Heterocyclic Chemistry
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Lecture - 3
Systematic Nomenclature

Good morning, this is the second lecture in the series of heterocyclic chemistry and today's lecture would focus on nomenclature of heterocyclic compounds. All of you know nomenclature is a very fast area first item in heterocyclic chemistry and there is a blue book called apace nomenclature and it consist of something like 1000 pages. Obviously, it is not possible to go through all the pages for such a small course, but what I have update just update to systematize to nomenclature in heterocyclic compound. The most cases what you will find for compound there are several names and many of cases also those names are accepted.

But, some cases they are not accepted and some cases of course people wrongly name the compounds, so we have to follow a systematic nomenclature. So, before that systematic nomenclature we have already introduced to you the conventionally accepted names in the last class for example pyridine is pyridine you cannot say as a banging. So, likewise you have introduce most of the names and also at the same time I said that you have to recognize the nucleus. Basically, in the last class we have identified important nucleus in heterocyclic chemistry today what will do we will do the nomenclature and nomenclature means all of us know that in the name what should be the first thing.

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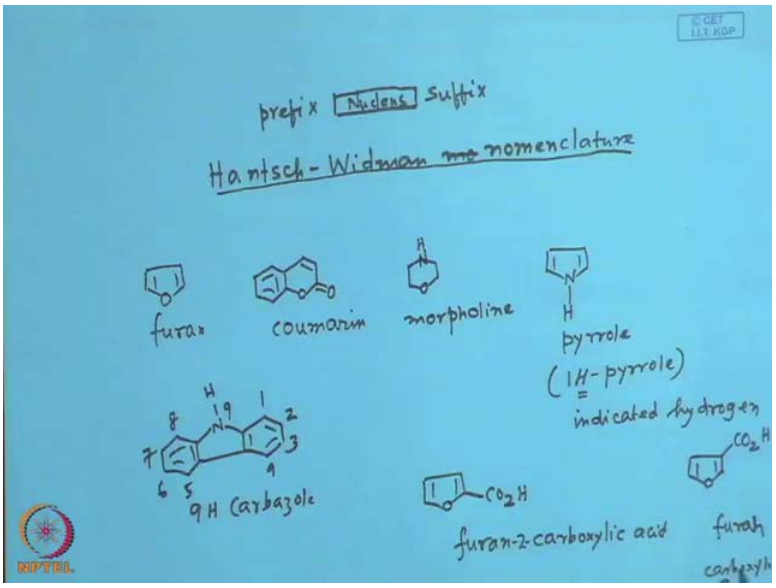

Basically, a nucleus, so you have to identified a nucleus when I say nucleus means like furan pyridine thyroxin etcetera and on the right hand side what will have you will have suffix and your left side you will have prefix. So, once you know this then the nomenclature is complete and of course it has to be done according to the heterocyclic nomenclature in the case of heterocyclic the nomenclature is little different. Normally, this nomenclature is normally named to as hatch wide man nomenclature hatch wide man nomenclature.

But, you do not have to remember these nomenclatures again like any other nomenclature these two persons have introduce the set of names for the suffix and the prefix. So, will go for the suffix first and then prefix later, but before that I will give you some examples because all of us know that is proverb example is better than anybody knows example is better than precept means religious in structure. So, we should have going the go for the instructions what do will do we will just pick up the examples first like all of us know let us say this is a furan.

So, all of us know it does not have to be named any otherwise and it is accepted through the inflect name likewise I will give you one more name which would look like this structurally and it has a name and this is a quite famous name accepted name is coumarene. But, this is not the systematic name, so let us say there are other compounds let us other compound I think in the last class we talked about let us say this one it is

again you can name systematically. But, it has a nick name or you can say it has a Tutuila name call morpholine, so likewise there are several names then when you come to this one also all of us know this should be named as this should be known as pyrrole to as pyrrole.

But, officially it has a name different name officially it should be named as one and this hydrogen should be telling and this should be known as pyrrole and this hydrogen. This hydrogen is known as indicated hydrogen indicated hydrogen, so by giving these examples basically we are introducing into the indicated hydrogen. So, both the names are correct pyrrole and on H pyrrole like when you say one butanol and butanol there is no different, the two there is a, there is actually there is no different between two when you do not say one actually it implies that one.

Basically, there is no one is butanol similarly when you do not say it one is pyrrole actually it implies actually pyrrole itself that means one is understood. So, likewise there is molecules also many of you know this one this one in this is again quite well known nucleus what do we call carbazole, but officially it should have been name to as officially it should be name to as 9 H carbazole nine H carbazole. So, that this is the parent system and this case this is not one carbazole it is 9 H carbazole even then when we say carbazole it is that understood there it should be 9 H carbazole.

So, let me numbers does not matter with 1 or 2 or 3, but it must correspond to the original the parent system, so in carbazole H identified it was the 9 H carbazole that was identified. So, we are saying have been retained nomenclature and numbering it should some more different, here if it is some more different see here in most cases numbering starts from the heteroatom like. But, in this case what you see the numbering start from here this is 1 and this is 2 and this is 3 and this is 4 and you go to this was 5, 6, 7, and 8, now this is 9. So, these numbering also are peculiar to peculiar systems that means it individually ring systems may have their old end numbering system like last time we have seen.

In case of purine and Teradyne there are 2 different numbering system, so these are all about this nucleus let us look at little more about the standard nomenclature. Then will let us say you are given a molecule of this kind this is a very simple molecule, so if furan carboxylic acid and so what should be the name of this compound. So, when I say what I

should name the compound you should first recognize the nucleus what is the nucleus furan. So, immediately write furan and then of course you have to write this suffix that is more important than the prefix because suffix, also contest some of the important structural features.

In this case is a origin of suffix carboxylic acid carboxylic acid then you have to specify the position of the carboxylic acid and there is no doubt about it in this case there is what is the position. The summation nucleus is number starting from the heteroatom mind it in the previous case it was not in the case of the carbazole. But, here heteroatom is that we are talking about the monocyclic compound mostly all the mono nucleon compound I should say mono nucleon means if a system is recognized as a single nucleus like carbazole.

As a single nucleus cumerine is the single nucleus, when I say cumerine actually is a bicycle compound, but as a unit is a single one, so it should be name to as furan 2 carboxylic acid. So, given that then what should be the name of this compound. So, once again once again nucleus is furan nucleus is furan and furan then what should be, then carboxylic acid that is perfect all right because that, that is should be the suffix carboxylic you cannot see. So, we will take it the separately.

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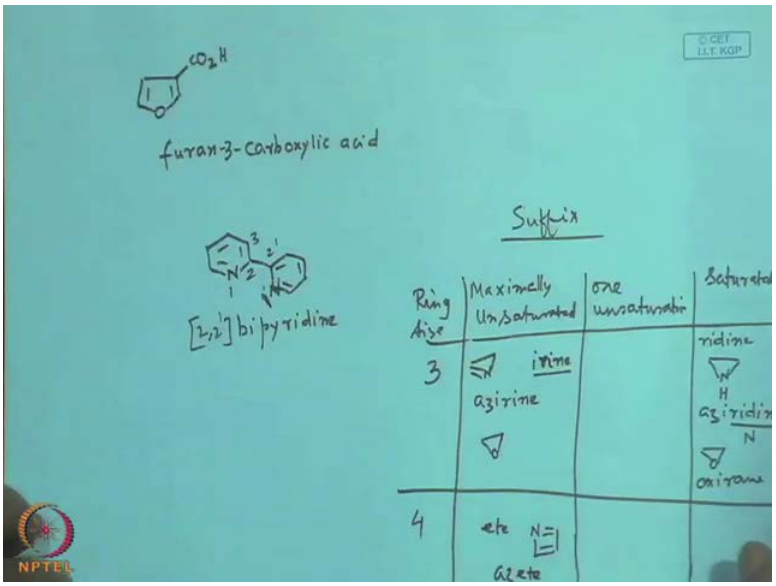

So, let us show nucleus is furan and suffix is carboxylic acid now you have to be little more precise, so you have to give the numbering. So, what should be the numbering

should be it could be starting from the carboxylic acid point of the substitution or from the heterocyclic heteroatom and in this case is heteroatom. So, these are all subscribed to once, so you cannot avoid them let me give you one more example. Basically what we are try to do we are trying to basically identify the nucleus first then number them.

Then we will put the suffix and the prefix that is all, so initially what we will we will do just basically take the mono nucleus heterocyclics and let us say in this case it could be this could be categorized as mono or it is a mono. Now, what you see this is you can say mono or die, but practical purpose it should be named as, sorry mono nucleus is a very similar means both the nucleus very same. So, what should be the name of this compound what should be the name of this compound it is a very important nucleus many of you know something happen, this is not furan through ling the nucleus you have kindly for the nucleus is a pyridine.

So, tune nucleus I join together, so it should be known as by pyridine, so it should be known as that means we have identify this by pyridine when I say by pyridine that means the nucleus is known there is no suffix there is no principle groups in nomenclature. We will find the term called principle group carboxylic acid etcetera alcohol etcetera those are called principle group you know principle groups such here. So, that means you do not have anything as suffix, so you have to then put prefix would contain the name of the substitute and the numbers.

So, what should be number once again the number goes starts from here as 1 and 2 and 3 and so on similarly in these case, in this case. So, in this case it is the hetero atom, so if you take biphenyl for example the biphenyl the one prime would start from the point of the attachment. But, in these case the heteroatom the heteroatom is dictating the numbering for the mono nucleus compounds mind it for the mono nucleus compounds, so is 1 prime, 1 prime and this is 2 prime. So, this should be named as 2 2, 2 2 prime by pyridine it is a very important nucleus and very important nucleus and you know all of us this is undergoes complex in the metal ants and many of the metal complexes are own catalyst.

But, unfortunately the preparation of these compound is not every easy the compound in which by it is free period it should descript here it is not very effective one these offer less than 30 percent, 40 percent. So, if you can come up of the good systematic method

for making this compound it will be rich very easily and so that means we all know the mono nucleus nuclei and they are nomenclature let me number it. Numbering normally guided by the heteroatoms then knows we will see something different all other like we have to remember all the things different all other you have to remember some other things.

Let us say that is a table called table of suffix, suffix normally are of three different kinds the first one is maximum maximally unsaturated I think you understand meaning of these unstauration at the present of the double bound. Then the compounds with one double bound that means one un saturation you can say one un saturation and then of course the other portion is a saturated one saturated one. Now, what we will see the all these for all these systems this suffix are different suffix are different and here let us say write about this ring size let us say the ring size is 3 maximally unsaturated what is the meaning, let me see have a double bounds.

We already say to begin with this one double bound here, so what should be ending of this compound in the name the suffix should be suffix should be irine sorry i this is r irine. The names or name of this compound should be the name of this compound should be azirine when we saturated for example what should be then azirine it should be named as ridine. So, the ridine you say ridine as a ridine, so it should be named as aziridine and in these case because there is only double bound possible. So, there is no compound with one and such patience and if by the why this is only for this irine its for nitrogen and ridine is for nitrogen.

Let us say if are oxygen for example, for example oxygen you have oxygen, so it should be named as there is no double bound appear here then if the double bound there it should named as here oxirine and if you do not have a double bound. So, what do expected irine, so ox means oxygen irine, so let me see these are basically you have to remember irine and ridine and irine.

So, that means these are the basically the suffix for the 3 number ring system, so likewise if you go to the 4 number ring, 4 member ring it such it the un saturated it should be known to as ete. When I say that means a compound of this for kind you have maximum double bound, so it should be named as nitrogen means az and azete yes and anything, sorry, fine, good, now let us talk about this again.

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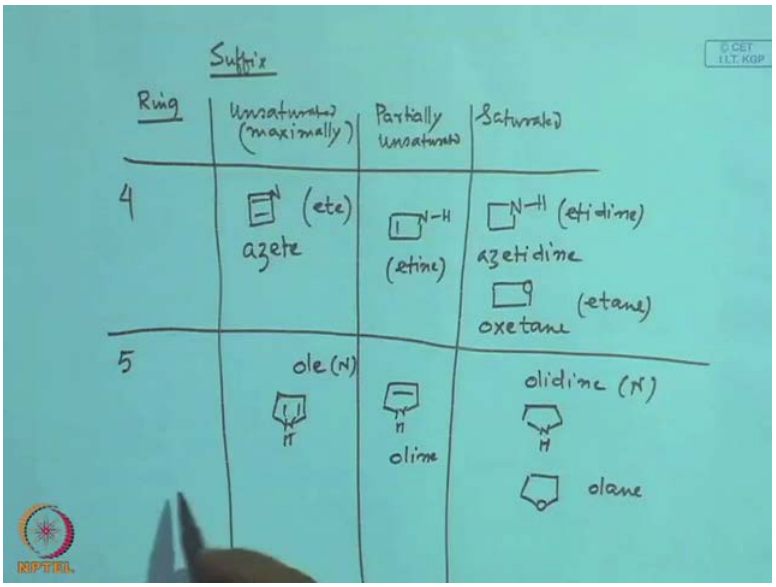

So, let us let us say ring size that means we are talking about the suffix we already talked about 3 numbered ring, so ring are size and is un saturated we can say maximally maximum maximally unsaturated and then saturated. You can say partially unsaturated or both, so we have talked about these 3 member, now we have the 4 member for here 4 member. So, maximum 4 member means just typically what comes to our mind is nitrogen, so you have two double bounds, so what I said before the suffix should be etcetera.

So, that means this should be azete and for nitrogen 4 member it should be betadine, so that means this one is a fully saturated it should be known as azetidine. So, then that is the little different for example if you have oxygen of here the name should be many of you know I guess what is the name oxetane. So, oxetane, so it should be that means this here then suffix etane and then you have I mean like say if you have let us say partially.

For example, partially means partially like a when you says what is that you have let us say partially example partially means like say let us say you have a system like this then it should be known as ethane. So, azitine, so I mean there are many I mean as go on you on you learn more and more I will skip some of the thing quickly you can just extrapolates then this is a very important one all of us know heterocyclic is normally 5 and 6, 5 and more useful in our day today life.

For a 5 member ring of course you have you cannot offer to forget this is all and if you saturated one, saturated one it should be olidine and provided yet you have nitrogen when I say olivine means, let us say example is, so this is known as pyrollidine. Similarly, I do not have to share this are all in these case is a azone, so in dole pyroll etcetera all these things then we say partially hydrogenated. For example, partially hydrogenated then it is not it should be known as any idea what should be pyrroline 1 pyroridine where we have dine I mean maximum saturation maximum saturation.

Then there is a problem because the for the same system what is this different this heteroatom are different for example it is a oxygen 5 number oxygen. So, what should be suffix, the suffix should be olane that means tetra hydro furan to be alternatively named as oxolane. So, tetra hydro furan is oxolane and let us, let us look at one 6 member ring system for example 6 member ring system again unsaturated then saturated.

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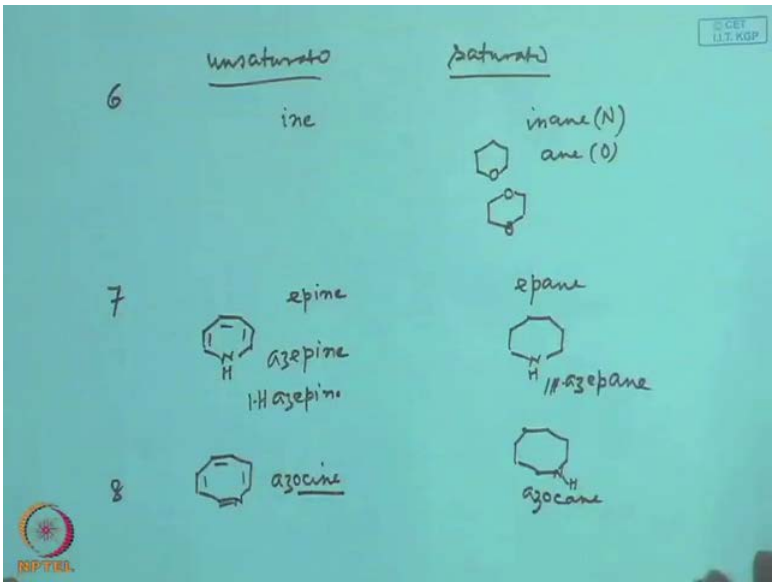

All of us know and the 6 member ring what is this pyridine is this to remember because all of us know pyridine, so it should be named as ine and for the saturated one what should be saturated one. Saturated one is you said inane, inane that mean after not often not use really, so inane for the nitrogen and then for oxygen this is for nitrogen for oxygen is ane. So, I would not I mean let us see the mean in these case oxane means this is oxygen something like this, so oxane we all know for example di oxane what is di

oxane, di oxane is this di oxane means this is called the oxygen that means something like this.

So, oxane we all know for example dioxin what is dioxin is tetra this is write dioxin, now that means if you have oxygen you have ane is ending and then 7 member I think 7 number un saturated such member un saturated epine and saturated one is epane. So, when I say, so that means it should be like this, so what should be the name of this it should be known as aze azepine sorry this is un azepine and this should be known as azepane this should be known as azepane.

But, actually as we as we go on this one should be exactly speaking it should be known as 1 H azepine, 1 H azepine. So, this hydrogen, so similarly this is it should be 1 H azepane and the for the 8 member, 8 member is a unsaturated again un saturated it should be known as azocine, azocine means is suffix is ocine. Then if you have saturated one 8 member, so it should be again 1 H it should be known as azo cane or cane whatever you say azocane. So, like this even you have all this will find all these suffix and prefix in most of the standard text books most of this standard text book.

So, that means we know now the suffix the suffixes of all this important saturated unsaturated compounds let us look at few examples, let us, let us see few example. Let us say that will give you some of the idea about this number ring system also and if you if you remember in the last class we talked about little bit of this heterocyclic numbering that means a nucleus is completely identified. If you know the name as well as they corresponding numbers of the heteroatoms and in the periodic table you know the arrangement the first comes nitrogen.

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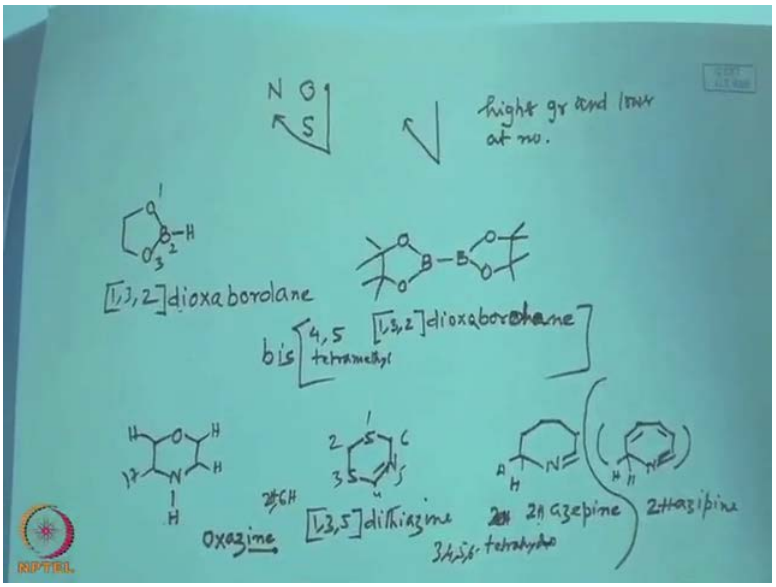

Then you write each oxygen and then at the bottom is a sulpher what I say this is an antitic kind of things that means what is the priority in case of the numbering of the heteroatom goes like this basically this way. Now, it is start from higher group lower atomic number that is what I have to remember that means a basically what I am saying to antitic I mean and in this case is start starting point is oxygen. In case of numbering the oxygen gets the highest number first numbering first number then the second number goes to sulpher.

Then goes to nitrogen they close to remember is that higher group and higher group and lower atomic number and lower atomic number lower atomic number that should be consider first. So, once you let us say in this case, let us say, let us begin with a simple molecule, now we know everything we know the nucleolus, we know this suffix. Now, we know the numbering, so what do I write first the nucleus, so what is the what is the nucleus dioxa highest group higher group, so oxygen comes first then you have a boron dioxa bor saturated high number saturated with oxygen olane. So, dioxa borolane, dioxa borolane, so then finally to be precise you have to give the number how you give number, how do you give the number one then 1, 2, 3.

So, that means we have already write dioxa that means both the oxygen should be number first one 3 and then 2, so this is how remember let us, let us say this is, this is I write one more molecule I have recent two select this on though I do not know that you

know or not. Why I have been focusing on a boron compound this is, this is very famous compound in chemical literature to go to the chemical literature you will in this find this molecule is being largely used and actual actually molecule is different one. But, the actual molecule is something like this I think it is make out why it is it comes out from phinacol, so phinacol oil disorients.

But, I what should be named once again the basic nucleus is basic nucleolus is dioxo borolane and the number is sorry oxa dioxa borolane and once again numbering goes to the 1, 3 and 2, 1, 3, 2 fine. What else 1, 2, 3 that means 4, 5 tetra methyl, so the name should be 4 5 tetra methyl with in bracket 1 3 this dioxa boro, sorry boro borolane, borolane it is not complicate together you put in bracket and then outside you write this then this name is completed. Let us say, let us say I mean we have learnt sufficiently about identifying the nucleus let us say a simple molecule masculine.

What should be, what should be the named mescaline should be named as what should be the first nucleus name nucleus should be oxygen comes first because the group number. So, ox no you have nitrogen ox means in 6 member means o n for oxygen, so ox 6 member as a 6 member what is that 6 member should be, but in these case will write oxazine that means oxazine means this is un saturated one this means metrics statured by putting the prefix. So, oxazine then you will put a prefix then you suggest the double bounds here and here, so you have to put hydrogen here and hydrogen here and hydrogen here and here.

But, it is provided un saturated hydrogen suffix is in, so oxazine, now what I am trying to say same compound can be categorized as on hydrogenated form I just hydrogenated like the with pure hydrogen. So, that is why I am putting the suffix for the unsaturated one unsaturated peridian, unsaturated then you have hydrogen saturated for hydrogen. So, this is actually 4 hydrogen that hydro oxazine I mean otherwise you could be done as in the 6 member one, 6 member one is in the inane, inane for the nitrogen. So, that is not really often use alright that is one is in some cases you have to see that more compound is that in many cases you have to see especially for the case of moleculin the numbering is different.

That means it starts from start from nitrogen although the numbering of heteroatom is start from oxygen in only in case of morpholine and in previous lecture people have

started numbering this nitrogen first then the oxygen. But, if you go they had began to use this the numbering oxygen first then this is nitrogen and some cases yes some cases the original names older name have to written that have to and I will be going on, I will study more and more. You will know which one is written which one is not written I will not remember, but basically you have to trying to systematize the nomenclature that is all.

Then let me give you one more example may be on this let us say you have six member again 6 member, 2 sulpher and nitrogen and what should be the what should be the name again. So, sulpher, so sulpher should come first, so dither it is a then comes A Z means nitrogen and this suffix is in 6 members. So, dithiazine that means we are talking in terms of the unsaturated one then you suggest unsaturated one we have then hydrogenated and this and you have extra hydrogen.

Now, what we do we put the number here what the heteroatoms for the number what is the number the heteroatom number should be starting from sulpher. So, 1, 2, 3 that means 1, 3 and 5, 1, 3, 5 dithiazine and what else hydrogenated, so that means you have to just 1, 2, 3, 4, 5, 6 that two 6 position that means 2, 6, 2 H and 6 H indicated hydrogenated. Indicated hydrogen means hydrogen required making an S P 2 carbon into saturated S P 3 or it is carbon or nitrogen it understood indicated hydrogen indicated hydrogen means the hydrogen requires to make the S P 2 atoms into S P 3 atoms.

So, the original parent system was having an S P 2 carbon here and S P 2 carbon here, so if I you are adding 2 hydrogen. So, those 2 hydrogen are note to be indicated hydrogens let us, let us say may be we have interesting one to indicate, so how do we name this at least you have recognize a nucleus what is the nucleus azi azipine fine. You can write both the saturated or unsaturated azepine when I say write azepine that means unsaturated that mean azipine you have several double bounds here. So, it comes from it comes from when you write azepine actually its starts comes let us say double bound, double bound double bond.

So, what is this what is the double bound here that is no bound, so original bound is this one and what is the what is the name of this molecules or the nucleus no as 7 like she suggested that 7 actually hydrogen is substitute. Now, it should be named as 2, so the parent system is 2 azepine, so as a 2 H azipine and now you can, now you can do this

coming up this one. So, what should be that means, so that means these two we are already, so you can say 2 H azepine all you can write here 2 H azipine then what you have done your added to 1, 2, 3, 4 hydrogen you added 4 hydrogens.

So, it should be tetra hydro tetra hydro 2 H azepine tetra hydro 2 H azipine then if you are little more courses you can just put the numbers that means 2. That means which 3, 4, 5 and 6 tetra hydro as a azepine, so that it is as you can go and let me give you 1, you let us say I think let me give you one more let us say system with indicated hydrogen.

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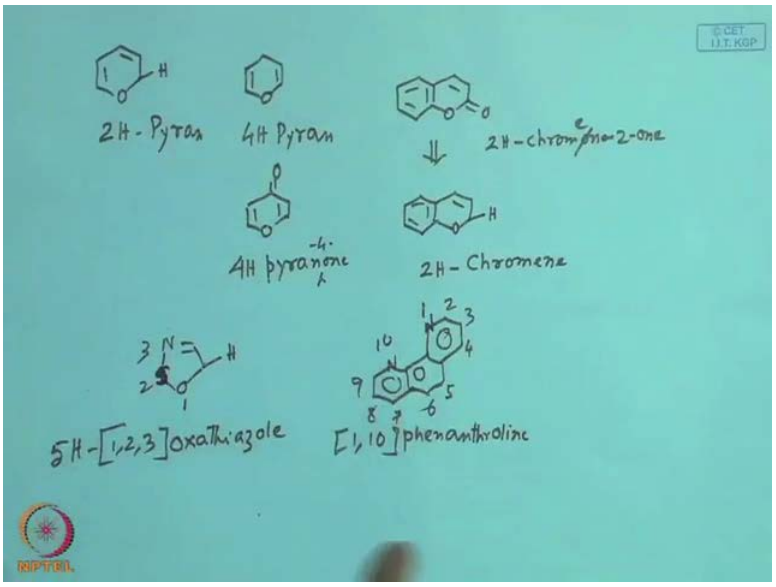

So, what is the name of the parent system, here you have to remember actually nothing can be done this with one oxygen 1, 1 oxygen and un saturated one what is the un saturated one it is prescribe one is one oxygen un saturated one is in i n. But, we start off molecules that you have to remember this are a molecules known as 2 H pyran this is a parent system has been accepted why came to accept this. So, you have to remember this likewise this is very important especially when you go to sugar chemistry carbohydrate chemistry you have to remember.

This is known as 4 H pyran, 4 H pyran, 4 H pyran, now you can name this one for example let us say what is this I mean this tribunal name as kuwarin how you name this one this one actually comes from a basic system for oxygen. Here, double bound this thing, this thing, this is as name that you have to remember nothing can be done this as a name.

So, like we left you have 2 H pyran, 4 H pyran, now have 2 H this is 2 H should have been so, but unfortunately it has a another name 2 H, 2 H. Now, this has to be known 2 H chromene, 2 H chromene, so that means what should be the cumerine official name should be 2 H, now chrome in 2 1.

Student: 2 H, hydrogen is not there.

No, but parent system is hydrogen with hydrogen like this one for example officially it should be name as you put hydrogen then you have to remove the hydrogen to make it own. So, it should be 4 H, 4 H pyranone, 4 H pyranone 4 H actually 4 pyranone, 4 pyranone, so most of the thing and let us say in the anything else I just one more I just have to little practice. Let us say, let us say we have a numbering with the all kind of heteroatoms and the oxygen and sulpher of here and then what should be the name what should be the name.

So, this is a earlier we have recognize the nuclear nucleus should be named as oxa, oxygen comes first then thia then aze not aza, azole oxathiazole then this numbering should be heteroatoms numbering of the heteroatoms. So, 1, 2, 3, so perfectly all right, so 1, 2 and 3, 1, 2, 3 oxathiazole, but there is a hydrogen over the S P 2 carbon dioxide it is hydrogen. So, this should be known as then this is should be 5 H, so 5 H, I think, now we have sufficiently talked about these things and in the last class we have talk about this napthoridine, therazine, cumerine, abzolin all this things.

Anybody remember the between cunazuline and cunabzoline, cunazuline and cunabzoline that two things which one cunazuline. Cunazuline each one thing phenanthroline is for example phenanthroline many of you know this phenanthroline is a unfortunate isomer and this structure goes like this structure goes like this. So, I mean one can do all kind of nomenclature, but the whole thing together identify as phenanthroline I mean one can say one as all this things that is a possible to remember and that is not quite often followed.

Most of the name as this one phenanthroline, now we specify the position of the nitrogen and what should be obviously numbering, numbering what you have to know, so I will. So, it is the heteroatom 1 then where do go left and this I mean actually we have to compete the same ring first, so 1, 2, 3, 4 and then we skip this carbon and goes this one

5, 6, 7, 8, 9, 10, so what should be the named as 1,10 phenanthroline, 1,10 phenanthroline.

Student: Sir.

Yes.

Student: For coumarine, forming of chromone puts to 1.

Chromene it should be chromene, sorry it should be chromene 2, 1 it should be chromene 2, 1 and so next one, so that means we have technical of the most molecules means the example for this. In this case phenanthroline together has been identified as phenanthroline, so it is sort of monocles is together of identifying monocles mono nucleus write down chromene and coumarine, now let us look at the fused systems.

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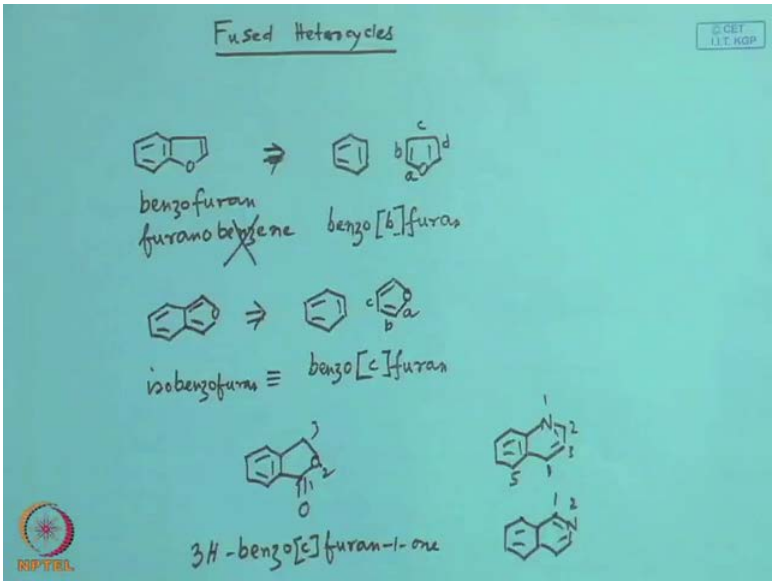

Fused heterocyclic system few tetra cycle how to name them to began let us say start with compound we can deal with all and this is a benzene thing and then you have a furan ring system. So, how do we name all of us know there are two first of all you have to identify the parent system what is the system it could be named as benzofuran or furan benzene. There are two possibilities benzo or benzofuran and the other possibility is furanobenzene obviously I think all of you can understand which one should be accepted one benzofuran because hetarcycles gets the reference heteroatoms gets this reference.

Now, but this is not enough you have because as if that means benzofuran has two rings are fused together, so that means you have to define the few some point this is a bound as if this is an equivalent or comes from comes from benzene and a furan. So, when you say that means in this case suffix is furan then all the parent system and then you have within third bracket you have to write the bound that is infused which bound of the furan. That means, now here the parent system is furan parent system is furan and the bound should be again start from the again the heteroatoms.

The first bound with respect to the heteroatom is termed a, the second bound b and then goes on and then c and d, so one can quickly see that b bound is getting fussily parent system. So, it should be again b is italic, so the within third bracket they should be impressed and then this is should be prefix and when you have benzene, so obvious prefix is benzo. So, benzo b furan benzo b furan, so let us say, let us say similar molecular let us say we take this one. So, what should be the name once again it comes from it comes from benzene and then this one, so it should be name as furan again and the prefix.

The prefix also we will have designated bound that is fused and in theses case that a bound is the one that is directly understood the heteroatom a this is b and this is c that means this is c, c bound, c bound of the parent system. In this case furan not the benzene and then of course the for benzene all the bounds are equivalent, so you do not have to specify any bounds, so you have to say benzo furan and officially this compound is known as basically benzo c furan also. It is known as isobenzofuran the previous one the original one was benzofuran and this is known as isobenzofuran.

So, given those all these things, now we know that basically you have to identify the fusion, now let us say we have a for the practice let us say this is the molecules of deal. So, what should be the name what should be the name identify the nucleus is benzo c furan, so that means the nucleus is benzo c furan benzo, c furan benzo, c furan that is perfectly all right let us identify. So, one on the numbering goes to 1, 2 see mind it few system for a few systems number is separate things I come to later it does not go and follow the heteroatom.

It follows the carbon or the atoms and next to the fusion next to the ring juncture when I say, so let me give, let me give you let us say for example let me give you. Let us say for

example the cumerine and anybody can start anybody can would be the starting point nitrogen 1, 2, 3, 4 and 5 here this is all. Similarly, let us say for say isoquinoline for this that should be the number 1 carbon again the carbon next to the this ring juncture that ring juncture is this one. So, there are two carbon 1 this one and this one and this one aguishly your idea would be given the right possible so this numbering starts from 1, 2, 3.

So, that means numbering here, so long we had been talking about moonlit corbocs, but when you have let me the compound in terms of the fuse system then the numbering system should be followed by this again and dictated by the fusion or the ring juncture. Now, we know we have identify when I say third brackets a, b, c, d etcetera that means it fuse a system and the numbering start from carbon obviously and the carbonile that is the lowest number.

So, that 1, 2 and 3, so that means benzo c furan 1 anything missing yes, so it should be 3 italic hydrogen, italic hydrogen and let us say. So, let me give you one more I give one more example, so in the previous cases in the previous few systems we had a benzene system. The heteroatom system that means the aromatic compound and heteroaromatic compound, now with the both the things is aromatic compound then what you do let us say I have an example here.

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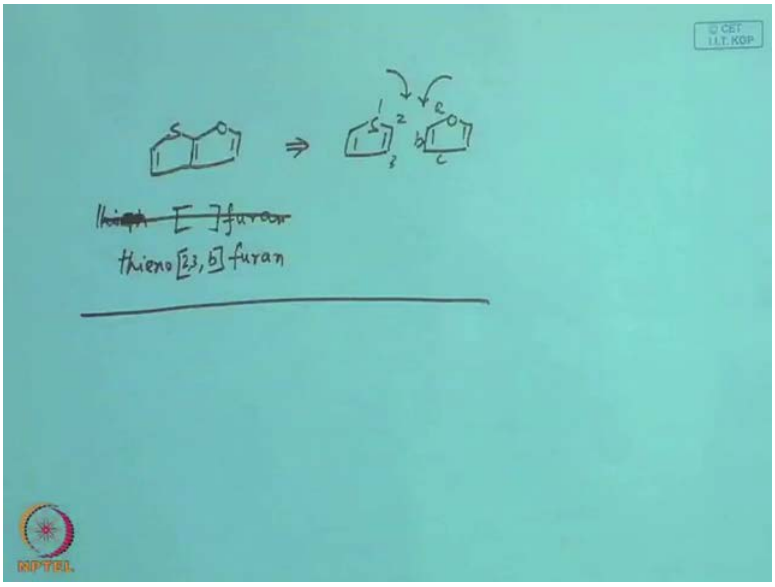

We have, let us say you have furan together furan together, so this could be named as thyro furan or furan entrophen which one do you want again the priority goes to oxygen no oxygen alpha nitrogen. So, it should be named as furan, so furan and within you have to mention the ring juncture and here, so thiophene or thino, sorry thiro, so I have to just check. But, now you have now thiro within bracket and then furan, now mind it in the previous cases we had just only use the alphabets a, b, c, d, b benzene c furan all those etcetera.

But, in these case you have to have a comma here and the right hand side alphabets and the left hand side will be number this comes from this comes from this one other comes from furan. So, the parent system in this case the hydro pyran group is this one, so at the mean it should be named as a, b and c and so that means it should be let me b bound is used for thirophione for the prefix ring for the prefix ring the number of the given that means 1, 2, 3, 1, 2, 3 so that means in these case.

So, it should be 2 and 3 bound that means I have also use you have to also follow the prefix direction of a, b goes like this numbering suit the numbering also following that means both the arrows should be cone margin that the arrows should be cone margin. That means then only it could have been two clue also there two three also, it depends you have to maintain the cone margins of the ring systems. So, summary what will be summary first of all you have to identify the mono nuclear mononuclear first then you have to put the suffix then suffix will normally goes to etcetera on carboxylic acid etcetera and the prefix is new bound.

The prefix could be we again substitute and the corresponding the number of the heteroatoms, so and this numbering follows this higher order and higher group and lower group number. That means numbering follow oxygen sulpher nitrogen that you have to remember then you has many more systems for example you have the next class we will be talking about more of.

Then we also talk about the important heterocyclic molecules for example and very recently are new addible telegraph of Lipitor, what is Lipitor you have to remember for the higher selling drugs in the market. It is marketed by Ranbaxy India, what is Lipitor next class Lipitor say cholesterol and we will see some of those important molecules which should be at least known to us as in organic chemistry.

So, in the next class we have to more on this nomenclature and examples, so at the end of this class you have to remember this is numbering system and this is fusion. Fusion we have already talked about that means if you have a few systems the parent system should be gives this later alphabets, and the prefix or the prefix system prefix ring system should gives the number like in the last examples.