Circular Dichroism and Mossbauer Spectroscopy for Chemists
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Lecture – 34
Applications of CD Spectroscopy - VI

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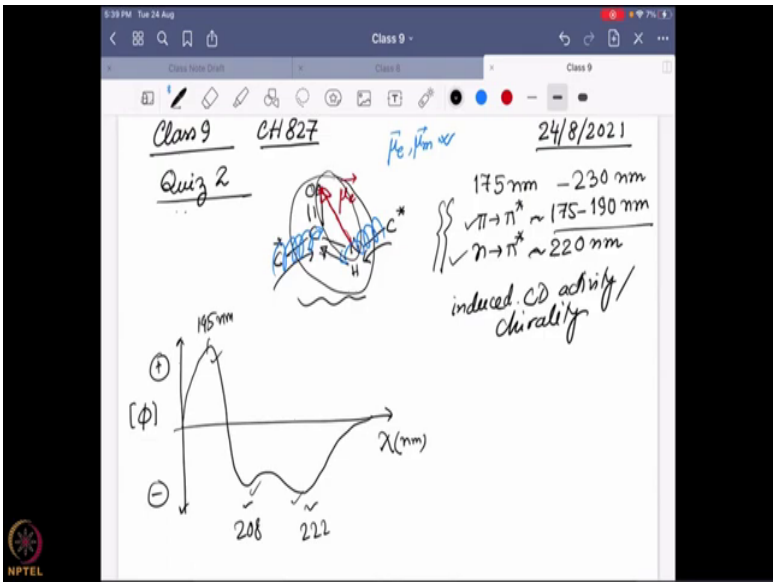

Now, coming back to quiz number 2 and how we actually look into that? The quiz number 2 the question was again that you have an amide bond present in a protein and this amide bond actually absorb in the region of 175 nm to 230 nm. And more interestingly the Π-Π* transition and n-Π* transition, these are the two primary transition that actually occurs.

So, Π-Π* transition that generally occurs 175 to 190, 195 nm region that may differ a little bit depending on what is overall structure. And whereas the n-Π* transition that actually occurs around the region of 220 nm. So, this figures I am saying it is kind of that the central part of the absorbance part the maximum. So, over there you can see that when you look into a CD graph and how it actually looks like?

And we can see that for alpha helix it has a band structure like this. But these are actually coming at 208 nm, 222 nm something around that region. This is the CD graph, so, over there you can see that it is comes around 195 nm. So, all these peaks actually coming from Π-Π*, n-Π* transition so, what is but that is actually done? And a planar molecule already it has a σ plane.

So, it should not be CD acting the way we have studied. So, why it is still being CD active? The answer lies that it is actually having these two α carbons sitting next to each other which are actually optically active. And they actually induce CD activity or in the other term chirality on this amide backbone. So that was the main concern that is actually happening over there and over there how it is happening?

So, if you look very closely this is the electric dipole moment for the carbonyl. Somewhere around here is the n-Π* transition which is coming from the lone pair of the nitrogen so, both of them are active. So, all together what happens? The actual dipole moment for this system because the conjugated lies somewhere around this red line. And now, that is actually having an angle other than 90° with respect to the CD active bands coming from this α carbons.

I am drawing that in helically because there the $\mu_{electric}$ and $\mu_{magnetic}$ both are actually active. Whereas in the red region only $\mu_{electric}$ is active for the n-Π* or Π-Π*there is no μ_m active. However, this blue line and this red line actually combine together and that is why this interaction of the n-Π* or Π-Π* they also become optically active.

Because that is actually having some influence coming from this chirality active α carbon centre. And because they have an angle between them and non 90° angles so, they become optically active and that is known as the induced chirality. So, over there in this system when you actually looking for the answer, the things you have to write that the Π-Π*and n-Π* are planner, not really optically active.

So, where this optically activated chirality is coming through? So, one thing you have to say is that it is coming from the induced chirality from the α carbon that is one point. And secondly you have to influence a little bit how it is actually influencing? And that is coming from this dipole moment interaction so, if you can write it in one of the other language that is fine so that is the two points I was actually looking for.

And I have shared your marks with all of you if you have any query or question please let me know. But different from asking questions like my friend, they probably write, totally wrong, I believe, I should get more marks. So, please leave that thing to me like who has written

what? And let me decide which will be the best way to provide the marks to you? And what will be the best way to judge you at this particular point?

And I can actually assure you like what you have done? And where you can actually improve? So, there is no point of comparing me with the other. Because you have not seen the answers for each of you that is what I have seen by myself. So, let that judgement line to me and you have to believe me that I am being fair with all of you. There is no partiality among each of you and with respect to that marks has been created.

And all of you actually already got a good amount of marks in that respect. So, do not need to worry too much because that is not going to affect your overall gain too much. Because the average number if I believe it is close to 8.5. So, it is very close to the full marks in this. So, most of the marks which is going to affect your grading will be probably the end zone exam. So that is where you have to put a lot of effort over there and write the answers properly.

So, over there any questions, any quiz or any assignment I am giving to you. You have to ensure that it is not about you have to write this particular way or this particular thing. You can write in different ways. You can write an answer multiple ways that is totally fine but you have to ensure that you are writing according to the what is the question has been asked? And answer it or provide your logic accordingly that is what I am looking for.

Say I am writing you to write that induced chirality, induced CD activity even if you do not write this particular terms. But in your own words you have mentioned the same thing I am happy with it. So, try to understand the question properly and then try to answer.