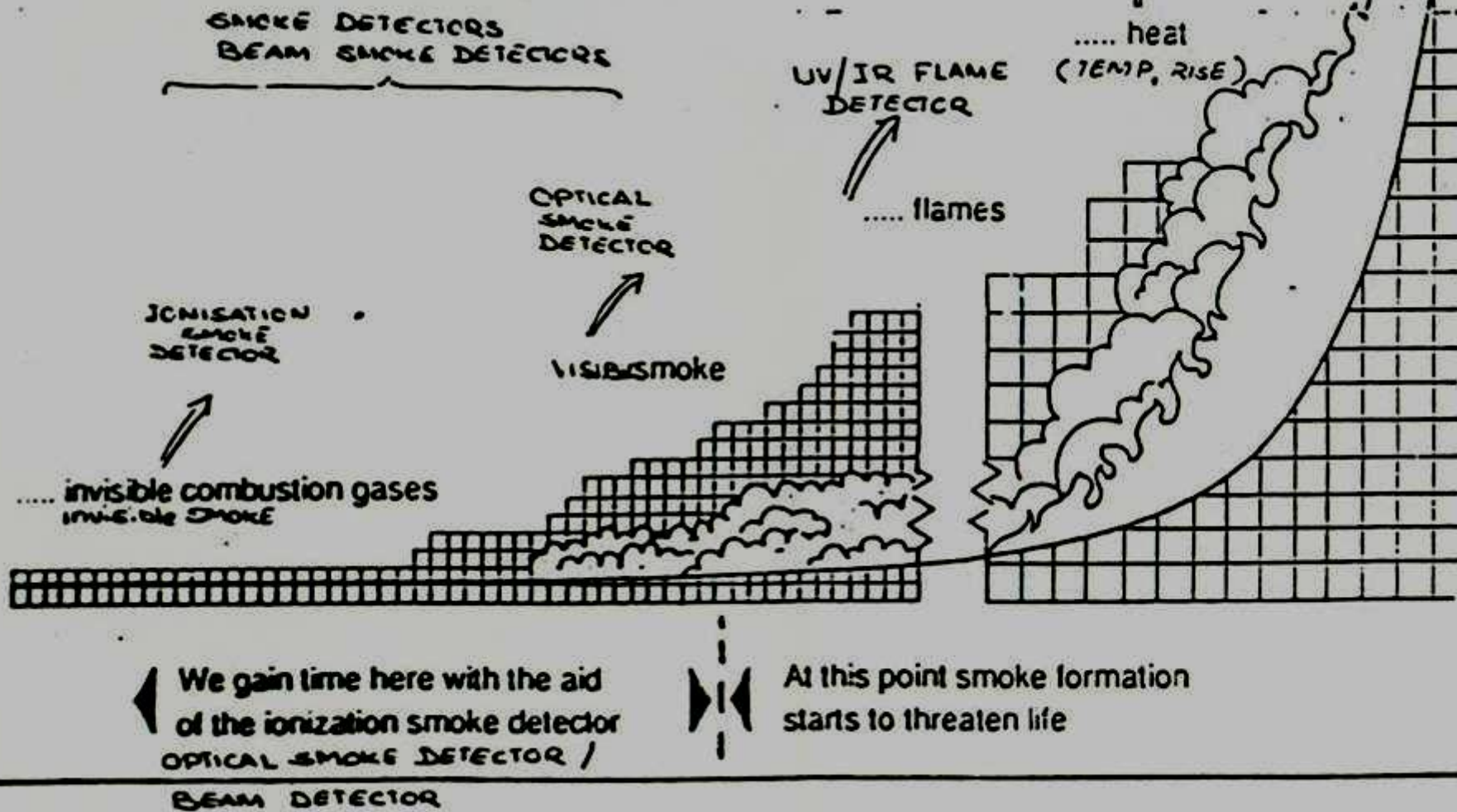
## **ADMINISTRATIVE CONTROLS :**

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- **Welding and cutting jobs through permit system.**
- **Permit system for storage of flammable materials like oil, Grease, chemicals, diesel, kerosene, solvent, cleaner etc.**
- **Ban use of wooden scaffolding in the plant**
- **Plant start-up fire prevention survey by committee**
- **Attending/controlling the sources of fire such as oil leaks**
- **Monitor makeup rate of oil, chemicals & other combustibles.**



# CHARACTERISTICS OF FIRE



Rev. C 18-1-75

FIG. 1

# **FIRE DETECTION**

- **Early detection (at incipient stage)**
  1. **Smoke Detector (Ionization)**
  2. **Smoke Detector (Optical/Photo electric)**
  3. **Heat Detector**
  4. **Flame Detector**
  5. **Linear Heat Sensor**
  6. **Beam Detectors**



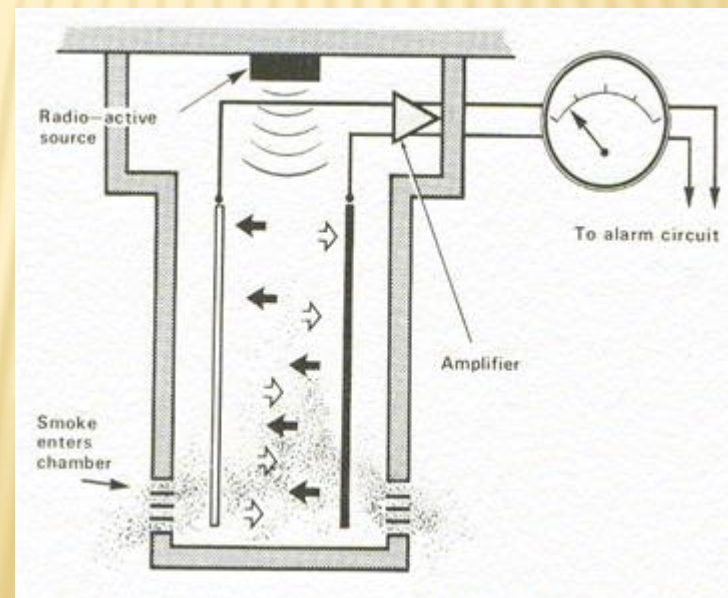
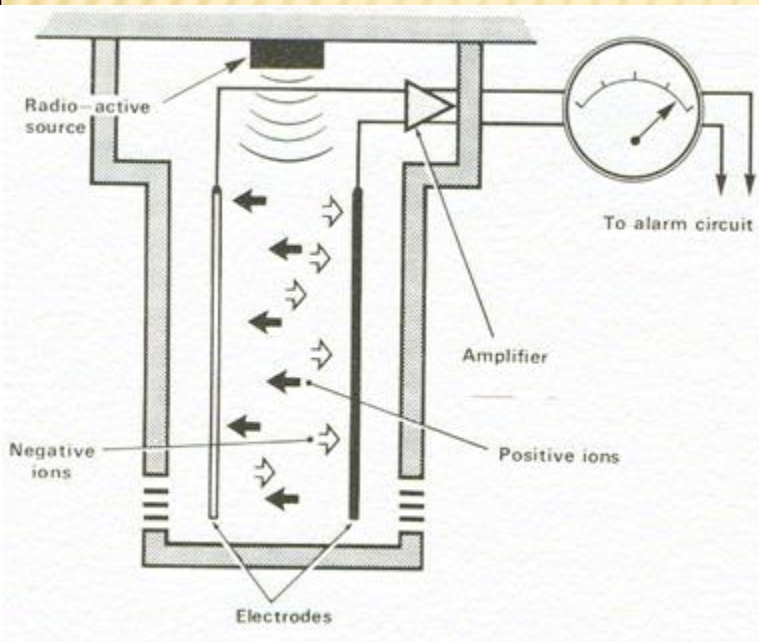
# Fire stages

## 1) Incipient stage :

No significant smoke, heat or flame is visible. Only invisible product of combustion are released

- Ionization Type smoke detector are used

(Source-Americium 241)

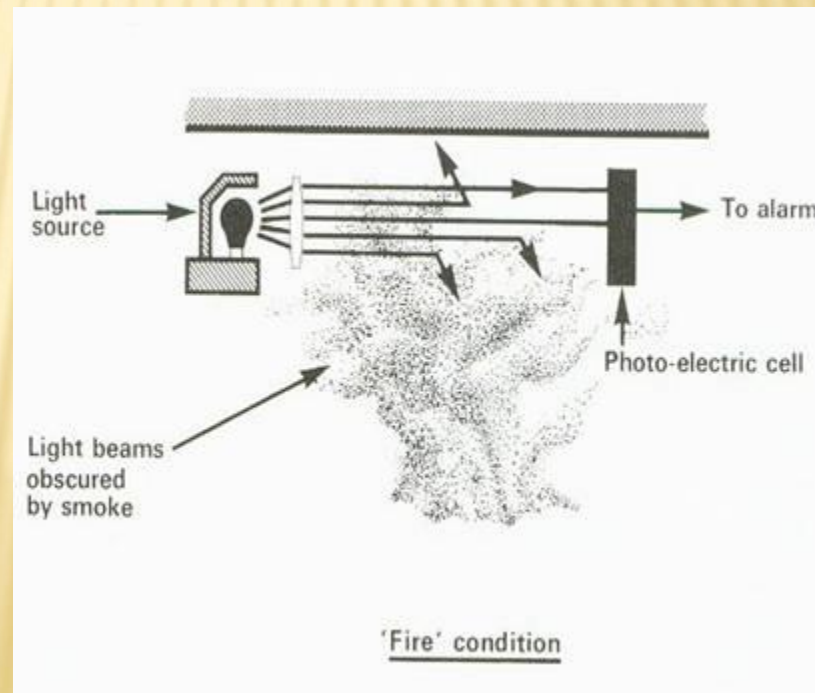
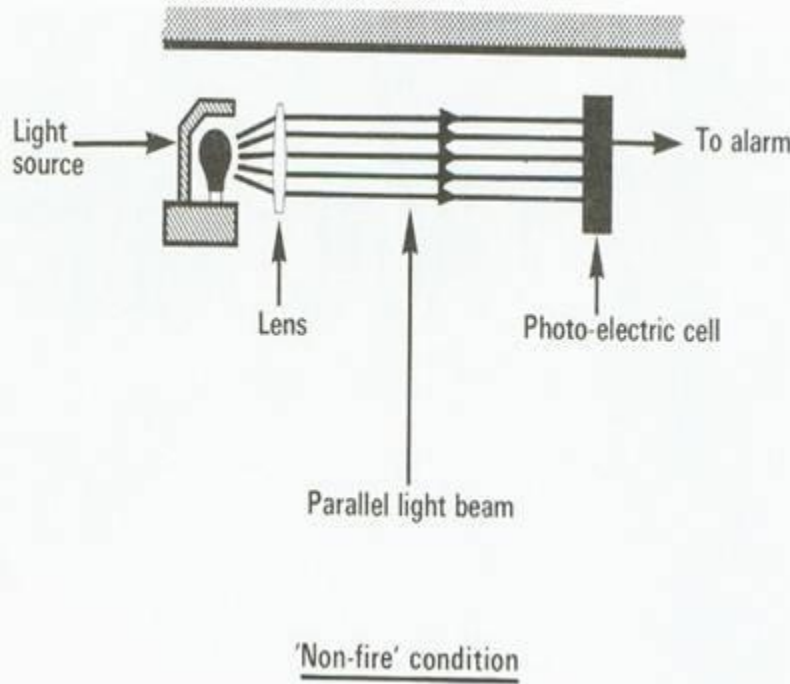


## 2) SMOLDERING STAGE



The material starts giving out smoke but is not yet visible.

\* Optical (Photoelectric) Type smoke detector / Beam Detectors are used



## **2<sup>ND</sup> LEVEL OF DEFENCE (EARLY DETECTION AND QUICK EXTINGUISHEN)**

### **EARLY DETECTION :**

- ✘ Right type of fire detector at right location

### **QUICK EXTINGUISHAN :**

- Automatic and non automatic fire system
- Trained fire squad members & dedicated fire staff
- Fire Hydrant system
- Portable fire extinguishers



## **3<sup>RD</sup> LEVEL OF DEFENCE (MITIGATE CONSEQUENCES OF FIRE)**

### **PREVENT SPREAD OF FIRE TO OTHER AREAS :**

- × Fire damper**
- × Cable fire barrier wherever cable passes through wall, floor, etc.**
- × Fire retardant coating at Cable fire barriers and at Cable crossing junctions.**
- × Fire doors**
- × Fire compartments/Fire cell**
- × Emergency oil tank draining arrangement**
- × Control on Storage of Hydrogen cylinders, oil, combustibles in the plant premises.**

## **4<sup>TH</sup> LEVEL OF DEFENCE (FIRE EMERGENCY PREPAREDNESS)**

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- × Training of fire crew, fire squad members, plant employee, contract personnel.**
- × Fire emergency exercises**
- × Fire safety promotional activities like Competitions of posters/slogan/SA/BA Set/extinguisher operation etc., Fire safety films, demonstrations etc.**



# CAUSE OF FIRE

- × **Electricity -**
- × **Friction - over heating of bearing/moving parts**
- ×
- × **Chemical Reaction -**
- × **Sparks - grinding**
- × **Welding/cutting - fall of molten metal on cables, oil, waste, etc.**
- ×
- × **Lightning**
- × **Smoking**















# CAUSE OF FIRE : **ELECTRICITY**

- × **Short circuit**
- × **over loading**
- × **loose connection**
- × **jumping of arc**
- × **use of non standard cables**
- × **Use of undersize cable**
- × **more then one top in plug**
- × **non use of plug top**
- × **failure of insulation**
- × **poor maintenance**

# **ELECT FIRE CONT...**

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**Electrical fires are the result of :**

**Defects/Error/Deficiencies in**

**1) Design of Equipments**

**2) Protective System**

**3) Installation, Layout ,**

**4) Environmental Conditions**

**5) poor maintenance**

**6) Operational error**

# **ACTION TO PREVENT ELECTRICAL FIRES**

**Proper specifications**

**Sound design with adequate protection**

**Reliable manufacture**

**Proper installation & layout**

**Safe operating procedures**

**Regular & quality maintenance & testing**

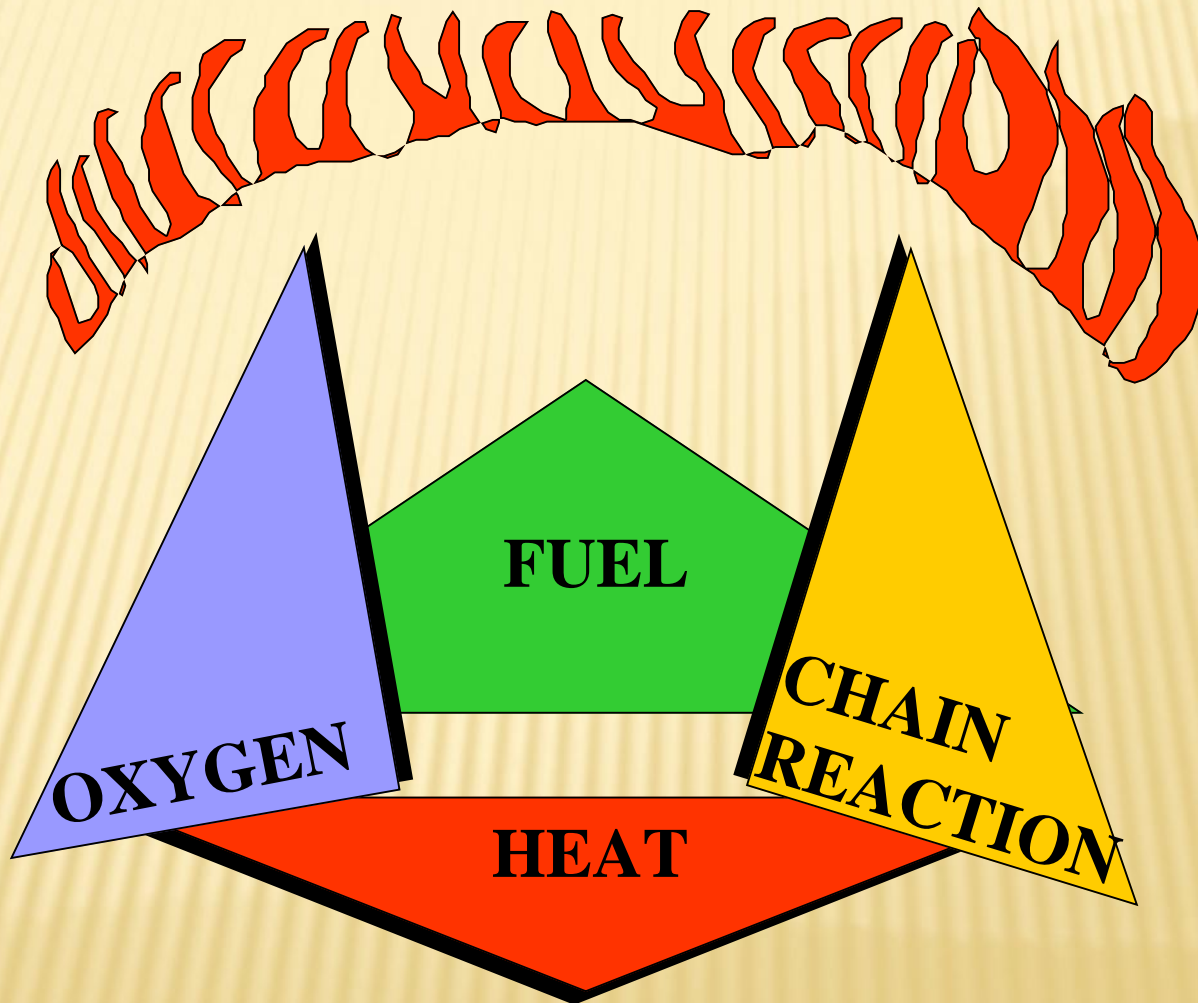
**Periodic inspection and electrical audits**

**Repair defects & deficiencies without delay**

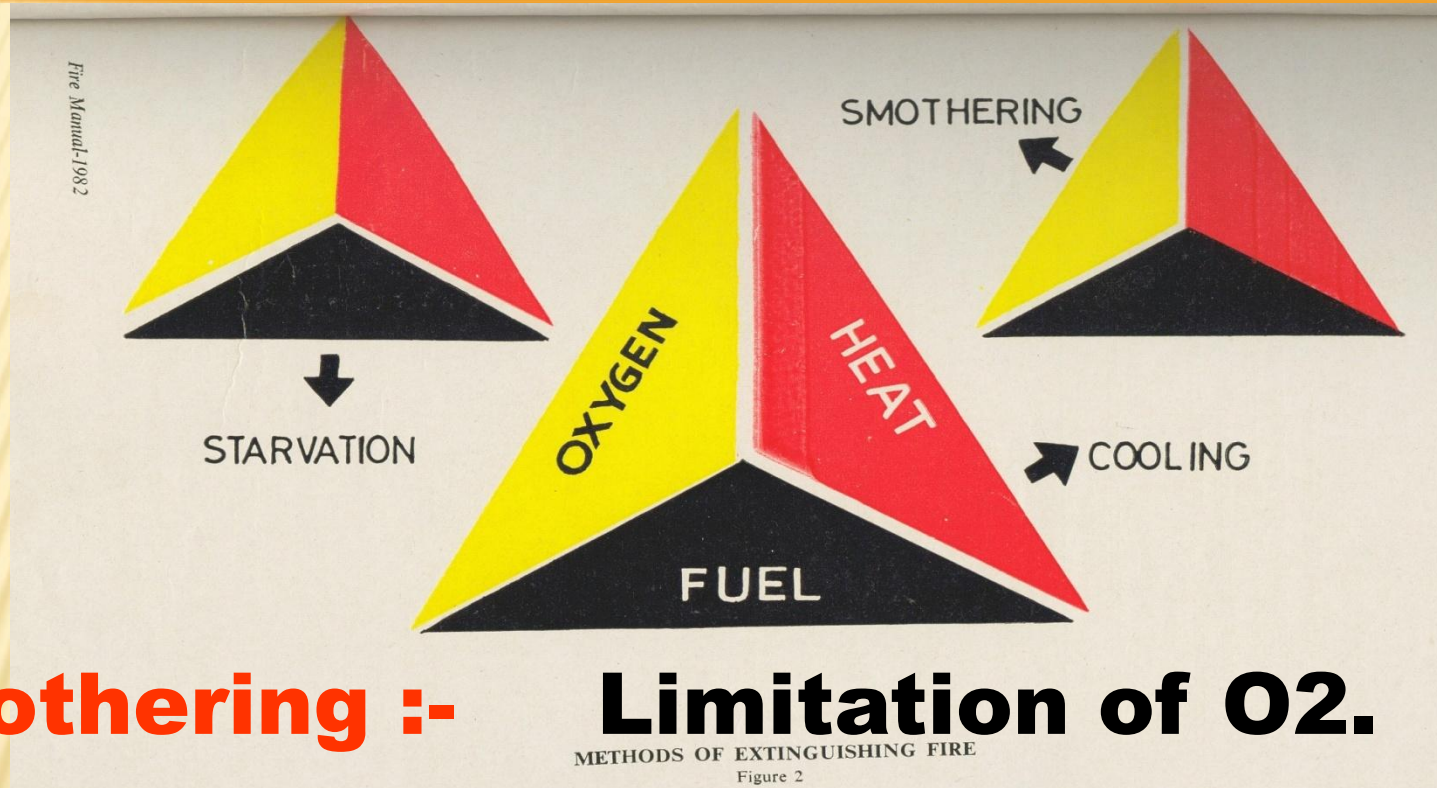
**Analysis of failure & action plan to correct them.**



# FIRE TETRAHEDRON (PYRAMID)



# METHODS OF EXTINGUISHING FIRE



**Smothering :-**

**Limitation of O<sub>2</sub>.**

**Starvation :-**

**Elimination of fuel.**

**Cooling :-**

**Removal of temperature**

**Chain inhibition -**

# FIRE FIGHTING

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## Four Basic Types of Fires

- ✘ Class A -- Common Solids – Water type
- ✘ Class B -- Flammable Liquids – Foam type
- ✘ Class C – Gas Fire – CO2 type
- ✘ Class D – Metals Fire – TEC type
- ✘ Fire blanket
- ✘ Oil fire
- ✘ Auto riksha fire



# **IGNITION SOURCES**

- **Electricity**
- **Smoking**
- **Hot surfaces**
- **Open flames**
- **Cutting & welding sparks**
- **Lightning**
- **Friction**
- **Spontaneous ignition**
- **Chemical reactions**
- **Pyrophoric/oxidizing materials**
- **Static charge**

# **EMERGENCY PREPAREDNESS**











W I S H Y O U  
S H Y O U  
A L O N G F I R E  
F R E E D A Y S