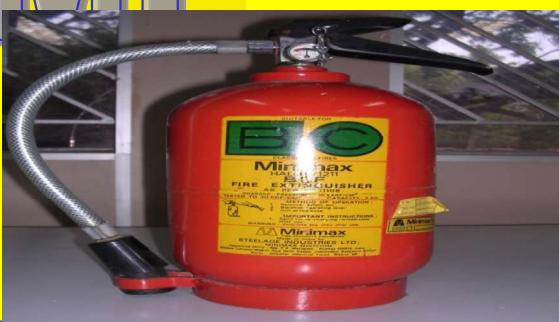


WELCOME to FIRE SAFETY PROGRAMME



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Introduction



To ensure that staff/ students are knowledgeable in fire prevention and emergency response in the workplace





**Can we name a practice where,
there is no risk?**

No

There is some degree of risk in every practice



Degree of risks are different

- Crossing the road
- Air/Bus/Rail travel
- Fire
- Use of Electricity
- Use of chemicals

What are the general hazards in a laboratory?

- Fire
- Breakage of glassware
- Sharps
- Spillages
- Pressure equipment & gas cylinders
- Extremes of heat & cold
- Chemical hazards
- Biological hazards
- Radiation



And many more!

Why does it matter?



- Safe working protects:
 - You
 - Other lab workers
 - Cleaners
 - Visitors
 - Your work

How to do a Risk Assessment?

- **Determine hazards and evaluate risks**
- **Use all relevant available data**
- **Determine controls needed to minimise those risks**
- **Document the assessment**
- **Agree it with your supervisor**
- **Use those control measures**



CAUSES OF ACCIDENTS

- 1 I DIDN'T THINK
- 2 I DIDN'T SEE
- 3 I DIDN'T KNOW







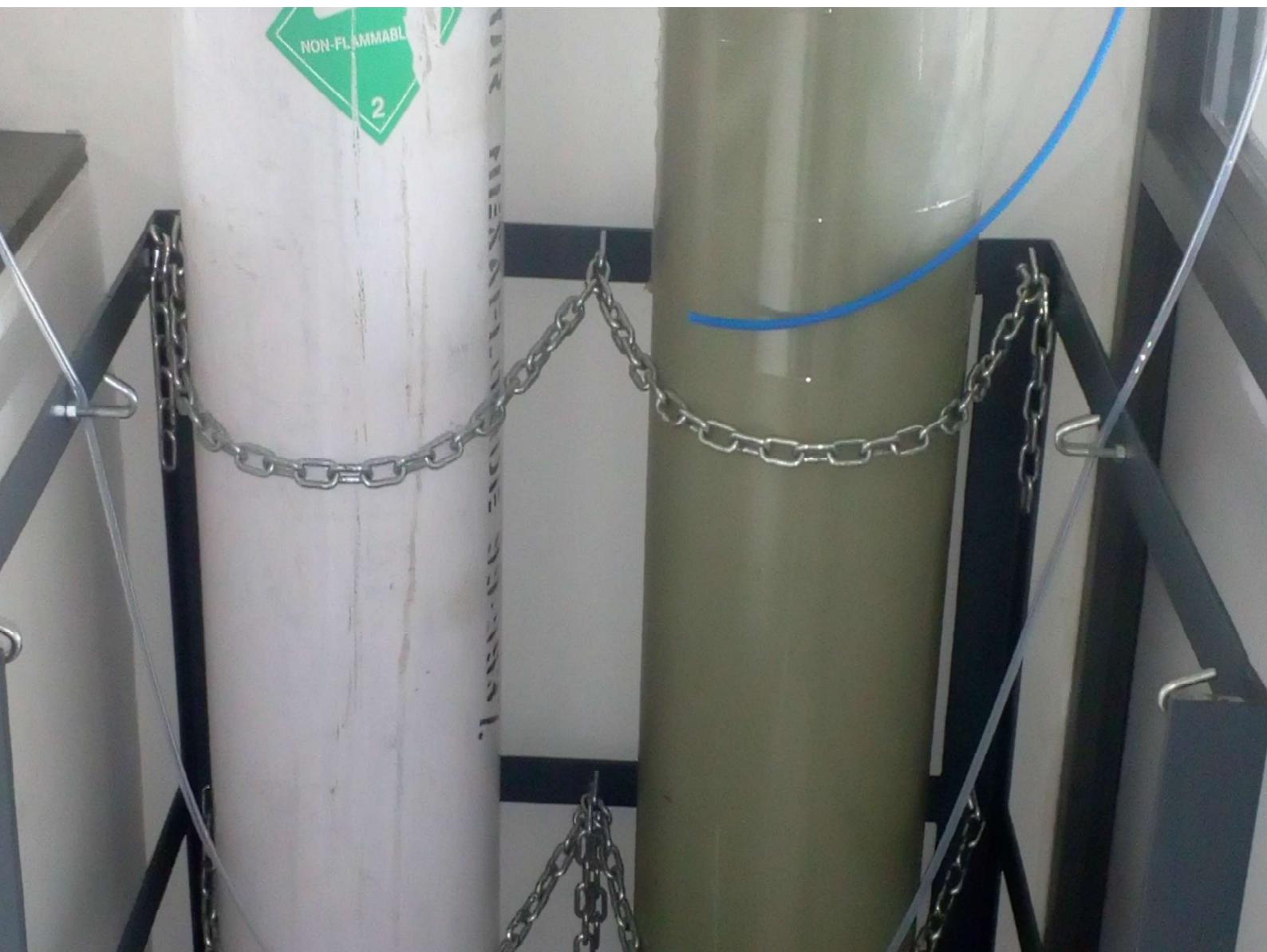




Gas cylinders

- Never use without formal training
- Minimise the number in a laboratory
 - Store externally whenever possible
- Cylinders are heavy and can do serious damage to you if they fall
 - Ensure that they are chained when in use
 - Move only with a cylinder trolley
- Use regulators & control equipment suitable for the gas concerned
- Consider the consequences if your cylinder leaks

















Arpit Hotel Fire accident Delhi -Feb 2019



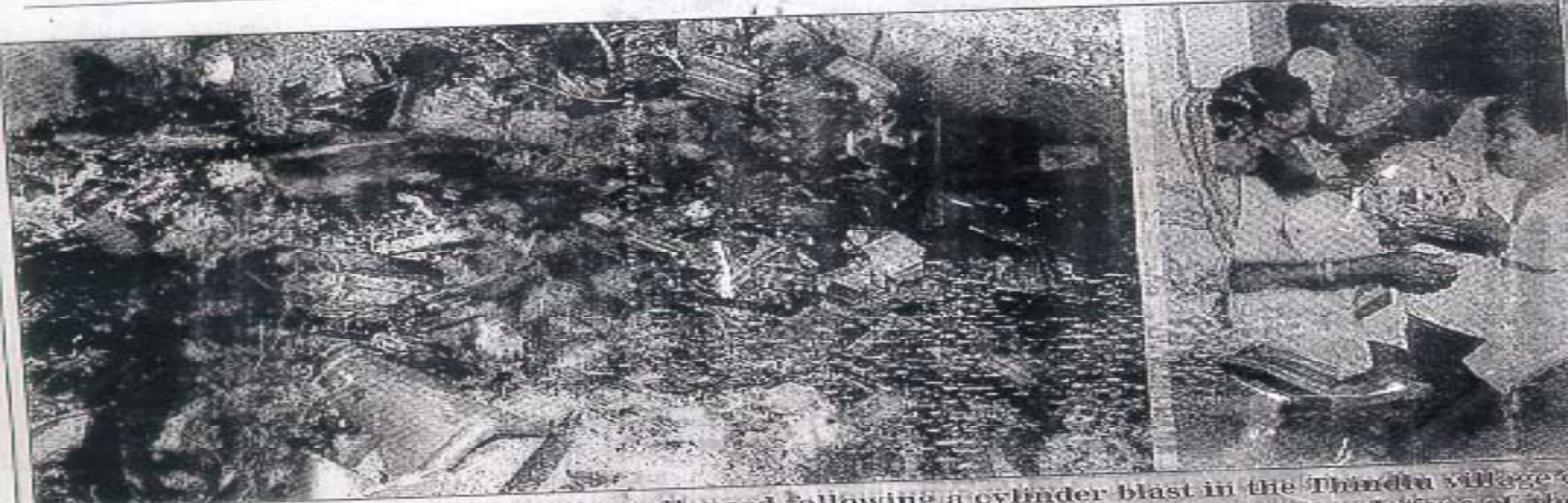
Jaipur IOC plant fire



A photograph of a massive explosion. A large, bright orange and yellow fireball dominates the upper portion of the frame, with intense flames and smoke billowing upwards. Below the fireball, a massive, dark, billowing plume of black smoke and debris rises into the sky. At the base of the explosion, several vehicles are visible, including a white truck and a yellow vehicle, which appear to be emergency responders or investigation vehicles. The background is a clear blue sky.

Oct 2009





The debris after the roof of a house collapsed following a cylinder blast in the Thindlu village of Anekal taluk in Bangalore rural district on Wednesday and (right) the grieving relatives of the victims.

Cylinder blast kills 5 of family

DH News Service

BANGALORE, April 3

Five persons of a family, including three children, were charred to death and another person sustained serious burns when a cooking gas cylinder exploded at a house in the Thindlu village of Anekal taluk in Bangalore rural district this evening. Materials worth around Rs 2 lakh were destroyed in the incident.

The deceased were: Krishnamma (45), Lata (25), Mamatha (4), Rakesh (5), both studying in LKG and Baby (8), a third standard student. All the five members were killed on the spot. Jayaramappa, the head of the family, who runs a provision shop, sustained burns in the mishap.

He has been admitted to a private hospital.

Emotional scenes were witnessed at the spot of the incident with aggrieved relatives gathered there.

The bodies will be buried this morning. Gowramma, who stays at her residence in Hoskote taluk, and Rakesh's in-laws are expected to be present.

Ho

F

LPG cylinder blast damages Vashi apartment TOI 2014-07-24 05:30:00

A leakage in a domestic LPG cylinder caused a blast at a flat in Cidco-built B-type building in Vashi on Tuesday

1 killed, 13 injured in cylinder blast in Chembur TOI 2014-08-26 11:15:00

A man died and 13 others suffered burns in a cylinder explosion at Sandeep Colony on PL Lokhande Marg in Chembur on Monday

At least 33 people were injured on Wednesday, three critically, following the blast of an LPG cylinder during a marriage ceremony in Galighar village of Kishtwar district in Jammu and Kashmir.

How Gas Cylinder Blasts?

- In a full Cylinder we get 14.2kg of LPG.
- 1kg of Liquefied Petroleum is converted into 500 liters of Gas.
- When this 500 liters of Gas mix with Oxygen it increases its power by 50 times.
- (ie) $500 \text{ liters} \times 50 \text{ times} = 25,000 \text{ liters}$ of Explosive Gas.

Be Safe with GAS SAFE



What happens when Gas Mix with Oxygen?

- Imagine that the full cylinder (14.2kg) of LPG is converted into Explosive Gas.
- (ie) $14.2\text{kg} \times 25,000 \text{ liters} = 3,55,000$ liters of Explosive Gas we store in our Kitchen without any Safety.

Be Safe with GAS SAFE



How long does it take for a Blast in case of Leakage?

- After gas leakage for a minimum of 3 – 5 minutes, the gas will spread all over the house.**
- During this period if you turn on any electrical switch it will lead to a severe blast.**
- Till today no one has survived after the blast.**



Be Safe with GAS SAFE

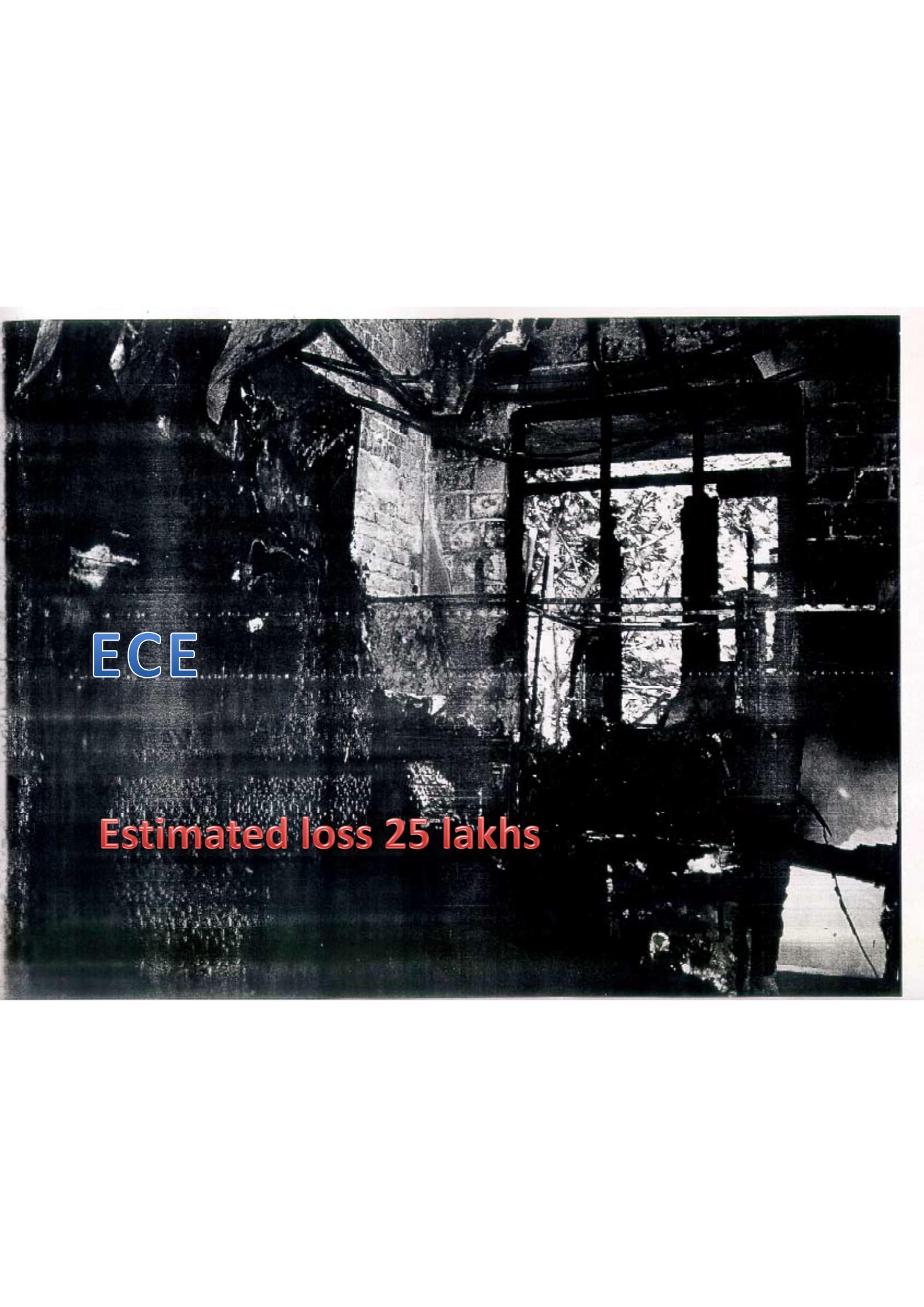
World Trade Center

September 11, 2001

- WTC came down because of fire – not structural damage from the collision
- Fire spread, among others, through telephone closets







ECE

Estimated loss 25 lakhs



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www.shutterstock.com · 7005964







Civil Engg



Biochem



Estimated loss 175 lakhs

Refrigerator













87 children die in TN

As the thatched roof went up in flames and collapsed, the children, most of them between eight and 10 years, had no way out and most of them died on the spot.

RON S MURRAY
News Service

MONAM (TN): At least 87 aged between eight and 10 years were on Friday in, 20 of them while



A Child is helped out of the Ycuá Bolanos supermarket in Asuncion, Paraguay on Sunday. The fire broke out while it was crowded with Sunday mid-day shoppers.

Fire sweeps supermarket in Paraguay, over 300 dead

The cause of fire is not known, though witnesses say an explosion was heard before the fire swept through the building.

Fire Statistics

What is the leading killer in fires?

Smoke & Toxic Gases

Why do we need to worry about smoke spread?

- Sprinklers will not prevent the migration of smoke
- Slow or no response from people to fire alarms



Fire station on fire

Dallas: Fire fighters in a Dallas suburb returned to their station to find a fire started by potatoes they left cooking on a stove, officials said on Friday. The fire caused about \$125,000 in damages to the station in Lancaster, a southern suburb of Dallas, said Fire Marshal Ladis Barr. The blaze was extinguished late Thursday night with the help of fire fighters from other stations. It damaged the kitchen and living area. Officials also wanted to remind the public to make sure not to leave food cooking before stepping out.

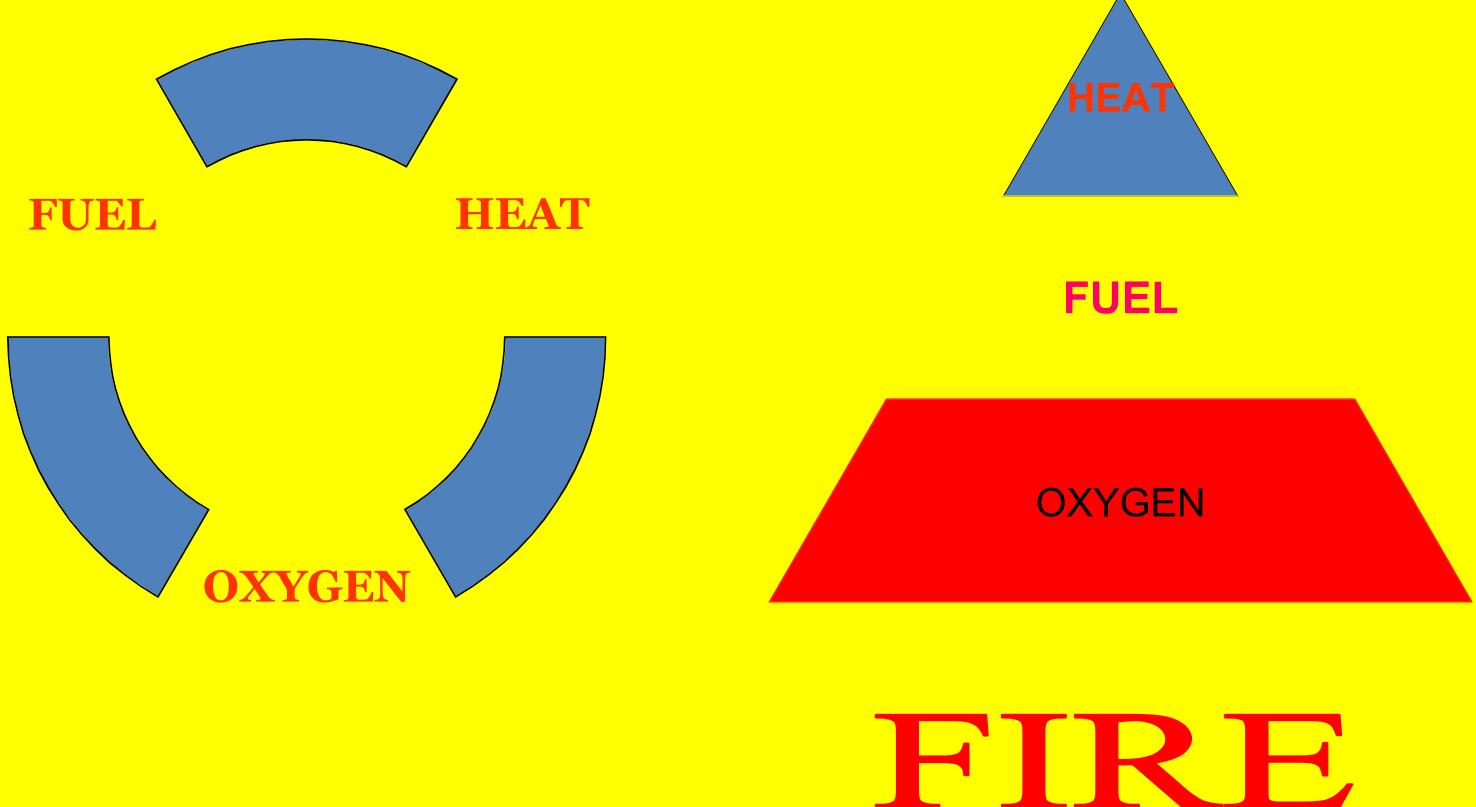
WHAT IS FIRE

- Fire is a chemical reaction called **COMBUSTION**
- To initiate and maintain this chemical reaction or in other words for an out break of fire to occur and continue

The following are essential

- FUEL
- OXYGEN
- HEAT

WHAT IS FIRE



Fire Tetrahedron

- Basic components of a fire are:
 - fuel
 - source of ignition
 - oxygen
 - process of combustion
- Commonly referred to as the "fire tetrahedron"



Each of these three elements must be present at the same time to have a fire. A fire will burn until one or more of the elements is removed.

Fuel

Any combustible material – solid, liquid or gas

Oxygen

The air we breathe is about 21% oxygen – fire needs only 16% oxygen



Heat

The energy necessary to increase the temperature of fuel to where sufficient vapors are given off for ignition to occur

There are 5 classes of fire:



Class A

Ordinary combustibles or fibrous material, such as wood, paper, cloth, rubber, and some plastics.

Class B

Flammable or combustible liquids such as gasoline, kerosene, paint, paint thinners and propane.



Class C

Energized electrical equipment, such as appliances, switches, panel boxes and power tools.

Class D

Certain combustible metals, such as magnesium, titanium, potassium, and sodium

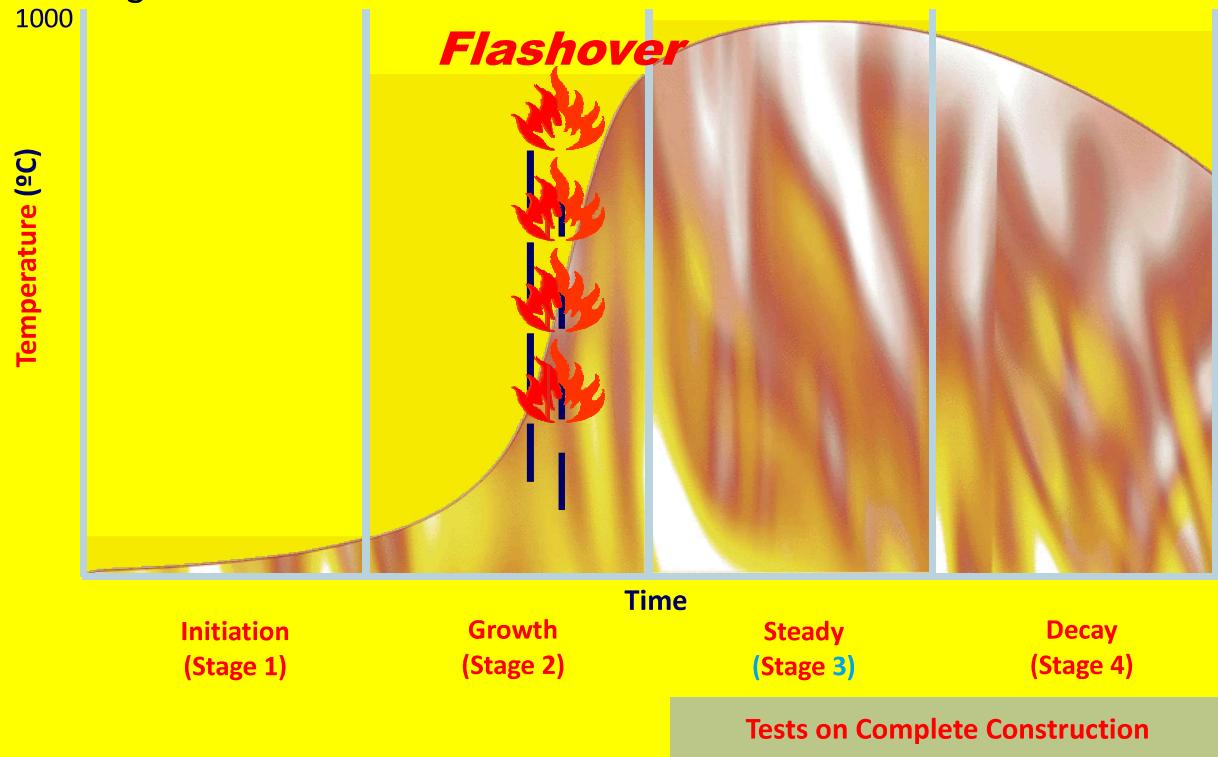


Class-E

Electrical fire .

STAGES OF FIRE

- Four Stages of Fire





ACTIVE FIRE PROTECTION

- **Fire extinguishers**
- **Hydrant systems**
- **Sprinkler systems**
- **Alarm systems**
- **Detection systems**
- **Suppression systems(FM 200 etc)**

Fire Extinguisher Chart

Extinguisher		Type of Fire				
Colour	Type	Solids (wood, paper, cloth, etc)	Flammable Liquids	Flammable Gasses	Electrical Equipment	Cooking Oils & Fats
	Water	✓ Yes	✗ No	✗ No	✗ No	✗ No
	Foam	✓ Yes	✓ Yes	✗ No	✗ No	✓ Yes
	Dry Powder	✓ Yes	✓ Yes	✓ Yes	✓ Yes	✗ No
	Carbon Dioxide (CO2)	✗ No	✓ Yes	✗ No	✓ Yes	✓ Yes

Fire Extinguisher Types

Water

Paper, wood, etc.

Not electrical, liquids or gases



Foam

Solids & liquids

Not electrical or gases



Powder

Solids, liquids, gases &
electrical



CO₂

Electrical, safe on most small fires





NOW IT
WORKS !!

Search ID: 36532928



Fuel

Chemicals - acetone, ether, methanol, etc

Gases - hydrogen, natural gas

Plastics - PCs, cable insulation, research equipment

Paper and cardboard - packaging

Wood - desks, benches

Fabrics - chairs, blinds, clothing

BEFORE you consider fighting a fire . . .

- ❖ Call the fire department.
- ❖ Confirm that the fire is small and is not spreading.
- ❖ Confirm you have a safe path to an exit not threatened by the fire.
- ❖ You know what kind of extinguisher is required and the correct extinguisher is immediately at hand.



To Prevent Fires

Class A ⇒ **Ordinary Combustibles:**

- Keep storage and working areas free of trash.
- Place oily rags in covered containers.

Class



⇒ **Flammable liquids or gases:**

- ♦ Don't refuel gasoline-powered equipment in a confined space, in the presence of an open flame, or while the equipment is hot.
- ♦ Keep flammable liquids stored in a tightly closed container and away from spark producing sources.
- ♦ Use flammable liquids only in well ventilated areas.

Class  ⇒ **Electrical Equipment:**

- ♦ Never install a fuse rated higher than specified for the circuit.
- ♦ Investigate any appliance or electrical equipment that smells strange. Unusual odors can be the first sign of a potential fire.
- ♦ Utility lights should always have some type of wire guard over them.

Class D ⇒ **Flammable metals:**



- Knowledge of the properties of the metals and using good judgment and common sense will assist you in controlling or avoiding potential fires/reactions.

Be prepared for a fire emergency

- Check the location of fire alarms and know how they work.
- Learn your building evacuation plan.
- Know where your two nearest exits are located.
Learn how doors swing and where stairs lead.
- Make sure nothing blocks fire pulls, extinguishers and emergency exits.
- Learn the sound of your building fire alarm.
- Post emergency numbers (including security(2400) and first aid(2227)) near your telephone.
- Make sure you know what to do if the fire alarm sounds.
Plan your escape.

