3S Space Groups IX:
Interpretation of International Table Page
Part-2: Symmetry Diagrams
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Lecture 24 b

We continue our interpretation of international tables page. So, in this part 2, we will look at symmetry diagrams.

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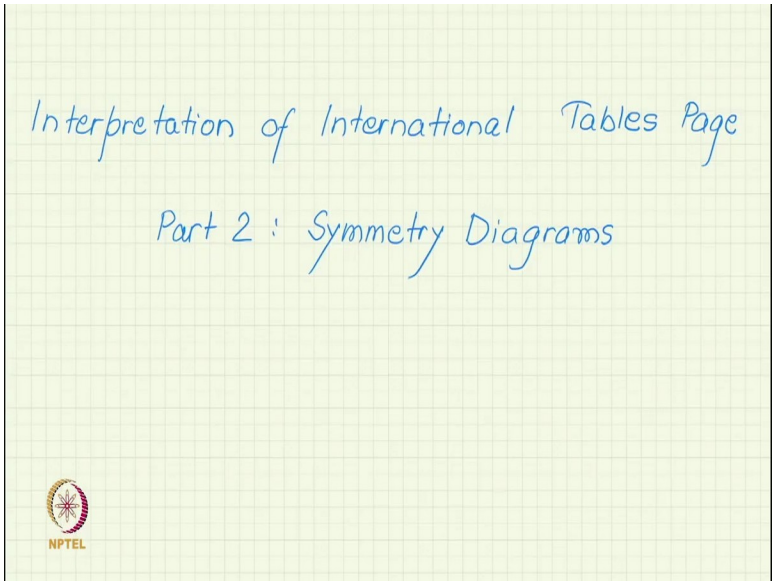

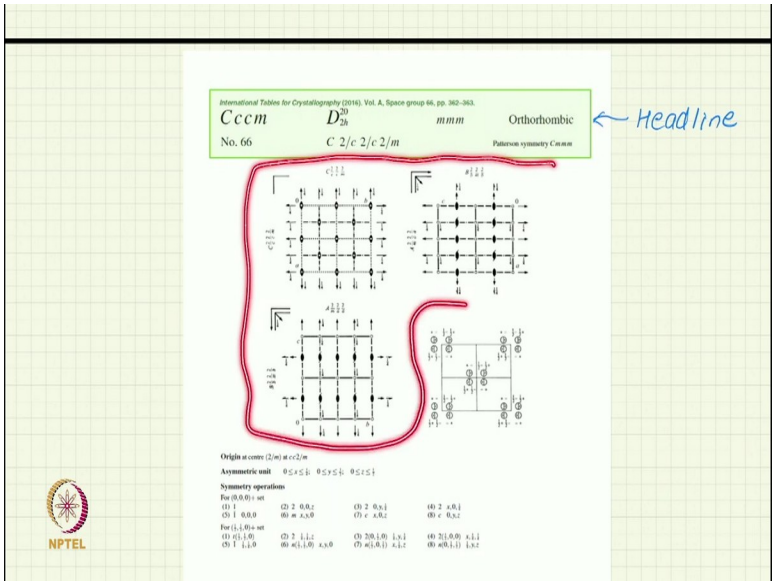

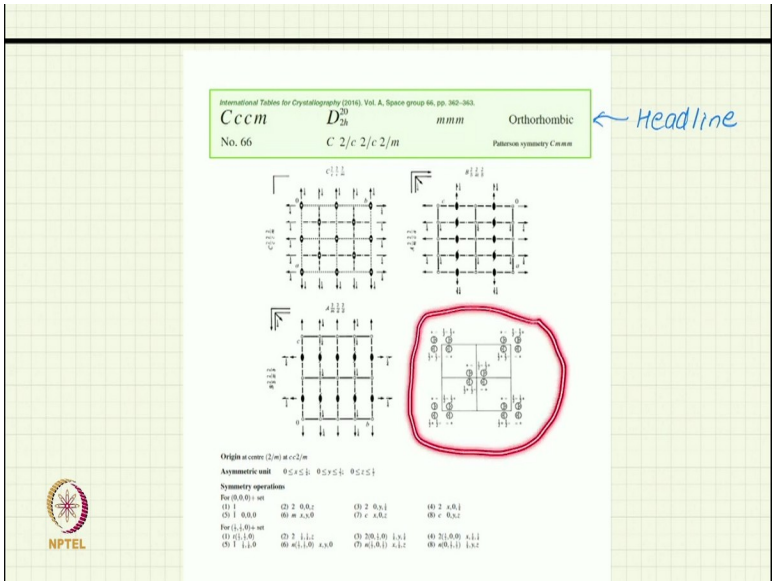

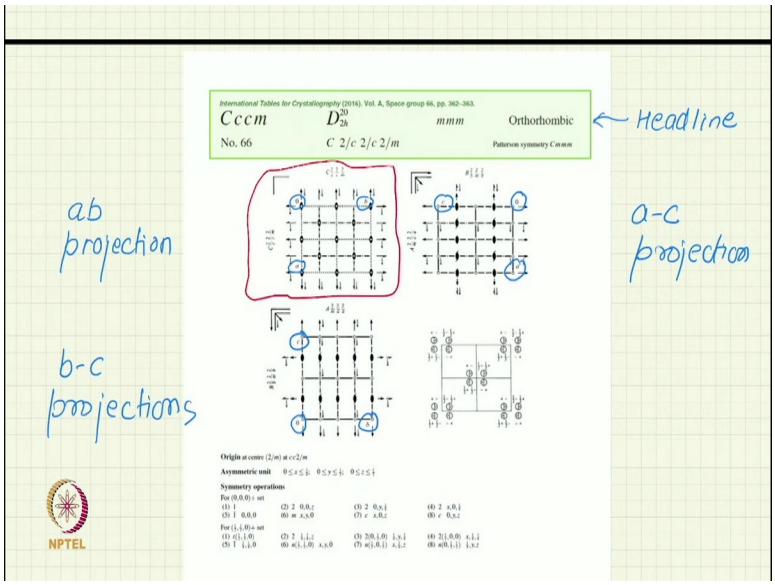

So, this is an example page which we are looking at the space group number 66. And so, in the last video, we looked at the data on the top of the page, which is called the headline this we have looked at in part 1. And in this video, we will now come down in the page. And we will look at these diagrams, which are known as the symmetry diagrams, there is another diagram here, which is called the general position diagram, we will look at it in the next video. So, there are 3 symmetry diagrams in this particular space group and they are always given as projections.

So, in particular, here the 3 projections, if you look carefully, it is labelled a and b with O as origin. So, this is the a-b projection, this projection on the a-b plane. Similarly, if you look here, this is origin, this is c, this is a, this is an a-c projection. And finally, here origin b and c this is the b-c projection. So, 3 projections are given here for better interpretation of the

symmetry elements, we will focus on one of them as an example. So, let us look at this particular ab projection in detail.

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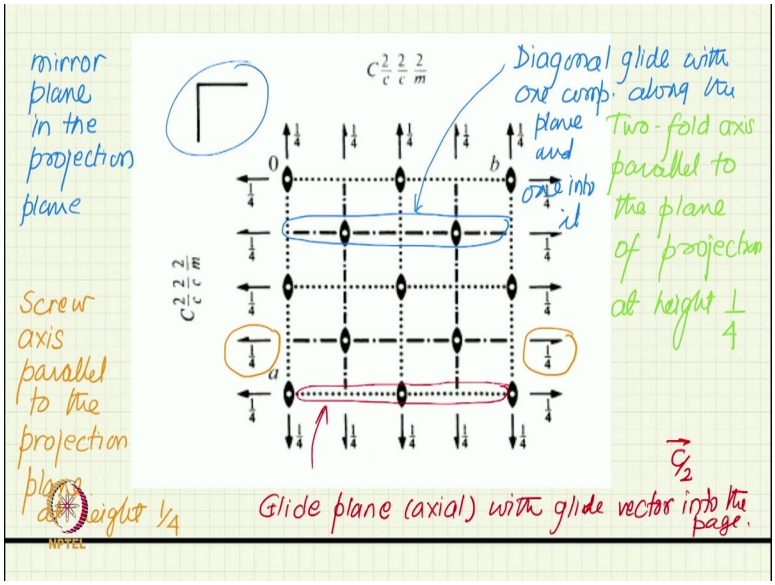

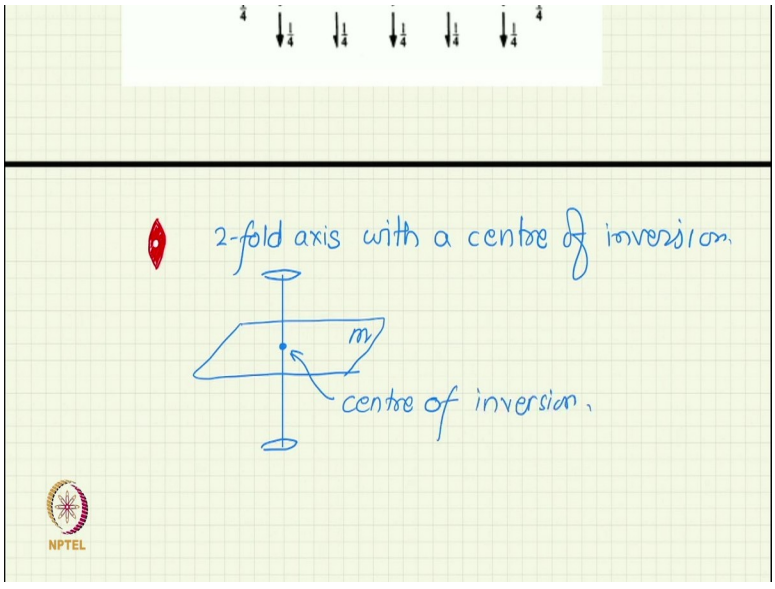

So, this is the magnified view of the AB projection. So, as I told you this O is the origin, a is the unit cell edge length along a axis and b is the unit cell edge length along b axis. And then the symmetry elements present in this prediction as shown by their international symbols, we have already talked about these symbols, when we were discussing various symmetry elements like rotations and then screw axis and glide planes. So, for example, look at the symbol this represents a 2-fold axis the lengths represents the 2 fold axis and the hole in the middle represents a center of inversion.

So, this is a 2-fold axis with the center of inversion. This as we know also represents a 2-fold axis with a perpendicular mirror plane because if you have 2-fold axis with a perpendicular mirror plane then you do get a center of inversion at the intersection. Similarly, there are other symmetry elements here. So, for example, these arrows are again 2-fold axis, but lying in the plane of projection. So, lengths represent 2-fold axis perpendicular to the plane of projection and arrow represents 2-fold axis parallel to the plane of projections and, this number quarter presents at height 1 by 4.

So, this means that the 2-fold axis although parallel to the projection plane is not actually lying in the projection plane, but a is that height 1 quarter. We have this symbol with 2 perpendicular lines and that represents a mirror plane parallel to the projection plane. And since no height is shown, that means it is actually the projection plane itself is the mirror plane. So, it is mirror plane in the projection plane, we can say for projection plane as the mirror plane. Then we have another arrow you will see here which is a half arrow, the half arrow represents a screw axis parallel to the projection plane.

The number quarter again represents the height, height of course is in the fraction of the C edge length, that quarter means at C by 4. Then we see different kinds of lines, dotted lines and dashed lines. So, we have here for example a dotted line this gives us a glide plane, glide plane is an axial glide with glide vector into the page and since the vector into the page in this case it just C axis. So, the glide vector will be C by 2 another line which you see here is a dash dot line and a dash dot line represents a diagonal glide with one component along the plane and one into it.

So, this way of course, these are the features in this diagram different diagrams will have different features depending on what symmetry the space group represents. And accordingly, they will have different symbols to represent them. In this case, we have looked at I think more or less all the symbols which are present in this diagram. So, thank you very much. We will in the next video, we will discuss the general position diagram which is the other important diagram in this space group tables. Thank you very much.