Hello students, myself Ms. Ravina Jalmi and I am

from PES College.Today I will take module number

15, for second year B.Sc industrial chemistry, for paper

general industrial chemistry and paper code is CHC153.

So this is the paper code CHC153 and the paper title is general industrial chemistry.

Unit name is halogenation.

And the module name is halogenation of aromatics that is side chain and nuclear

halogenation. This is module number 15.

This is the outline.

Halogenation of aromatics and will be studying about

side chain halogenation and nuclear halogenation.

These are the learning outcomes.

This module explains about aromatic and nuclear halogenation reactions. And also cites some examples.

So these are the subtopics students, that is, we will be

studying about halogenation of aromatic side chain and

halogenation in the nucleus of aromatic compounds.

First we will study about chlorination of aromatic side

chain. So students, we can see the reaction of toluene reacting

with chlorine to give benzyl chloride and HCl.

So here the side chain is getting halogenated, meaning CH3 which is not in the ring system, but it is a side chain and chlorine attaches to this methyl group of toluene and we get benzyl chloride with HCl as a byproduct.

When chlorine is passed into boiling toluene, a mixture of different chlorine products is obtained.

The degree of halogenation will depend on the quantity of chlorine utilized.

Generally, a higher temperature of chlorination 80-130 degree celsius favors substitution in the side chain while chlorination at a lower temperature 30-50 degree celsius in the presence of catalysts e.g. Iron, favors the replacement of nuclear hydrogen.

So students, please remember this important sentence that, at a higher temperature of chlorination that is in between 80 to 130 degrees Celsius, It favors substitution in the side chain, while chlorination at a lower temperature that is 30 - 50 degrees celsius and in the presence of a catalyst like iron favors the replacement of nuclear hydrogen.

Next is chlorination in the nucleus of aromatic compounds.

Nucleus of aromatic compounds,meaning directly the aromatic group or the benzene ring will be getting attacked by the halogens.

Substitution of chlorine for hydrogen in the benzene ring takes place readily.

The reaction is facilitated by the presence of a halogen carrier such as iron, aluminium or iodine. These are some examples of halogen carriers that are iron, aluminium or Iodine.

Side chain chlorination occurs with alkyl benzenes when chlorination is carried out at comparatively elevated temperatures and in presence of light.

At low temperatures and in the presence of a halogen carrier, if reaction takes place, the halogen replaces the hydrogen atom in the ring.

So this is an example of aromatic nuclear halogenation,

where in benzene, when it reacts with chlorine, we get

chlorobenzene and HCl as a byproduct. Here chlorine atom directly attacks the aromatic ring and hence it is called as nuclear Halogenation or aromatic nuclear halogenation.

The chlorination of benzene is carried out in iron vessels, which may be lined with lead or coated with glass.

FeCl3 or ferric chloride is used as a halogen carrier.

The reaction vessel is provided with an efficient stirrer and a reflux condenser.

So students, there is a long vessel, OK, which is coated with

either lead or glass and this is a reaction vessel. It is provided

with an efficient stirrer to stir the mixture and also a reflux condenser is provided.

Benzene takes up chlorine in the presence of carriers and the heat of reaction brings the charge to boil, making it necessary to employ a cooling or refluxing system to control the temperature.
When only mono chlorobenzene is desired, it is advisable to maintain the temperature at 40 degrees Celsius and use only about 60%of the chlorine necessary for chlorination. So students, when we want only mono chlorobenzene to be formed, it is advisable to maintain the temperature at 40 degrees Celsius and use only about 60% of the chlorine necessary for chlorination.

So students, these are the references, that is I referred UGC

study material for second year

industrial chemistry. Thank you.