welcome students. In this session the lecture which will be dealing with is the course mineralogy in the subject of geology and it's a course which is dealing with the fifth semester for the third year students of geology. It involves the syllabus from unit 1 and the title is description of mineral group Mica. I am an assistant professor from the department of geology Parvatibai chowgule college margao goa. In this session we will be basically dealing with the structure and the chemical composition of the mica group of minerals. at the end of the lecture the student will be able to correlate crystal structure and the chemical composition with respect to the mica group of minerals. now when it comes to micas, all micas are chemically distinct from other ferro magnesium minerals like pyroxenes or amphiboles and the basic difference is when it comes to micas the alkali elements are very important in its classification alkali elements like potassium they are very essential over here but unlike the ferromagnesian minerals like pyroxenes and amphiboles calcium will be virtually absent and if at all any calcium is present within any mica those micas will become brittle and they cannot be used for any commercial purposes. now the structure of micas most or all micas are basically phyllosilicates that means they are sheet silicates which are also called layer silicates. now what are these phyllosilicates. in phyllosilicates you will have the SiO_4 tetrahedra are arranged parallelly in sheets each tetrahedron will share three of its oxygen with the neighboring tetrahedra those three oxygens will always fall in the basals or in parallel to the sheet the shared oxygens are all situated in one plane and the apices of the tetrahedral that is the unshared oxygen that's the fourth oxygen will all point in the same direction the sheets are arranged in layers such that are apices of two adjacent sheets point towards each other so that means when you have these sheets aligned parallel the unshared oxygens of the two sheets will be pointing towards each other in one layer these are apices are cross linked either with aluminium as in the case of muscovite or with Mg as in the case of phlogopite. hydroxyl groups which also present line the plane of unshared oxygens and help to complete the six-fold coordination of aluminum or magnesium 6-fold. coordination means wherein one cation will be shared by six oxygens surrounding it the sheets are not exactly one above the other but are slightly staggered to some extent. Now a firmly bonded layer is thus produced with the base of the silicate tetrahedra on both of its outer sides this layer has a negative charge because Al is substituting for Si. so Al is three plus and Siis four plus. in some of the tetrahedral sites now because there is a deficiency of plus one this can be compensated by the addition of potassium and sometimes very rarely by sodium because both are cations which are plus . as a direct consequence of their atomic structure the mica shows pseudo hexagonal symmetry though actually they are monoclinic. As it was told to you earlier is because the two sheets wherein you have the unshared tetrahedra oxygen are not exactly pointing towards each other but are slightly staggered and that gives a false image of pseudo hexagonal symmetry. but because of that staggering also it doesn't crystallize in the hexagonal symmetry but it goes to the monoclinic symmetry. to an eye they may appear to be simple hexagonal crystals with a tabular habit but careful measurements show that the basal pinacoid is not perfectly at right angles to the prism faces however the angle beta is within a few minutes of 90 degrees so it could be 91 or 92 degrees. so therefore it jumps over to the monoclinic system. When it comes to the chemical composition of all molecules its general formula is $W_2 XY_{4-6} Z_8 O_{12} (OH,F)_4$. w is what we call the interlayer cation these are mainly potassium or occupied by potassium sometimes it can also be occupied by sodium calcium rubidium or Celsius. in the x y sites are the octahedral sites these are mainly occupied by aluminum magnesium or iron and sometimes by manganese chromium and titanium.in the Z sites are the tetrahedral cations. These are dominated by Si and Al. A chemical feature which is most present in most micas is the presence of water content so only exceptional cases when fluorine is quite high micas may occupy as much as four to five percent of structural water. so H_2O plus means structural water. Structural water is the water which is present within the silicate structure that means if you have to release that water you have to actually break the bonds for the release and H_2O minus is moisture. so here when we speak of water it is structural water and not water as moisture. the greatest variation is found in the octahedral sites; the cations in this plane could be either divalent or could be trivalent. Now when it comes to divalent it could be Mg2+, Fe2+ or when it comes to trivalent cations it could be Al3+ or Cr3+ now. if divalent the charge balance is achieved by when all the octahedral sites are occupied. so there are three sites per ring so if it is divalent and you want to occupy all the three sides of the tetrahedral ring then it is two plus two plus two so six. s we are using the word tri-octahedral is because all the three sites of the tetrahedrals are filled with divalent cations like Fe2+ or Mg2+ that is why they are called tri-octahedral not because the trivalent cations enter into the structure. On the other hand if the cations are trivalent like let's say in the case of Al3+ charge balance is maintained when only two of the three octahedral sides will be occupied so Al-3+ and Al3+. So when two Al3+ goes you get Al3 plus so 6 plus and the charge is balanced. These are what are called dioctahedral micas. di means two sites of the octahedral sites are filled by the addition of trivalent cations. The best example of trioctahedral cations or trioctahedral micas are biotite and dioctahedral is muscovite. So for this lecture we have used references of deer howie zuzman, an introduction to rock forming minerals by the mineralogical society and fords danna's textbook of mineralogy. it is a book which also involves crystallography and physical mineralogy thank you