Heterocyclic chemistry
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Lecture - 04
Nomenclature (Contd.) and Important Names

So, that means names and number cloture they are all divided into three lectures. First lecture was a regarding important nucleolus of the hetro-cycle compounds and in second lecture systematic compound. Today also we continue the systematic compound partly, but with the focus on fuse system. And then we will see some important names in heterocyclic chemistry and normally those which are found in medicine, natural product, polymers etcetera, etcetera, agriculture all this thing.

And also we try to the identify nuclei present in the structure. So, that take cares sort of names, vocabulary and nomenclature everything. So, let us begin with an example with the fuse system. Suppose, you come across the fuse system how do you name them? What is the first job you have to do? First job is to do draw a coordinate.

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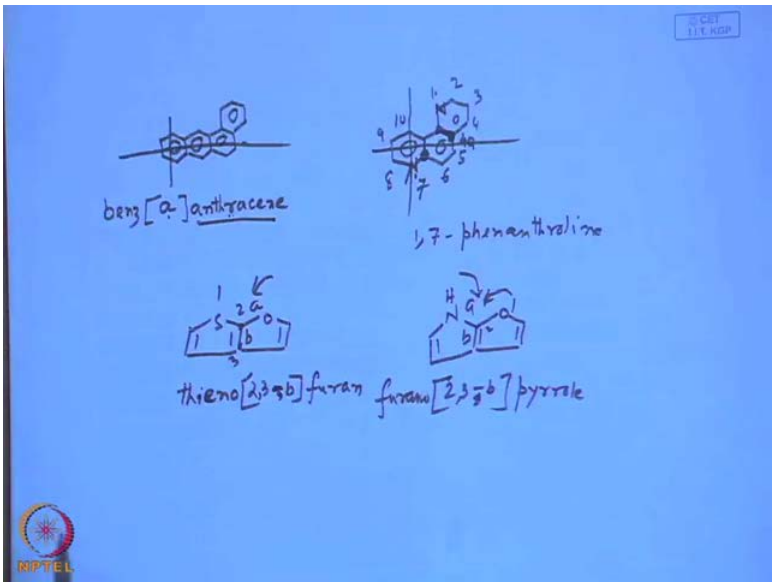

So, draw a coordinate and then place as many as possible rings along the x axis. Let us take a simple molecule and then probably, let us say we are talking about the molecule of these kinds where, you have 6 member ring fused linearly. And then there is a ring also, say tetra cyclic ring system. As you can see, these are all aromatic, aromatic, aromatic,

so that mean you have to place the molecule such a fashion that, the maximum number of ring lye along the x axis.

Also you have to keep it in mind maximum number of the atom must be on the right top corner quadrant. I think you understood the meaning. This is the right to p coordinate, so maximum number atom must be there. Then you have to identify the basic nucleolus, the nucleolus, which should be named as the surname. In this case what you can see the linear, what you have an anthracine. So, you write anthracine and what is left out? That is the right top ring this 1 and this 1 should be coming as the prefix. So, in this case it should have been banjo, it should banjo anthracic, but what we write?

We will write is the benz anthracic, there is an alphabet over vowel here after the bracket. If you do not have the alphabet like a here is a vowel here. So, then you write banjo, but in these case we write benz and within brackets are bracket will have it a. How do I know a, it could have b, c excreta all this things. The a is referred to a bond of anthracine and means this is the basic nucleolus or nucleolus of higher priority.

That must be referred in naming the bond a, that means a bond is referred to the anthracine. And this case the case of benzene you see all the carbon all the equivalent, so there is no numbering required. Now, let us take a heterocyclic molecule. So, we have the molecule let us say in my node, there is the molecule of these kinds, so here again this is pantheon and then there is the nitrogen of here and nitrogen of here. So, I mean so far then, again just draw the coordinate axis and then and try to place as many as atom possible in the right top quadrant.

Then what else and that is all, that mean what is the basic nucleolus now here this is the queen. You have then the prefix would be pyridines, that know quinoline that should have been the name, but again this is not named as the pyridine quinoline. Reason being that is why every first class you have given in the important nuclei. Those are accepted in IPEX nomenclature cannot be named as benz pyridine, it should be named as quinoline.

Similarly, a pantheon with 2 nitrogen should be named as not really, it is acutely phoneme trodden. So, phoneme trodden, but mind it then why did I write then? This one, this is also very useful for numbering system then, how to number actually again to do the numbering start from the right to p corner, and that too the bond which is not fused to

an atom, which is not fused to ring. For example, in this case right top of corner is this 1 pyridine and the nitrogen here is not fused to the ring.

So, you start from here 1, 2, 3, 4, you skip the fused bond 5, 6, 7, 8, 9 and 10. So, from the numbering system, you have to draw the coordinate axis then, put as many maximum numbers atoms possible in the right top of the corner coordinate. Then, start numbering from the atom immediately after the point of the fusion. So, in this case we are not ignoring the left coordinate, we are ignoring the left bottom coordinate, right bottom corner.

So, we are concentrating on this 1 and the fusion point is only this, this one, this one. So, next atom should be the given the first number one. So, then go on clock wise, so then clock wise 1, 2, 3, 4 etcetera. You skip the basically the bond that is fused, so they are skipped. And all of you know I think just to be precise and this bond, which this carbon which has been skipped is numbered as 4 a.

Similarly, this carbon is number as 6 a, so as a whole this system of nomenclature of the fused system given as two things the new name or the new numbering. I said again mind it will have more on this new numbering system, but eventually what should be named as? This one should be 1 7 7 and 1 7 7 7. Let us say few more there are one more let us say few system here. You have thiamin fused to furan now what should be the name? Here is the case of now both the rings are of same size 5 member, but the atoms are different oxygen and sulphur, so which one gets the preference, that is what we thought.

So, I mean, but there is the specific actually there is priority rules in the hand book of heterocyclic chemistry, but yes now you have been right. So, let me prone system get the higher priority than thiamin. So, the thiamin should be the prefix then so Thio. So, I actually it should not Thio, it should be thieno and then it should be bracket, bracket should indicate fusion and then it should be named as furan fine. And then what should be this bonds here within the bracket, it should be a then b.

So, that means the furan should carry the alphabet b then before that you have a hyphen and then you have to specify this bond here. So, again you start from Sulphur here individually 1 and 2 and 3 so it should be 2 commas 3 hyphen and b this is name. Let us look at one more example very similar example, thus you see there is the little bit of

confusion here. Now, payroll is being fused to payroll being fused, so what should be the name then?

So, it should be named as furan and payroll, that is what we thought, but again you have to go to the book and see what the priority is? In this particular case Nitrogen actually gets the high priority, nitrogen, oxygen and sulphur. If you do not remember, you do not have to remember, but this is important because it is given the priority is already sighted in the text book. So, it is actually payroll and in this case there is no problem then, prefix would be furan.

And as usual so the alphabet should comes from the payroll ring a and b, so this is b this is hyphen and for the furan, this is the arrow and the furan it should be 1 2 3, so it should be 2 and 2 comma 3 and this. Let us take an another example this one little tricky low. What you have to remember that the when you are finding out the alphabet, the ring fusion or the numbers, both of the arrows should be converge means, if the arrow one is anti clock wise another should be clock wise not both the arrow should be clock wise and both this anti clock wise.

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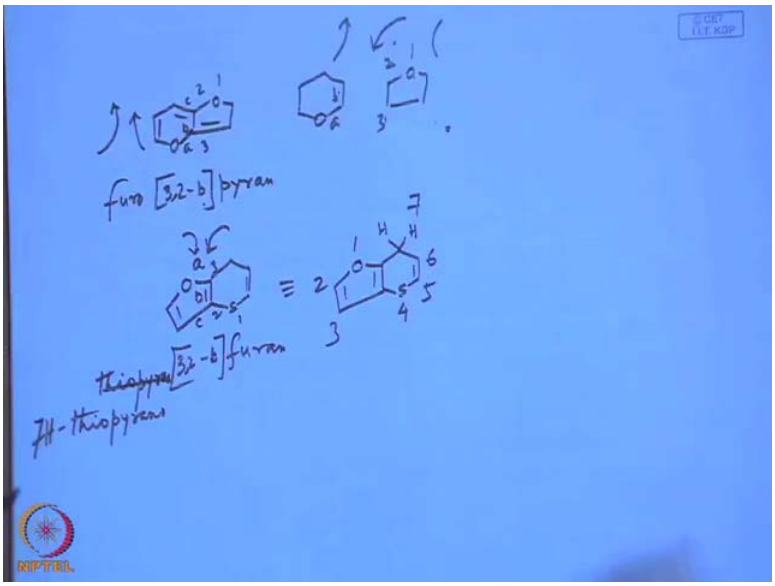

Then example let us look at this example here. Here you have a 6 numbered ring and then you have 5 numbered ring. The bonds are of course, like as usual and this, so what the name of this nucleolus? See here, so in the first case what I said, if I bonds first the payroll gets the priority then, the furan then, the thiamine and just reverse from what we

have the numbering oxygen sulphur and nitrogen. But in these case it is easy to distinguish, which one becomes the parent ring system.

Which one become the parent ring systems? 6 members the 1 in larger 6 number, so it should be named as pyran, it should be named as pyran. Then there should be with bracket again and then the other one should be furrow. Now, you have to specify the ring juncture, so specify the ring juncture means you have principle ring is pyran then, alphabet should come from the pyran.

So, all of us know that the first bond should be named as a and this is b and this is c, so that means it is basically b. So, b pyran b pyran then hyphen and the numbering, numbering in case of furan all of us know 1, this is 2 and this is 3. So, this not that means when you are putting the alphabets, the arrow was like this and the numbering actually comes this way. But that means when you record the numbering you have arrow of this kind that means you have to write here 3 and 2, 3 and 2.

There is nothing to be noted, let us think I break this into 2 things. How is that let us say this is pyran being system and this is the furan being system, this is the principle group. So, principle group should carry the alphabet, so this a and b. So, that means b has been denoted for this furan number should be indicated. And in this case if you individual number this furan being 1 2 3, so that means when you go 1 to 3 the arrow goes like this and here when you go to a to b into c the arrow goes like this.

So, anti clock wise and this is anti clock wise and this is also anti clock wise, but both the arrows should be clock wise or anti clock wise. That means once you fix the b here then, to make this arrow clock wise you have to read 3 and 2. Let us say one more here, you have again a system 5 member, 6 member, two different atoms. So, which one gets the high priority that means the priority can be decided by the base number of atoms, nature of the atoms or the nature of the size of the ring. So, obviously the first thing that should to come to a mind is the size first. No matter what is the ring, that is what it says, but there is the prescribed priority in books.

So, you have if you do not remember just gone to the book and see. In certain cases thing are not as you expected, like I would have expected a 6 member getting the higher priority than the 5 member, but in these case hector atom that is deciding. So, there is a list actually, there is the list like you know there is sir names and nick names, there is

suffixes and prefixes. So, there is the list of priority the nuclei, like in a norm cloture priority of the functional books like a carbolic acid, alien sterol alcohol, etcetera, and etcetera.

So, in these cases this is also named as furan and so within bracket. Then what is the other one, it should be thio-pyran 6 members with sulphur is known as thio-pyran. So, it should be named as thio-phyrano. Now, you have to specify the ring juncture, what is the alphabet? B hyphen and the number that means a and b and c. Now, you see 1 2 3 so if this comes this way, the arrow must also converge, so it should be then 3 and 2. Now, that means to clearly if you re write, it would look like this. Now, mind it there is the extra hydrogen of here on the top, so that is termed as indicated hydrogen. So, what is the number of indicated hydrogen?

That is what I also did that, I did the same mistake when I was a student. But you have to remember one thing, it is very important thing in hydro cyclic chemistry most people do not know because some were at some point you know just well negligibly written some were. What you have to do after, so far what did I do we identified the nuclei, we identified the fusion, but also we have said the number starts from right top corner. That is what we did, but when I say so.

Actually, you have to do that after having the paring nucleolus name fusion and then you have to do re numberings. Did you get my point? That means after everything is done the numbering has to be done as fresh means that means whole system should be numbered. In these cases again numbering, if you remember for the numbering system you have to start from oxygen, sulphur, and nitrogen like entity. So, this should be then that means we are now having the real fresh numbering 1 2 3 4 5 6 7, so that means this should be named as 7 it is thio-phyrano 3 2 b furan. I will give you one more example.

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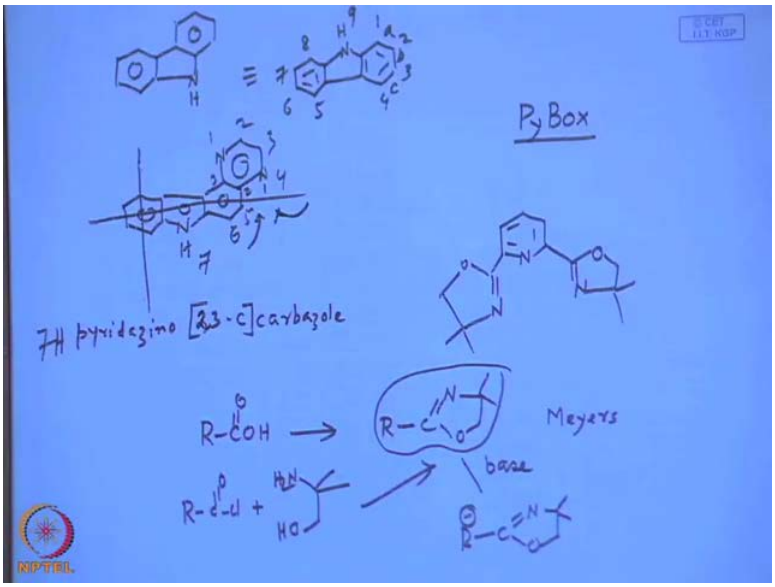

Now, all of us know this is Nitrogen and this is Nitrogen and this is what it is Carbazole. So, what should be the numbering, what is the numbering start 1 2 3 4. When this numbering was suggested actually what they did they inverted this molecule as if nitrogen on the top nitrogen. This is actually the way ah people is to write, but we do not follow, but you have to keep this up now right top corner, what is right top corner 1, 1 2 3 4 5 6 7 8 and 9. So, the pyran carbon is basically 9 edge carbazole. Now, let us take a molecule take this kind again.

Now, how do you send them, that means first of all we have identified as a few system. When you have few system you write a coordinate to plus maximum number of this maximum number of the ring along the x axis. Then maximum number of atom right top co dent. Then what then you have to identify the principle nucleolus, what is the principle nucleolus in this case carbazole because this is laying along the so is a carbazolfyn.

Carbazole and then bracket I think we will write later, what is the prefix what is the prefix 6 numbered with 2 hydrogen 1 4 nitrogen pyridazin, pyridazin 1 2 nitrogen pyridine 1 3 nitrogen pyridine pyridazin. So, pyridazin that means pyridazino. Pyridazino carbazole and then numbering what is the numbering system, what should be the bound what should be the bond, the alphabet comes carbazole.

Student: ((Refer Time: 21:42))

No, one see a b and c which 1, if you look at individually carbazole separately as basically the c. Now, we are talking about this nucleolus etcetera individually. So, c then hyphen and then number, what is the number, number of number of what the number should come from the prefix, prefix nucleolus prefix nucleolus that means. So, that means this number should this number should come from prefix nucleolus right. So, that means a b c this 1 at arrow should also be this that means 1 this 1 2 3 that means 2 3. So, 2 3 2 3 c carbazole right 2 3 c carbazole fine what else to.

So, that means pyridazino c carbazole, but something else is missing now. You have to identify you have to level the hydrogen this hydrogen of sphere, what is the number of hydrogen. As I said what we have to do know you have to start a fresh numbering, fresh numbering now that is the important thing. After fusion everything done. So, you have to fresh numbering right top corner after diffusion point 1 2 3 4 5 6 7. So, it is actually 7 h 7 h pyridazino 2 3 sorry 2 3 c carbazole, understood. Let us take a let us take a molecule which is very famous molecule, very famous molecule.

I think let us see those who are studying asymmetric synthesis they would know a term called Py box what is that Py box.

Student: ((Refer Time: 23:58))

Close, not exactly though Py stands actually stands for pyridine. So, you have a pyridine up here and then oxazole ring system, oxazole means

Student: ((Refer Slide Time: 24:22))

Oxygen and hydrogen 1 and 3 position and joule means 5 numbered ring. So, you can very clearly write 5 number 5 number. Similarly, on this side also there is 1 sphere and 5 number ring fine and both the cases both the cases there are actually two methane groups here methane groups. So, this is very important actually catalyst most of the all of us know, nitrogen has the space of facility towards a particular metal cooper.

This is special affinity whenever you are coming across any cooper code rating reaction you will see one of the first nitrogen like you all know prosperous. So, likewise oxygen if you have achromatic also very useful etcetera. So, this is a very useful catalyst for all

kinds of reaction with copper chemical catalyst reactions. It can also be decompensate as the decompose I mean etcetera it can also induce cosmetic induction.

There is synthesis it can do indurations all kinds of things, but I mean abbreviate as Py box, but you can understand what is the name what should be the name. The name should be I think we will come back to that little later. May be let us see will first 2 little bit of little bit of small thing. Let us say if let us say if you have a carboxylic acid right. From there you want to make oxazole see little bit of synthetic chemistry.

So, long we have been talking about hector cyclic chemistry etcetera, nomenclature. Now, how do you make it. It is the oxygen derivative this is useful derivative many of you know and useful derivative who was the pioneer meyers peoples say meyers oxazole system. It is very useful system and how do you make it.

Student: ((Refer Time: 26:41))

Very good and what else, that means that means you have to an amino group here themselves and O h group and what is the other substitute. Other substitute should be acid chloride just mix them very nice reaction, very nice reaction you state with you get this compound, what is the advantage this is the activating group, means if you have the base it can generate a carbonize at the alpha position. So, let us say if you that means you have the carbonize alpha position. Then you can do all kinds of reaction all kind of reaction. So, how do name this oxazoline for example, how do you name oxazoline. This oxazoline may be oxazoline means you can quickly write R c double bonds

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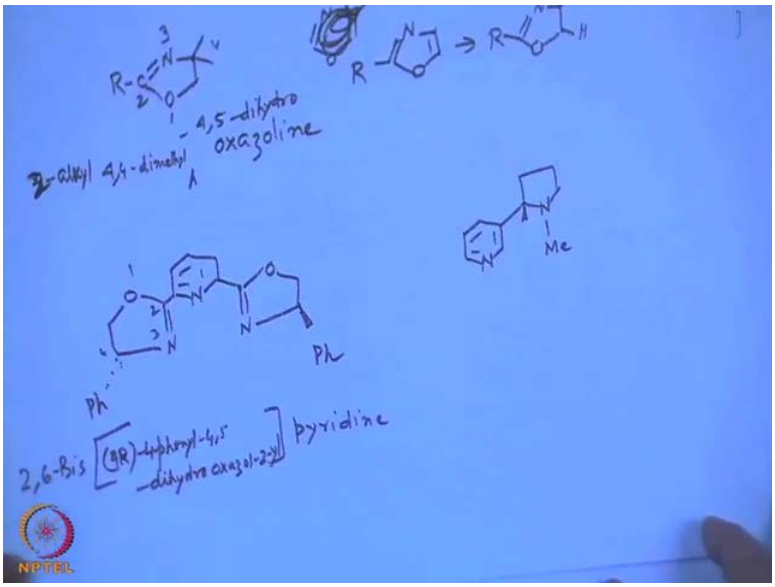

It is like the base kind of the thing and then it is easy to remember. . So, that this should be next to nitrogen. If you have group next to oxygen then you have the tendency to go hydrogen this amino is pretty stable alcohol. Now, what should we name how do you name it. So, let us we know now oxazoline fine that is understood oxazoline. Oxazoline fine what else we have to then you know you have to do the numbering. So, numbering starts from oxygen. So, 1 2 3 and 4 so that means 4 4 di methane, di methane and then 1 2 3 then this 1 one 2 1 2 3 alkyl 4 4 di methane.

Student: Two alkyl.

Sorry 2 alkyl 2 alkyl 4 4 di methane no.

Student: 5 alkyl.

Right, you have to say 1 2 3 4 5. So, here you have to write 4 5 di hydro that means the original oxazoline. So, original molecule is like this right. So, 4 5 di hydro means 1 2 3 4 5 4 5 di hydro, means first you have hydrogenated 2 this 4 5 di hydro. Then you have substituted this 2 hydrogen by di methane group. So, that means this name now come to this. Let us say Py box Py box, then what should be you have pyridine again. So, you have nitrogen double bond nitrogen oxygen here 5 member just.

If you recall this oxazoline derivative. So, on the pyridine side you have just 5 member oxazoline, oxazoline then what. As I said before in these case in these case the real pi

box actually will have you have the phenyl book here and the phenyl book on the other side. So, what next how do you name it again 5 member and 6 member. Both the cases you have nitrogen and oxygen. So, size gets the preference size gets the preference most of it unless we prescribed.

So, that means it should be named as pyridine fine the substituent. Now, what now, you have within the bracket substitute what are the number of substituent 2 6, 2 6 that means 2 6 2 6 2 6 then this is the different substituent. So, you write this fine that means this 2 substituent, then what do you write then just only 1, what is this that means you have taken care of them. Then you write only one of them. So, it should be first number 1 2 3 4. So, 4 phenyl no, but at the movement you also must write 4 r or s something like that. So, this is what let us say a b c r that means this is the 4 r within bracket, then 4 phenyl 4 phenyl then 4 phenyl then.

Student: Four 5 di hydro.

Four 5 di hydro 4 5 di hydro di hydro oxazole. There is one more, no oxazole is connected at 2 position. So, 2 oxazole 2 i l oxazole 2 i l. So, everything is complete

Student: sir ((Refer Time: 33:17))

Both are because they are mirror image if you just if you have the c 2 axis. So, if you just rotate it that is basically the mirror image.

Student: Sir they will (Refer Time:33:30)

No, which I will do that vanishes. Let us take a molecule which is quite familiar to all of you. I think by now you should be able to, I will forward answer from you write down again. If it is nucleolus right and here you have you have what is that nucleolus name of the nucleolus,

Student: ((Refer Time: 34:05))

No this nucleolus 5 member nucleolus, it is not a pyrol, it is known as pyridine, pyrolene pyridine. Now, all of us know this what is the name of this molecule right. In brief nicotine, nicotine is good or bad I do not know no because.

Student: Both

Right why good.

Student: Sometimes the given to ((Refer Time: 34:35))

No, nicotine what is the actually the pyridine use of nicotine anybody knows. Nicotine is to be used is as harmonize, harmonize insecticides. I do not know uses it or not, but previously it is to be used,. So, how do you name I think I should I try or you will try at home, you try at home may be I will give. So, we have few more examples may be I will give you some other example you try at home. Let us say one more very popular molecule actually.

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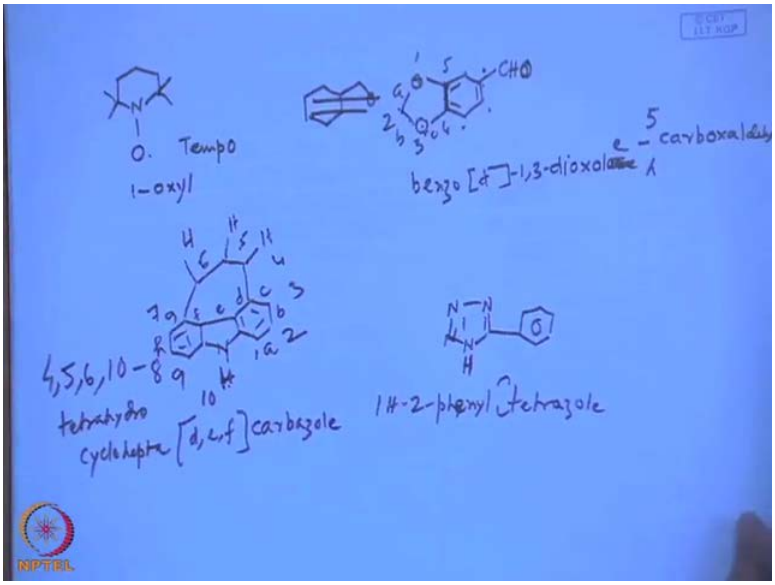

These are all popular molecule I think some of you know. Last week there was the seminar speaker who talked about this molecule is simple molecule.

Student: ((Refer Time: 35:30))

Tempo, Tempo is not good enough, but you have to know th e full name tetra methane, tetra methane.

Student: Pyridine.

No pyridine n oxide means, it is the plus and minus, tetra methane Py pyridine 1 oxyl this is the tempo and let us say and very recently. I think this is also in many of you have come across the such a molecule. Let us say this one molecule of this kind it has also a

nick name. Recently one of research corner also gave us the seminar from lab, what was the molecule.

Student: ((Refer Time: 36:30)).

No again it has a, right very good t phenyl what should be its official name official name.

Student: We saying like that ((Refer Time: 36:50))

But that is not the official name, when you write the paper you have to go back unless until you know the exact name you have to go back dig out the name, take a your lot of time, but if you little confident you can be. Let us say like it is a furan for example, furan molecule anti carbolic acid. If must identify the nucleolus. So, in these cases nucleolus what is the nucleolus in this.

Student: ((Refer Time: 37:20))

You have a 5 member with oxygen. Like yesterday I said t h f is known as t h r, it is nick name ox line right. Similarly, this is di oxolyne 1 3 di oxolyne, but you have the benzene nation here. So, benzo di oxolyne. So, that means benzo di oxolyne. So, then you have to talk about the fusion also talk about fusion right. So, what is fusion that means one you can write benzo and some this fusion and then 1 3 1 3 di oxolyne 1 3 di oxolyne or 1 di oxolyne these case it writes have the di oxole.

That is being because you have to put the test. So, the formal group. So, the formal groups should be known should be named as carboxile di hyde, carboxile di hyde. So, you have benzo, now you have to specify this numbering here what is the numbering. The fusion that means the fusion is this bond is fused. So, that means the fusion comes fusion should be designated as alphabet right of the parent system.

Parent system is oxazole. So, but the numbering should go through a, individually number first were 1 2 3 4 5 right. So, that means a b c d c well my notes does not say anything though, but you have to say a b or a b c d. So, benzo prowl should be the benzo d 1 3 di oxolyne benzo d 1 di oxolyne.

Student: ((Refer Time: 39:46))

See you have individually number this, when you say by carbazole benzo carbazole. First individually number them then 1 2 bond should be a, 2 to 3 bond should be hence go on. Then eventually you have to give this whatever the bond is fused that should be designated as an alphabet. So, a b c that is perfectly d, we will have check may be I think I will check, but then.

Student: ((Refer Time: 40:17))

That is what you have to do it now. Then what is the numbering that is what coming to for final numbering you have to after the fusion everything over. Then you have to do a fresh numbering new numbering system that means whole molecule should be taking together. Now how do you number them again. So, 1 2 3 4 5 and 6 right, then you have to give the lowest number 1 2 3 1 2 3 4 5. So, it should be acutely 5 carbacid we have enough of numbering right. So.

Student: ((Refer Time: 41:00))

That should be no, that should not be done here because in case of benzene all the carbon bonds are equivalent. I did the hydro atom substitute. For example, if you had the nitrogen of here, then you have to specify the number, number of the bond which has to be oxolyne bond oxolyne nucleolus. Let me at take another example, we have recently synthesize this molecule, see what should be the name of this molecule. So, we say what is the name this you can see that carbazole molecule. So, the parent nucleus should be named as carbazole, carbazole right and what else and a cyclo heptanes system to carbazole. So, that means you have to indicate.

The fused bonds fused bond. So, how do you do individually number the carbazole by a b c d. So, that means this is a this is b c d e f g h. So, we have now individual number carbazole nucleus with a b d c bonds. Now, carbazole you can see that which are the bonds that has cyclo heptanes d e and f that also and what else which ring as been fused prefix the prefix is, the prefix now cyclo hepta, cyclo hepta. So, cyclo hepta, but then there are. So, many hydrogen there right. So, hydrogen means extra hydrogen, how many extra hydrogen are there 4, you have the n h hydrogen. So, that means these are the extra hydrogen over the s p 2 carbon atoms.

So, you have 1 2 3 4 that means tetra hydro, tetra hydro cyclo heptads d e f carbazole that is not enough. You have to specify number of the hydrogen. So, how do you number the hydrogen. Again you have to do the new numbering taking the molecule as a whole as 1 molecule. So, you start from 1 2 3 4 5 6 7 8 9 and 10. So, that means you have 4 5 6 and 10 4 5 6 10 tetra hydrogen. So, likewise there are actually. So, many thing I think they will summarize I mean there are other thing, also there are quite a few interesting features I can tell you. Let me for example, one I think I should talk about this one because lot of people you know department works on this sort of molecule.

So, what should be the name of the molecule for example, what should be simple one very simply one, but what should be the name of the molecule. Now you have to give the complete name, I do not yes they are sometimes you have to identify the nucleolus sometimes you have to give the full name. If you say it should be tetrazolyl and then phenyl, phenyl should be 2 phenyl, 2 phenyl right 2 phenyl tetrazolyl and what else yeah right 1 tetra joule. So, 1 age 2 phenyl tetra joule, but now the case very similar thing very. Similarly, thing what you see earlier things I mean you have to just little bit that is all you may not have to remember everything, but at least you should know that the situation should differ again nitrogen.

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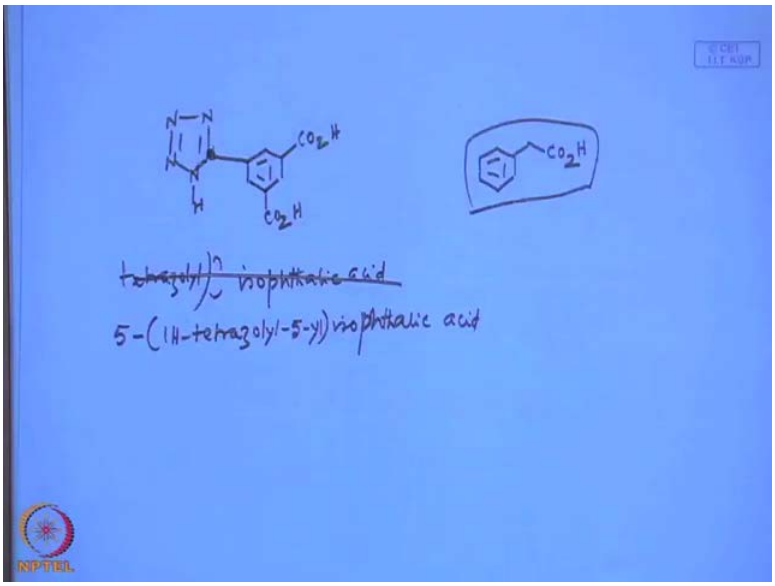

I will write the same molecule nitrogen here, sorry this is carbon and this is the nitrogen of here nitrogen, here you have the benzene thing and then what you will find you will

find the carboxylic acid carboxylic acid here. So, what should be the name like say one would say in previous example recall that was known as 1 h 2 phenyl tetra joule, but in this case, the parent system is different, parent system different is different what is the parent system. All of us know isophthalic acid, isophthalic.

So, that means it should be named as tetrazolyl tetra joule when you say. So, thing you have to do i will rewrite name is 5 1 h tetrazolyl and then you have to specify the point of attachment that is 5 l then i. So, t h t h phthalic and then acid like many of you know in high school right. So, what is the name of the acid for example, what is the name of the ((Refer Time: 47:46)). Let us come to the what is the name of this I P name of this acid.

Student: ((Refer Time: 48:00))

That means now it is basically named as compound because carboxylic acid lies there, that means the group gets the priority. So, the phenyl substitution similar here the carboxylic acid gets the priority. The parent system identified by the presence of the carbolic acid, yes processed.

Student: ((Refer Time: 48:26))

This acutely taken from printed to one, it should be yes 5 value, because it goes by the hydrogen number of hydrogen.

Student: Pervious case sir.

Previous case means which case

Student: ((Refer Time: 48:43))

Previous example that is also fine, I think we are running out of time may be will give you one more important name, the reaction this is sometimes I think will not have enough time next time, we will talk about that.

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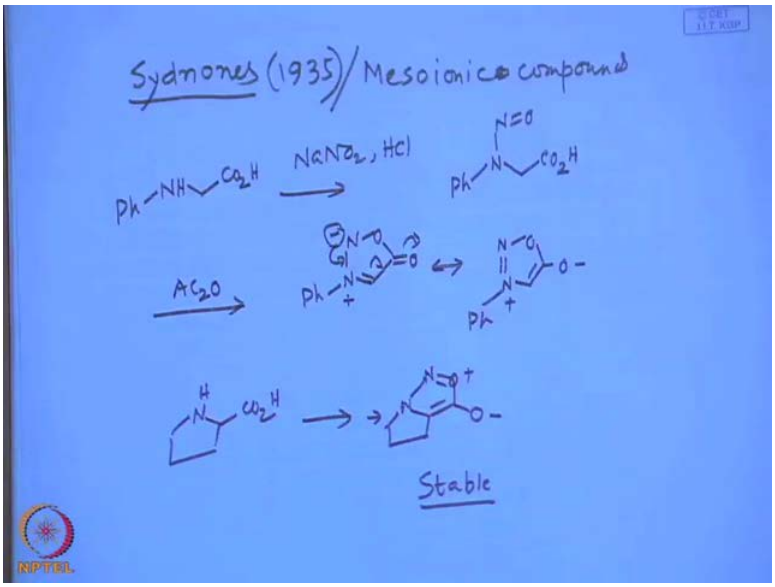

There is the name called a class of compound known as sydonones, I do not know whether you heard of this name, originated from a very simple reaction n phenyl n phenyl, if you take n phenyl then treat this with sodium and nitrite presents of concentrate H c l, you can guess what is the expected product, what is the expected product, P h and glicine remains as it is, what is the expected product, a and o right. Then if you just for then you treat it acidic right nitrite we get a cyclic compound, you get a cyclic compound.

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Not really that is called actually a sydonones name of this the compound that is obtain will have a structure like this, it is not truly looking like organic structure or aromatic structure, but it would look like this, it would look like this, that means sydonones this is basically the 5 numbered ring. All this sydonones of this 5 numbered compound for which there is no definite resonator structure. Normally the 2 structures are possible as you can see form here the charge are delocalized.

One of the other structure could be were the charges are delocalized outside. The outside the ring system outside the ring system. So, this was this was actually this is basically this is called sydonones, this why sydonones and this compound should have discovered in Sydney in 1935 Australia, Australia by a scientist, but this was not named of the scientist it was name after the place.

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Then people did not like it because there are obviously, there are you know competition here and there. So, this sort of compounds are renamed. This compound are also known as mesoionic compounds, mesoionic compounds special class of the ionic compound, but this since the cyclic compound this is hydro cyclic. So, that is why they have named sydonones people do not often use only, but in 2010 there was review article sorry tetrahedron.

So, you can go through it, but it not very popular, but special cases and variation one of the compounds I will say, if you begin with amino acid all of you know what is the amino acid everybody knows this one praline. Obviously n product if you follow the series of the reaction that I describe before. So, what you will find you will find again a 5 numbered ring and the oxygen up here then plus charge and minus and what you see here charge of delocalized, but one of the charge is outside the ring system.

In such situation they are known this sydonones or mesoionic compounds, but what is the advantage suddenly they have been identified as a class of compound this is the pretty stable compound it can store for days and days you can prepare in grams and multi grams. So, we are all mesoionic well identified well characterizable products. Then why we should talk about in hydro cyclic chemistry portion because it is an hydro cycle number 1, number 2 it actually is an aromatic.

Sydonones is aromatic compound there are many reaction which have been characteristic of the aromatic city of the nucleolus. So, that is the reason why they have been special attention. So, I think there are,

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What is that.

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That is the reaction, yes that is the idol kind of reaction substitution. All kinds of reaction actually yes just like shot of a furan a kind of a molecule. Since we have one or more minutes may be maybe we can talk about one more important, we actually I had one more lecture notes I thought I would talk about different medicine you often you take

most important medicine were the hydro cyclic nucleolus figure. Anybody has taken recently any medicine anywhere no. So, you all healthy person fine. So, for healthy person hyper active persons, you know often we often we give medicine right. Often we give medicine there is called I think whether you know or not hilium.

Anybody knows what hilium is no. Now, you have to say something else basic nucleolus you have to say. I will give you the basic nuclear you write down the structure you say benzo 1 4 benzo phonon, let us say 1 benzo phonon. So, you have to write down the structure and if you do not know next time come up the structure because this is a very important class of molecule. Many of you know, if you have let us say metal disorder metal problem often when you are in especially in research.

You know you will have you will come across such time, when you are depressed things are not going alright with the lab with the with the professor in all kinds of things. So, once upon a time we have to take the benzo 1 4 dig phonon or alpha jorum what is alpha jorum knows it looks like what is it,

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It is a kind of drug and it is good you can have as I said before I think. So, then there is a there is a huge number I do not know whether I should talk about it or not because actually we have to talk about little bit of chemistry. So, probably next class will talk about something like, let us say what structure determination. How to determine the structure hydro cyclic compounds, what is the specialty, why is this structure determined from the special in hydro cyclic chemistry class.

Any idea, though I can expect a good answer from the research colors or those were inverted research. See if you go to the in n m r room come out spectrum, the spectrum is good it starts smiling, but you do not know how to explain. In most cases we leave we go for proton n m r right, but in most hydro cyclic compound will not have proton enough number of proton diagnostic protons. So, it is very difficult to I mean very difficult to determine this structure with confidence. So, you have so will talk about it and then what are the things then there are certain guide lines, you follow this fallow that.

For example, you have produce let us say 2 3 di methyl pyrazole, pyrazole do you remember what it is now can you make out what it is, 1 2 nitrogen 5 numbered 2 di

methyl. So, acetyl hydrogen mix together you get the nice rock solid no problem, but how do I know whether we have got the molecule in our time we used to check meeting point now what we do I means without thinking people go to the enormous root whether it is sulfur is proper or not.

So, what do you expect out there what would you expect in n m r room, a single led only say the symmetric molecule you get the methane and methyl 2 point something it could be as acid ton acidic acid all kinds of things. So, it is very difficult, you have to ascertain whether you have an hydrogen or not. If you remember often I ask question those who are making alcohols for example, how do you know you have made the alcohol it could be sub 2.

If you have let us say the cyclic diol, I r since you have not started the research yet if you do not know what I r is, but all the example will give you who I speak. The way you run the I r here in this. I think last year I do not know I used to take heterogenic class, I used them to the n m r room, they will see I mean, if you take any way any organic compound. Simply because this room should be free from moisture machine should be free moisture, it should be covered silica gel. All this things yes, with precaution find out from I r, but without precaution we cannot.