

**Chemical Process Safety**  
**Professor Shishir Sinha**  
**Department of Chemical Engineering**  
**Indian Institute of Technology Roorkee**  
**Lecture 25 - Fire Extinguishers – 1**

(Refer Slide Time: 00:53)

### What we have studied in last module...

- Fires and Explosion
- Modes of Heat Transfer
- Fire triangle
- Flammability characteristics
- Explosion and its classification
- Vapor Cloud Explosion
- BLEVE
- Dust Explosion



Welcome to this module of Fire and Explosion. In this module, we will study about the different type of fire extinguishers. So up till now we have studied in previous modules about fire and explosion, different modes of heat transfer through which fire can propagate, the fire triangle, flammability characteristics, what kind of different type explosions with their classification. We have gone through the vapor cloud explosion, BLEVE and the dust explosion.

(Refer Slide Time: 01:00)

## What we will study in this module...

- Fire Extinguisher
- Fire Classification
- Types Of Fire Extinguisher



In the present module we will study about the fire extinguisher, how we can classify the fire and based on this particular classification what kind of different fire extinguishers are in place. See, the fire is of 2 types, positive approach and a negative approach. So when we are cooking food in our kitchen that is the positive approach but when fire adopts the destructive nature then it is a negative approach. So once it adopts a destructive nature that means we need to extinguish the fire in a scientific manner and there are different type of fire, so you need to know that which is which kind of fire it is and how to extinguish this particular fire.

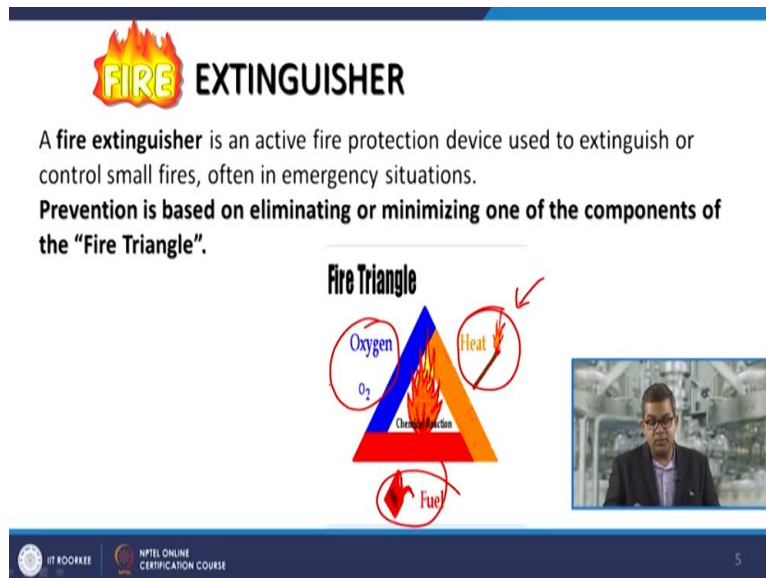
(Refer Slide Time: 01:56)

## FIRE EXTINGUISHER



So in this particular module, we will have a look that what kind of different fire extinguishers are there and based on the different class of fire which kind of fire extinguisher we need to use for that particular kind of fire.

(Refer Slide Time: 02:09)



**FIRE EXTINGUISHER**

A **fire extinguisher** is an active fire protection device used to extinguish or control small fires, often in emergency situations.

**Prevention is based on eliminating or minimizing one of the components of the "Fire Triangle".**

**Fire Triangle**

The diagram illustrates the Fire Triangle, a concept where three elements—Oxygen, Heat, and Fuel—interact to sustain a fire. Each element is represented by a colored circle (Oxygen in blue, Heat in red, Fuel in yellow) and is connected to a central fire icon. The Oxygen circle is labeled with 'Oxygen' and 'O<sub>2</sub>'. The Heat circle is labeled 'Heat' and has a red arrow pointing to it. The Fuel circle is labeled 'Fuel' and has a red arrow pointing to it. The text 'Chemical Reaction' is written at the base of the triangle. To the right of the diagram is a small video inset showing a man in a suit speaking.

IT ROOKIEE NPTEL ONLINE CERTIFICATION COURSE 5

Now let us have a basic approach of fire extinguisher. A fire extinguisher is an active fire protection device used to extinguish or control small fires often in the emergency situation. Now usually prevention is based on elimination or minimizing one of the components of a fire triangle, so it is a rule of thumb. If you wish to produce the fire in the, obviously we have discussed the fire triangle in the previous modules, so if you wish to have a fire then you need to have 3 different ingredients of fire: fuel, you must have a source of ignition or net sustain net release of heat and sustainability aspect and oxygen.


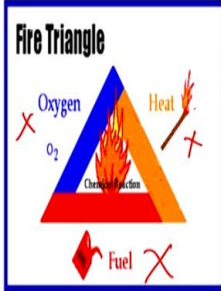
So if you wish to have a positive approach for fire, then you need to have all arms of fire triangle intact. In the vice versa if you wish to extinguish the fire then you need to disable this fire triangle either by a way of blanketing it so that the supply of oxygen may be cordoned off or you wish to cut off the supply of fuel or you have to remove the excess amount heat being liberated so that it cannot sustain in due course of time.

(Refer Slide Time: 03:23)

Three ways to extinguish a fire:

- Starvation - Removal of fuel
- Smothering - Removal of oxygen
- Cooling - Removal of heat

Remove any one of the three components and fire cannot start or be sustained


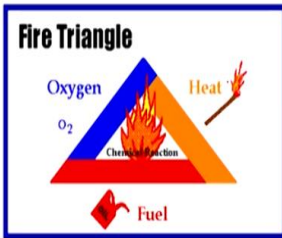


IT KOOEREE NPTEL ONLINE CERTIFICATION COURSE 6

So in a nutshell, we can remove, we can have the fire extinguishment in 3 ways: one is starvation that means you remove the supply of fuel, another is that is smothering that you remove the supply of oxygen and then cooling that you remove the excess amount of heat being liberated. So remove any one of these components, then fire cannot be sustained. Now how we can remove these arms, that is a basic scientific question.

(Refer Slide Time: 04:01)

Fire Safety, at its most basic, is based upon the principle of keeping fuel sources and ignition sources separate.



IT KOOEREE NPTEL ONLINE CERTIFICATION COURSE 7

So fire safety at its most basic is based upon the principle of keeping fuel source and ignition source separate so that once fire initiated it do not propagate and if propagate then it should be extinguished in a simpler manner.


(Refer Slide Time: 04:18)

**Three things must be present at the same time to produce fire:**

1. Enough **OXYGEN** to sustain combustion
2. Enough **HEAT** to reach ignition temperature
3. Some **FUEL** or combustible material

Together, they produce the **CHEMICAL REACTION** that is fire.

Take away any of these things and the fire will be **extinguished**.



IT ROORKEE  
NITEL ONLINE  
CERTIFICATION COURSE

8

Now three things must be present at the same time to produce fire: Enough oxygen to sustain combustion that means one way is to remove the supply of oxygen so that it cannot meet the stoichiometric demand of that particular fuel, enough heat to reach ignition temperature, another way in a positive sense is that you extract the excess amount of heat being liberated in due course of combustion process so that it cannot sustain, fuel or combustible material whatever is there it should not be there so that the fuel definitely the fire will not be sustained.

So together if all these things are together then definitely they will have a chemical reaction and that is called the fire and if it is not then definitely the fire will be extinguished. Now let us have a look of fire classification, because in our day to day affair you may see that there are different types of fire, fire through the electric circuit, fire through the chemical run away reaction, in a domestic approach your LPG that is purely a combustible reaction that is in the positive way. So based on this type of approach there are various way through which we can classify the things.

(Refer Slide Time: 05:45)

## Fire Classifications

- Fires are classified according to the type of fuel that is burning.
- If one use the wrong type of fire extinguisher on the wrong class of fire, one might make matters worse.
- Its very important to understand the five different fire (fuel) classifications...



Low let us have a look of few line that fires are classified according to the type of fuel that is burning, that is one approach to classify the fire. Now if one use the wrong type of fire extinguisher on the wrong class of fire, one might make matters worse, like if you are in a domestic affair if you try to extinguish the fire that is based on the cooking oil with the help of say water then definitely the scenario would be extremely destructive, the reason is that the oil will sputter it out. So it may cause more danger compared to the fire. So it is very important to understand the different classes of fuel.

(Refer Slide Time: 06:27)

## Fire classification

- Class A Fires: Ordinary combustibles such as wood and paper.
- Class B Fires: Flammable and combustible liquids and gases.
- Class C Fires: Energized electrical equipment.
- Class D Fires: Combustible metals.
- Class K Fires: Cooking Oils and Fats.



Now there are five different classes of fire: The class A, class B, class C, class D and class K. So the class A fire that is the ordinary combustibles such as wood and paper, you can distinguish it with the normal water. Class B fire, flammable and combustible liquid and gases; class C fire, energized electrical equipments, so you cannot use water sprinklers etc because it will propagate the thing and that the result would be more destructive; class D fires that is combustible metals and class K fire, cooking oils and fats.

(Refer Slide Time: 07:06)

## Fire Classifications

Most fire extinguishers will have a pictograph label telling you which types of fire the extinguisher is designed to fight.

For example, a simple water extinguisher might have a label like this...



...which means it should only be used on **Class A fires**.



So most fire extinguishers will have a pictograph labeling telling you which type of fire the extinguisher is designed to fight like this. Let us have example, the simple water extinguisher might have a label like this which means that it should be only be used on class A type of fire.

(Refer Slide Time: 07:32)

**FIRE EXTINGUISHING CLASSES**

Class	Materials
A	• cloth • wood • rubber • paper • plastics
B	• gasoline • grease • oil
C	electrical fires
D	combustible metals
K	kitchen fires

IT KOOBEE NPTEL ONLINE CERTIFICATION COURSE 12

So you may see different type fire extinguishers in different places you visit or different industry you work upon, so there are different classes of fire extinguishers: one is the class A basically attributed to cloth, wood, rubber, paper, plastic; class B gasoline, grease, oil; class C, electrical fires; class D combustible metals; class K that is the kitchen fires etc.

(Refer Slide Time: 08:01)

**Labeling of Fire Extinguishers**

- Traditional lettering system has been used for many years.

ORDINARY <b>A</b> COMBUSTIBLES	FLAMMABLE <b>B</b> LIQUIDS
ELECTRICAL <b>C</b> EQUIPMENT	COMBUSTIBLE <b>D</b> METALS

IT KOOBEE NPTEL ONLINE CERTIFICATION COURSE 13

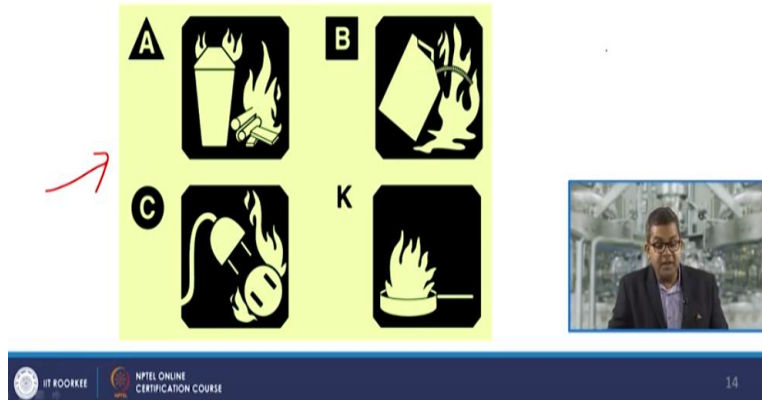
Now traditional lettering system has been used for many years that is for the labeling of fire extinguishers like ordinary class A ordinary combustible, flammable liquids class B, electrical equipment C and combustible metals D, these are the traditional one.



(Refer Slide Time: 08:22)

## Labeling of Fire Extinguishers

- Pictograph system has recently been developed.



But nowadays it is being replaced to some pictographs etc, so the pictograph system which we recently developed that is based on this type of figure, you can have a look this figure that is A class, B class, C, K etc. Now this is more easier to understand for workers who use, those who are illiterate so that they can visualize the things based on these pictographs. So that is why there was a need of labeling with the help of this pictograph system.

(Refer Slide Time: 08:52)

## Types of Extinguishers

Type of fire extinguishers are classified by the type of fires on which they may be used.



Now types of extinguishers, basically they are classified by the way of type of fires on which they may be used, like fire extinguisher, these are the pictographs used that you may find the fire extinguisher at particular place.

(Refer Slide Time: 09:09)

## Fire Extinguisher

There are two main types of fire extinguishers:

**stored-pressure and cartridge-operated**

- In **stored pressure units**, the expellant is stored in the same chamber as the firefighting agent itself. Depending on the agent used, different propellants are used like nitrogen, air. Stored pressure fire extinguishers are the most common type.
- **Cartridge-operated extinguishers** contain the expellant gas in a separate cartridge that is punctured prior to discharge, exposing the propellant to the extinguishing agent. This type is not common.



Now there are two main type fire extinguisher; one is based on stored pressure and cartridge operated. Now in stored pressure units, the expellant is stored in the same chamber as the firefighting agent itself, now depending on the agent used the different propellant are used like nitrogen, air etc. The stored pressure fire extinguishers are the most common type, even you can find it in your domestic affairs plus office places, industry etc.

They are certain cartridge operated extinguishers that contain the expellant gas in a separate cartridge that is punctured prior to discharge exposing the propellant to the extinguishing agent and usually this type is not common but for some specific use it is being used.

(Refer Slide Time: 10:04)

## Fire Extinguisher

Fire extinguishers are further divided into:

**handheld and cart-mounted (also called wheeled extinguishers).**

- **Handheld extinguishers** weigh from 0.5 to 14 kilograms (1.1 to 30.9 lb), and are hence, easily portable by hand.
- **Cart-mounted** units typically weigh more than 23 kilograms (51 lb). These wheeled models are most commonly found at construction sites, airport runways, heliports, as well as docks and marinas.



The fire extinguishers they are further divided into handheld and cart-mounted, also called the wheeled extinguishers. Sometimes in a big establishment you will find it this type of extinguishers, they are handheld extinguishers weigh from 0.5 to 14 kilogram and hence easily portable by hand so that in case of zonal fire you can use those handheld extinguishers even in the household some people they are using it. The cart mounted unit, typically weigh around 23 kilogram and these wheeled model are most commonly found at construction sites, airport runways, heliports as well as docks and marinas; so they usually used for the big fires and big establishments.

(Refer Slide Time: 10:59)

## Types of Fire Extinguishers

Different types of fire extinguishers are designed to fight different classes of fire.

The 4 most common types of fire extinguishers are:

1. Water (APW)
2. Carbon Dioxide (CO<sub>2</sub>)
3. Dry Chemical (ABC, BC, DC)
4. Wet Chemical



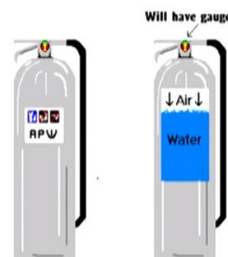
Now based on this particular knowledge we can have a different type of fire extinguishers to fight the different classes of fire. There are four most common type of fire extinguisher: water APW air pressurized water, carbon dioxide CO<sub>2</sub>, dry chemicals ABC BC DC, and the wet chemicals.

(Refer Slide Time: 11:18)

## Types of Fire Extinguishers

### 1. Water (APW) Fire Extinguishers

- Large silver fire extinguishers that stand about 2 feet tall and weigh about 25 pounds when full.
- APW stands for "Air-Pressurized Water."
- Filled with ordinary tap water and pressurized air, they are essentially large squirt guns.



Now first let us have a look of water or air pressurized fire extinguishers, so usually they are large silver fire extinguishers that stand about 2 feet tall and weigh about 25 pounds when they are full. As I told you earlier that APW stands for air pressurized water, so air is usually

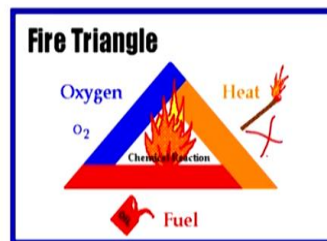
pressuring to the water droplet so that it can squeeze it out in a pressurized manner, so the pressure acts in a two-fold, one is that it promotes the usual way of water to reach the fire and another one is it promotes the formation of fine droplets.

So fine droplets they are having the large surface area so that the fire can be extinguished easily. The basic purpose is to extract as much as heat you can extract from that the firing surfaces so that the one arm of fire triangle can be eliminated in such a way that heat is gone away. So filled, usually they are filled with ordinary tap water and pressurized air they are essentially large squirt guns.

(Refer Slide Time: 12:33)

## Types of Fire Extinguishers

### 1. Water (APW) Fire Extinguishers



APW's extinguish fire by taking away the "heat" element of the Fire Triangle.



Now APWs they extinguish fire by taking away the heat element of the fire triangle because of the formation of small droplets.

(Refer Slide Time: 12:52)

## Types of Fire Extinguishers

### 1. Water (APW) Fire Extinguishers

APW's are designed for Class A fires only:  
Wood, paper, cloth.



- Using water on a flammable liquid fire could cause the fire to spread.
- Using water on an electrical fire increases the risk of electrocution. If you have no choice but to use an APW on an electrical fire, make sure the electrical equipment is un-plugged or de-energized.



21

Now these air pressurized water extinguishers are designed for class A fires only, that is attributed to wood, paper, cloth. Using water on flammable liquid fire could cause the fire to spread, using water on the electrical fire increases the risk of electrocution. If you have no choice but to use an APW on an electrical fire, make sure the electrical equipment is unplugged or de-energized, otherwise the person who is using this APW may get may be in danger.

(Refer Slide Time: 13:32)

## Types of Fire Extinguishers

### 1. Water (APW) Fire Extinguishers

- APWs will be found in older buildings, particularly in public hallways, as well as in Residence Halls.
- They will also be found in computer laboratories. It is important to remember, however, that computer equipment must be disconnected from its electrical source before using a water extinguisher on it.
- It has the advantage of being inexpensive, harmless, and relatively easy to clean up.





22

(Refer Slide Time: 14:27)

**Types of Fire Extinguishers**

**1. Water (APW) Fire Extinguishers**

- It has the advantage of being inexpensive, harmless, and relatively easy to clean up.
- Disadvantage: Freezes at 32°F (0°C).
  - Load-stream extinguishers, wetting agents, or water mist can be used.



IT ROOKIE NTEL ONLINE CERTIFICATION COURSE 23

This APW will be found in older buildings particularly in public hallways as well as the (residence) residential houses etc, they will also be found in the computer laboratories. It is important to remember, however that the computer equipment must be disconnected from the electrical source before you use this APW. Now it has the advantage of being inexpensive, harmless, relatively easy to cleanup because you are using water, a normal tap water.

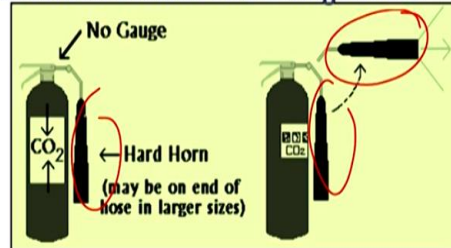
So they are relatively inexpensive, they are usually harmless because you are not using any kind of chemical to extinguish the fire and you can easily cleanup even because after extinguishment you are having only water, so you can easily cleanup this water. So that is why they are having this particular advantage. It has the advantage of being inexpensive, harmless and relatively easy to cleanup. And disadvantage, because when anything is having advantage simultaneously they are having the disadvantage, that they the water inside within the fire extinguishers freezes at around it 32 degree Fahrenheit or 0 degree Celsius.

So you cannot use this fire extinguisher when the temperature is at around 0, atmospheric temperature is around 0 or the subzero. Now another disadvantage is that the load-stream extinguishers sometimes wetting agents or water mist can be formed, so in other way in the positive sense you can use certain wetting agent so that the normal freezing point can be changed or the water mist.

(Refer Slide Time: 15:15)

## Types of Fire Extinguishers

### 2. Carbon Dioxide Fire Extinguishers



The pressure in a CO<sub>2</sub> extinguisher is so great, bits of dry ice may shoot out of the horn!

CO<sub>2</sub> cylinders are red. They range in size from 5 lbs to 100 lbs or larger. On larger sizes, the horn will be at the end of a long, flexible hose.



Now there is another class of fire extinguisher that is carbon dioxide fire extinguisher and usually they are denoted in red color. They ranges in the size from 5 pounds to 100 pounds or larger. On larger size the horn, this is the horn be at the end for a long flexible hose, the pressure in CO<sub>2</sub> extinguisher is so great that a bit of dry ice may be shoot out of the horn, so sometimes they are called the dry ice extinguishers.

(Refer Slide Time: 16:00)

## Types of Fire Extinguishers

### 2. Carbon Dioxide Fire Extinguishers



CO<sub>2</sub>'s are designed for Class B and C (Flammable Liquids and Electrical Sources) fires only!

CO<sub>2</sub> fire extinguishers will frequently be found in laboratories, mechanical rooms, kitchens, and flammable liquid storage areas.



Now CO<sub>2</sub> are designed for class B and class C type of fires, flammable liquid and electrical sources fire. CO<sub>2</sub> fire extinguishers will frequently be found in laboratories, mechanical rooms,



kitchen, flammable liquid storage arena, so they are having the wide spectrum, so they are applicable for class B and class C type of fire.

(Refer Slide Time: 16:26)

## Types of Fire Extinguishers

### 2. Carbon Dioxide Fire Extinguishers

Carbon dioxide is a non-flammable gas that takes away the oxygen element of the fire triangle. Without oxygen, there is no fire.



**CO<sub>2</sub> is very cold as it comes out of the extinguisher, so it cools the fuel as well.**



Now why we are taking this CO<sub>2</sub> fire extinguisher? Now CO<sub>2</sub> is a non-flammable gas that is takes away the oxygen element of the fire triangle and without oxygen there is no fire, so this is the plus point or this is the basic advantage of this CO<sub>2</sub> fire extinguisher. Now CO<sub>2</sub> is very cold as it comes out to of the extinguisher, so it cools the fuel as well. So you can utilize this aspect to eliminate the excess heat even you can utilize the preheating of the fuel if the fire is propagating, so it is having the multifold advantage.

(Refer Slide Time: 17:17)

## Types of Fire Extinguishers

### 2. Carbon Dioxide Fire Extinguishers

A CO<sub>2</sub> may be ineffective in extinguishing a Class A fire as it may not be able to displace enough oxygen to successfully put the fire out or the high-pressure cloud of gas can scatter burning materials.

CO<sub>2</sub> is not suitable for use on fires containing their own oxygen source, metals or cooking media. Although it can be rather successful on a person on fire, its use should be avoided where possible as it can cause frostbite and suffocation.

**Class A materials may also have tendency to re-ignite.**



Now CO<sub>2</sub> may be ineffective in extinguishing a class A fire as it may not be able to displace enough oxygen to successfully put the fire out or the high pressure cloud of gas can scatter the burning material. Now you can see that they are in the red color and this is this one is the horn. CO<sub>2</sub> is not suitable for use on fires containing their own oxygen source, metal or cooking media although it can be rather successful on a person on fire, its use should be avoided where possible as it can cause frostbite or suffocation. So that is why this is one of the disadvantage of using CO<sub>2</sub> fire extinguisher. So class A material may also have tendency to reignite, so that is why it is again very sensitive case, so you be particular about the using of CO<sub>2</sub> fire extinguisher in specially in class A.


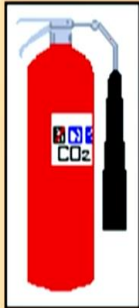
(Refer Slide Time: 18:12)

## Types of Fire Extinguishers

### 2. Carbon Dioxide Fire Extinguishers

Limitations include:

- Weight
- Range
- Weather
- Confined spaces
- Suitability



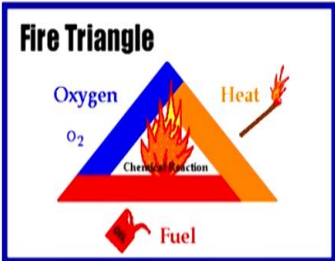
IT KOOKEE NPTEL ONLINE CERTIFICATION COURSE 28

Now this limitation includes another, they are certain limitations with the carbon dioxide fire extinguisher and this limitation includes the weight because it is a bit heavy, the range because of pressurized CO<sub>2</sub> range is limited; weather conditions, confined spaces and suitability with different class of fire and different type of environment.


(Refer Slide Time: 18:42)

## Types of Fire Extinguishers

### 3. Dry Chemical (ABC) Fire Extinguishers



Dry chemical extinguishers put out fire by coating the fuel with a thin layer of dust. This separates the fuel from the oxygen in the air.



The powder also works to interrupt the chemical reaction of fire. These extinguishers are very effective at putting out fire.

← D.C.  
S.S.

IT KOOKEE NPTEL ONLINE CERTIFICATION COURSE 29

The next class of fire extinguisher is dry chemical ABC fire extinguishers. So dry chemical extinguishers they put out fire by coating the fuel with a thin layer of dust and this separates the fuel from the oxygen in the air. So suppose you are having the fire over here, this is a pool and

when you apply the dry chemical fire extinguisher then it will cordon off the things, so it is separates the fuel from the oxygen in the air. So by this way it can extinguish the fire. The powder also works to interrupt the chemical reaction of fire and these extinguishes are very effective at putting out fire.


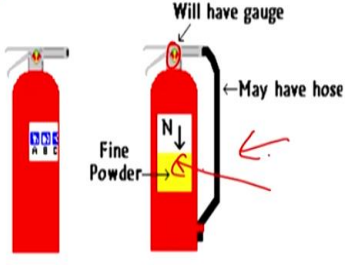
(Refer Slide Time: 19:28)

### Types of Fire Extinguishers

#### 3. Dry Chemical (ABC) Fire Extinguishers

"ABC" fire extinguishers are filled with a fine yellow powder. The greatest portion of this powder is composed of mono ammonium phosphate. The extinguishers are pressurized with nitrogen.

**ABC extinguishers are red.**



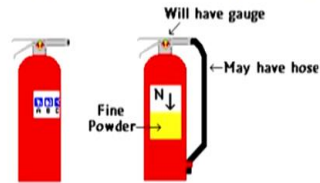
IT KOOEKKE | NPTEL ONLINE CERTIFICATION COURSE | 30

Now ABC they are filled with the fine yellow powder, the greatest portion of this powder is composed of mono ammonium phosphate, and these extinguishers are pressurized with the help of inert nitrogen. So they are usually like this: the anatomy of these fire extinguishers is like this, they are fine powder and they are supported with this nitrogen and here is the pressure gauge and it may have a hose or horn etc that depends on the situation. So usually the color code for these ABC type of fire extinguishers are red.

(Refer Slide Time: 20:13)

## Types of Fire Extinguishers

### 3. Dry Chemical (ABC) Fire Extinguishers



Dry chemical extinguishers come in a variety of types...

You may see them labeled:

- DC (for "Dry Chemical")
- ABC (can be used on Class A, B, or C fires)
- BC (designed for use on Class B and C fires)



Now these dry chemical extinguishers they come in variety of types and you may see the different type of label in these dry chemical fire extinguisher. One class is the DC that stands for dry chemical, another is ABC it can be used for class A, class B, and class C of fire. BC that is designed for the use in class B and class C of fire, so it can have a variety of classes.

(Refer Slide Time: 20:48)

## Types of Fire Extinguishers

### 3. Dry Chemical (ABC) Fire Extinguishers

It is extremely important to identify which types of dry chemical extinguishers are located in your area!

An "ABC" extinguisher will have a label like this, indicating it may be used on Class A, B and C fires.

You don't want to mistakenly use a "BC" extinguisher on a Class A fire thinking that it was an "ABC" extinguisher.



Now it is extremely important to identify which type of dry chemical extinguishes are located in your area or at your workplace so that in case of a fire you can use appropriate type of fire extinguisher and ABC extinguisher will have a label like this that indicating may be used for A B

or C class of a fire. You do not want to mistakenly use a BC extinguisher on a class A fire thinking that it was an ABC extinguisher, so do not get confused, you have to use the appropriate type of fire extinguisher for the fire in question.

(Refer Slide Time: 21:30)

## Types of Fire Extinguishers

### 3. Dry Chemical (ABC) Fire Extinguishers

Dry chemical extinguishers with powder designed for Class B and C fires ("BC" extinguishers) may be located in places such as commercial kitchens and areas with flammable liquids.



The dry chemical extinguishers with powder designed for class B and C fires may be located in place such as commercial kitchen and area where you may have a flammable liquids etc, some industrial locations and so on.

(Refer Slide Time: 21:48)

## Types of Fire Extinguishers

### 3. Dry Chemical (ABC) Fire Extinguishers

- Additives prevent packing and caking.
- Disadvantage: Chemicals are corrosive.
- Primary compounds:
  - Sodium bicarbonate
  - Potassium bicarbonate
  - Urea-based potassium carbonate
  - Potassium chloride
  - Ammonium phosphate



Now the additives, you may use a different additives to prevent the packing and caking. Sometimes they may form a lump if they are rose, that is why you may observe that some of the fire extinguishers they do have some expiry dates. Now disadvantage of this dry chemical extinguishers are the chemicals which are used in the dry chemical extinguishers they are corrosive in nature and the primary compounds which are used in the dry chemicals are sodium bicarbonate, potassium bicarbonate, sometimes urea based potassium carbonate, potassium chloride, ammonium phosphates etc.

So in this particular module, we have studied 3 different type of fire extinguishers and before study of these different type of fire extinguishers we have classified the fire and based on this classification we have gone through 3 different type of fire extinguishers; APW, dry chemical, and CO<sub>2</sub> type of. Subsequent module, we have other type of fire extinguisher along with the methodology and anatomy of and how to use those fire extinguishers. Thank you very much.