Myself Ms. Saniksha Naik & I'm from Govt. College, Khandola. We

will be dealing with Unit 3 petroleum and petrochemical

industry. OK now the module which I'll be

Taking the Petrochemicals. part one and

The model number for this is 17.

So now in this topic, PetroChemicals, what we're going to

see actually is the introduction to this topic. Then the

classification of the Petrochemicals. Then we are actually

going to look after the petrochemicals. First one is Vinyl acetate and the second one is propylene oxide.

Their preparations and uses.

Now at the end of this course,students you will be able to

explain the term petrochemical, classify the types of the

Petrochemicals and illustrates the processes involved in the

synthesis of Petrochemicals.

OK, so let's get started now.What are these Petro chemicals?

Petro chemicals are those chemicals which are derived from

petroleum and natural gas, like drugs, then plastics. You have

your fertilizers, raisins,paints and so on. So all these

substances which which are derived from petroleum and

natural ways are called Petrochemicals. OK, so the first

Petro chemical which was manufactured on industrial scale

was isopropyl alcohol in 1920.

Now why are these Petro chemicals important for us? Why there

Is there a need to have these Petrochemicals? Its because now the

petrochemical industry. It is grown up in recent years

Due to its easier conversion of petroleum to the

aromatic compounds by physical separation. That is, we can

easily separate this Petrochemicals to the aromatic

compounds. And the second reason is they form the basic

raw materials in the manufacturing of large number of

other materials such as ammonia, plastic, rubber

paints etc. So they form the basic raw material for the

rest of the products which is to be synthesized.

So now let's go to the classification of the Petro

chemicals. So basically, Petrochemicals are divided into three

types. We have, the olefins which are unsaturated straight chain

compounds. That means you have either double bond or triple

bond. For example you have ethylene, butadiene, propene, etc.

Next is the aromatic Petrochemical. In this we have

unsaturated closed ring  hydrocarbon molecule. OK so you can

understand it by the name itself.

Right, so example of this include Benzene, toluene,

xylene and so one. and the last one is the synthetic gas, the

Petro chemicals, which are obtained from the synthetic

gas. Now, what is this?What are they made of? Its

ammonia and methanol.

So now we will actually see what are the examples, which are the

Petro chemicals that we are going to see. The first

part is vinyl acetate. As you can see, this is the

structure of vinyl acetate. Now the vinyl acetate is an acetate ester of vinyl alcohol. OK, if I hide

this group, only this part, it’s vinyl alcohol  that is,

If I replace this group by hydrogen, So what I'll be

getting vinyl alcohol. So my vinyl

acetate, It is nothing but it is the acetate group instead of your

 alcohol. speaking about its property. It is colorless,

flammable liquid with some

irritating odor. It is completely soluble in organic

solvent, an it is not soluble in

water. Now it is also the precursor of Poly vinyl acetate,

which is an important industrial polymer. So from this Poly vinyl

acetate it is used as a monomer to synthesize Poly vinyl

acetate. Now will see the synthesis, how this is

synthesized. Is. You take ethene & acetic acid & react it in presence of oxygen with the help

of catalysts such as Palladium. so this is the reaction which

is given. So when you react ethene with acetic acid

you get vinyl acetate and of course these side product is

water which can be easily removed. students We are

learning this in terms of industrial preparation so we

need to focus only on the main

product. Right now, this vinyl acetate. Once it is formed, it

is then recovered by condensation and scrubbing,

which is then purified by distillation method. OK, so next

is the uses of vinyl acetate so this vinyl acetate it is used to

make many other industrial chemicals such as glues for

packaging and for building industries. It is also used to

make textiles and paints and also

It is used as a coating in plastic, fibers, for food

packaging and also as a food modifier.

Next, the other petrochemical is the propylene oxide. OK, now as you can see the structure over here

This is the oxide of your propane. Now it is a colorless

volatile liquid. Within odor resembling to ethers, the smell

of ether and this propylene oxide, it is very much similar.

OK now it is the chiral epoxide molecule which is detected in

the Sagittarius B2.

Which is a cloud of gas, in our Milky Way.

Next we will look after the synthesis of propylene oxide.

Now this propylene oxide industrially, it is.

Prepared in two approaches.the first one is the

hydrochlorination approach and the second one will come to it

later on. As in when we start it, this is

hydrochlorination approach, it is having two

steps. the step one. It is the conversion of the propane

to propylene chlorohydrin.  what we're doing in this

we are taking propene molecules and we're adding.

Chlorine gas to it in presence of the water. So

what do we get is this?

Propylene chlorohydrin, so these are the two products which

we get. These are the isomeric products which we get. So we have

2-chloro-1-propanol and 1-chloro-2-propanol.

Now in the next step, what happens is you take this

chlorohydrin an you just dehydrochlorinate it, that is,

dehydrochlorination means you are removing the hydrogen and you're

removing chlorine.  how we're doing this, is we are

treating the previous products with calcium hydroxide.

so that's how we get our propylene oxide formed along with

the water and calcium chloride.

So this is how the hydrochlorination approach it

goes one. The second is the peroxide method, so this is the

2nd way how you can synthesize your propylene oxide. So

the first step in this is air oxidation of  ethylbenzene.

So this is my ethyl benzene moiety, &. I'm oxidizing it

and I'm getting it. Ethylbenzene hydroperoxide, once I get

this entire Benzene hydroperoxide, I treat it with the

propene to get propylene oxide. And along

with that 1-methyl benzylalcohol.Now this is very

easier to remove, So what we're focusing is getting propylene

oxide. So the first method which we have used, the

hydrochlorination method. It is much easier.

Since we were not getting any of the side products,

 now coming to the uses of propylene oxide we have. It is

primarily used as a chemical intermediate in the production

of polyethers and propylene glycol, next is it is used as

Pesticides and as a fumigant for the sterilization of packaged

foods and plastic, medical instruments. Also used in making

detergents, lubricants and so

on.So that's it with today's topic. So these are

some of the references which I have referred to.

And thank you students.