Welcome dear students.

So the program is Bachelor of Science

First Year. Subject is Chemistry.

Semester II. The course code is

CHC102 Course title is Physical

And Organic Chemistry and section

is organic chemistry section B.

I am Shubhada Gawandi, Assistant Professor

In Chemistry at St. Xavier’s College,

Mapusa Goa and I'm going to deal

with the module, namely Reactivity

And Relative Strength of Carbon-

Halogen Bond in Halides like Alkyl, Allyl, Benzyl,

Vinyl and Aryl Halides.

So we're going to deal with the reactivity

and relative strength of carbon hydrogen

bonds in Halides like alkyl halides,

allyl halides, benzyl halides,

vinyl and aryl halides.

And at the end of the video you are going

to compare the reactivity of benzyl, allyl,

alkyl, vinyl and aryl

halides. Explain the trend of

reactivity among various halides.

Recall how the reactivity of alkyl halides

is influenced by the nature of halogen

atom and nature of alkyl groups and

select the most reactive species

among the listed halides.

So the general trend of order of

reactivity of halides is observed

as benzyl halide being the most

reactive followed by Allyl Halide,

which is followed by alkyl halide which is

followed by vinyll halide and the last

reactive is aryl halide.

So now let us look at the structure

of each of them. So here we have

the structure of benzyl halides.

Then this is the structure of allyl halide.

This is the alkyl halide.

This is the structure of the vinyl halide,

and this is the structure of aryl halide.

So, in all these structures there

is a common atom and that is X,

which could be either Cl, Br or I.

Generally, the species that gives

the most stable, cabocation is the,

most reactive.

So let us learn about Benzyl halide.

This is the structure of benzyl halides.

Benzyl halides are most reactive

because the intermediate formed

after the removal of halide ion,

which is the benzylic carbocation which

is intermediate can stabilize itself

to the maximum due to the resonance.

Here are the resonating structures

of benzilic carbocation.

So altogether there are five

resonating structures.

Structure one and structure five are one and the same.

Next, we're going to learn

about allyl halides.

Allyl halides are more reactive

as compared to alkyl halides.

So this is the structure of allyl halide.

Allyl halides can give more

stable allylic carbocation

with the loss of halide ion,

so in the example I have

taken allyl chloride,

so with the loss of chloride ion.

We get allylic carbocation.

This is the allylic carbocation.

Which can resonate into this

structure so all together there

are two resonating structures

which are of equal energies,

thereby making it more stable

intermediate carbocation.

So the stabilization here

is by means of resonance.

Next are the alkyl halides.

This is the structure of alkyl halide.

So here, the carbocation

stabilization is by a weaker

phenomenon of inductive effect.

So in this example,

I've taken the tertiary butyl chloride

and with the loss of chloride ion I

get tertiary butyl carbocation.

Although the chemical reactions

of alkyl halides are similar,

the reactivities are not similar,

and the reactivity of alkyl

halides depend on two factors.

Factor one is the nature of the alkyl groups,

and factor two is the nature of halogen atom.

So, the first factor is the

nature of alkyl groups,

so alkyl groups are electron releasing

groups. More the number of alkyl groups,

greater will be the electron density at

the carbon atom of carbon halogen bond.

Hence there will be a greater repulsion

of electron pair that is shared between

carbon and halogen and this is observed

maximum in case of tertiary butyl bromide.

because of which

it tries to lose the bromide.

ion more easily.

Now when we compare the

examples like methyl bromide,

ethyl bromide isopropyl

bromide and tertiary butyl bromide.

With the loss of bromide ion Delta

H values goes on decreasing.

So, as the number of alkyl groups

go on increasing,

you can see that the delta X

values go on decreasing.

And.

So in this examples.

Tertiary butyl bromide.

You can say it is more reactive.

The second factor is the

nature of halogen atom.

It is observed that larger

the size of the halogen atom,

greater is the ease with which the

halogen atoms can be substituted and the

order of reactivity is as follows: first

comes the alkyl iodides,

which are the most reactive,

followed by the alkyl bromides

and the least reactive ones

are they alkyl chlorides.

So alkyl iodides

are very reactive,

and are even decomposed by light.

Next are the vinyl halides.

This is the structure of vinyl halide.

So vinyl halides are less reactive

compared to alkyl halides due to

the following resonance phenomenon.

So there are two resonating structures.

We can consider this as one and

we can consider this as

second resonating structure.

So in one of the resonating structure

that is, in this structure two,

the double bond character

strengthens the carbon halogen bond,

thereby making the removal

of chloride ion difficult.

An in structure one, carbon,

is sp_2 hybridized.

Thus carbon halogen bond is shorter and

stronger compared to alkyl halide's.

Next, we have aryl halides.

This is the structure of aryl halides,

so aryl halides are less reactive

then alkyl halides due

to the resonance stabilization

of aryl halides as follows:

So all these are the resonating

structures of aryl halides

if you look at this structure.

2, 3 and 4.

Carbon halogen bond is a double bond

and is not easily broken which make

the living of the X group difficult,

making it list reactive.

So this is all about this module,

so let us summarize.

So we have compared the reactivity of benzyl,

allyl, alkyl, vinyl and aryl halides,

we have seen how the resonance affect

the reactivity of some halides.

We have also learnt that the

reactivity of alkyl halides depend

upon the number of alkyl groups and

the nature of halogen atom and the

trend of reactivity among the various

halides we have seen and when compared

The reactivity of halides

follows the order benzyl halide

being the most reactive,

followed by allyl halides,

which is followed by alkyl halides,

which is followed by vinyl

halides and the last one is the

aryl halides.

So these are my references.

Thank you.