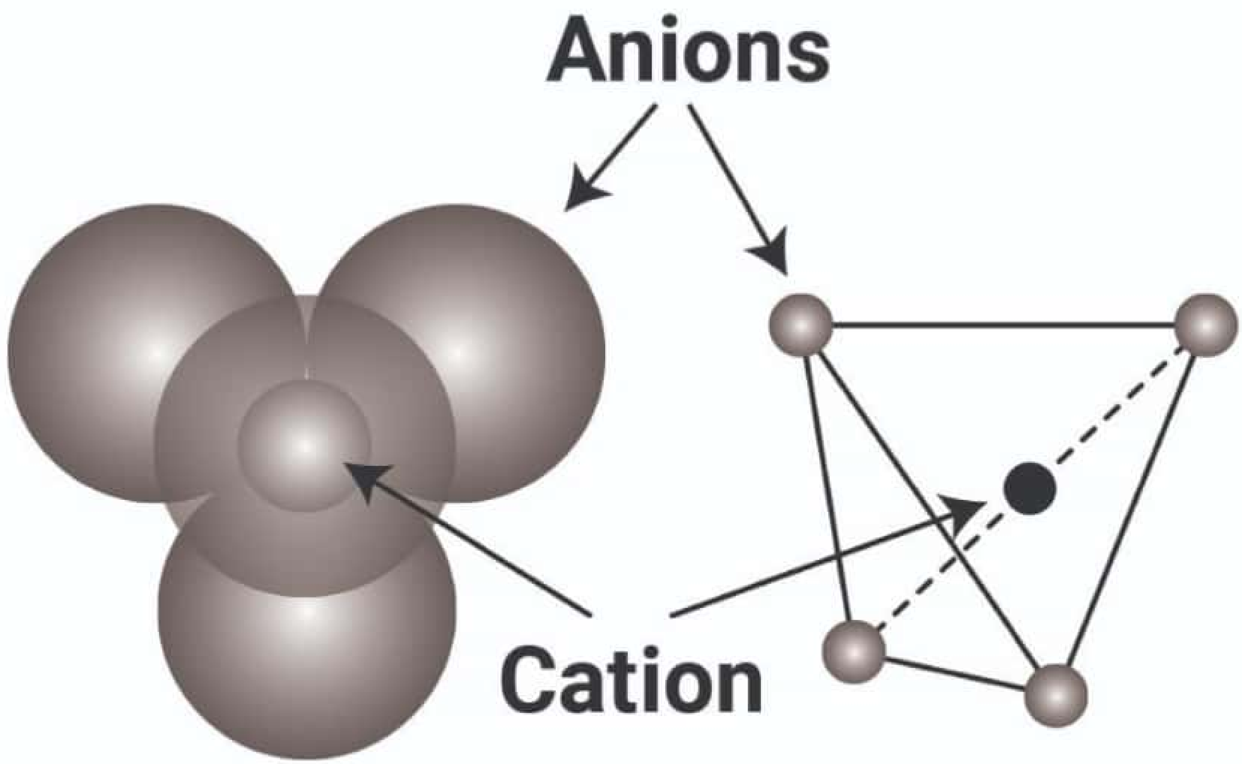
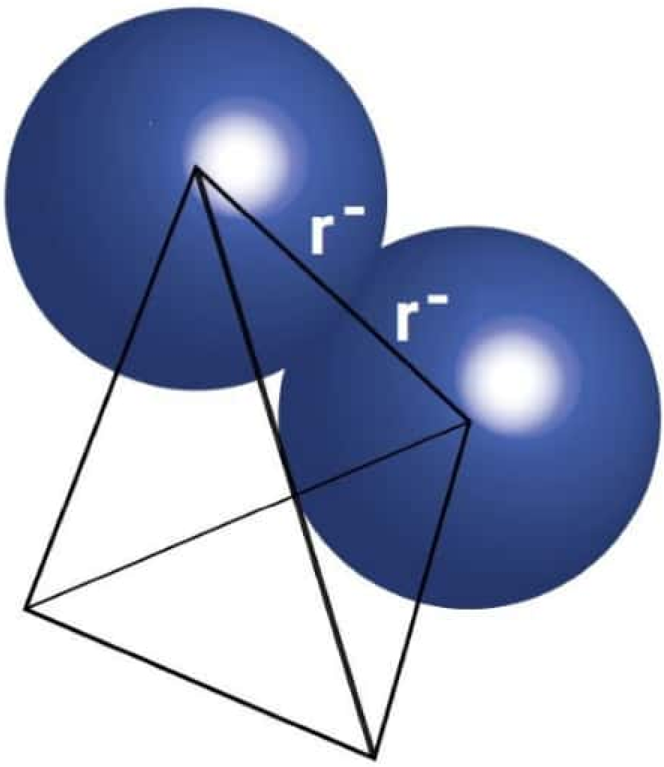
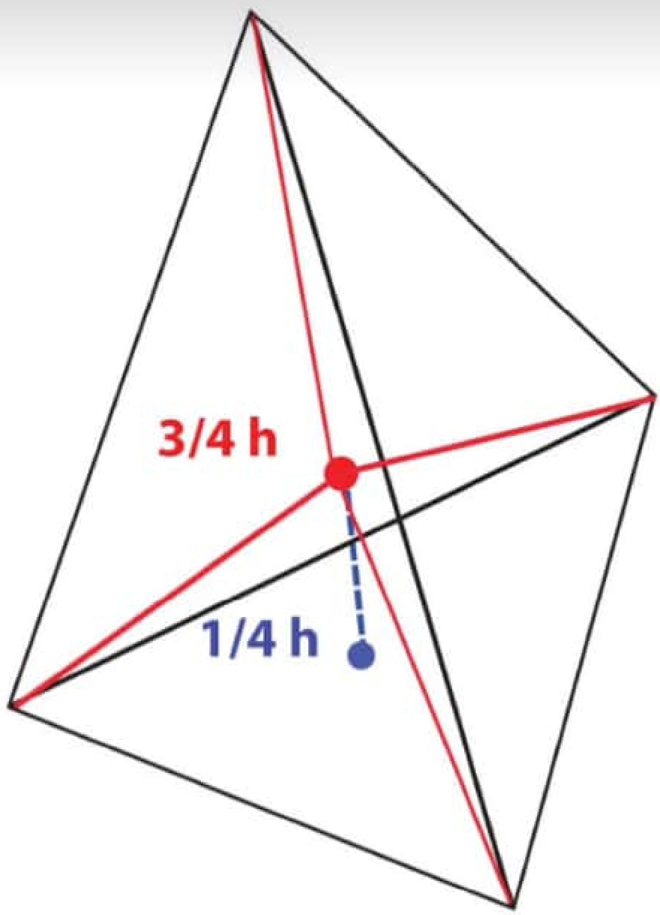
Now we will discuss about limiting radius ratio for C.N. = 4



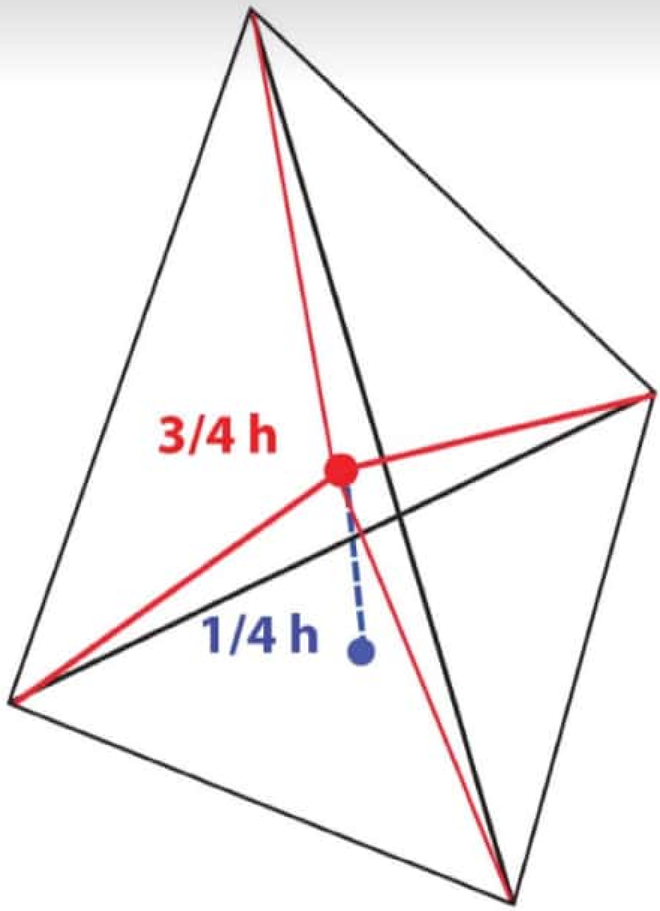
The geometry obtained here is tetrahedral



At the sides of tetrahedron, two anions are touching each other. So the side length of Tetrahedron is $2r^-$



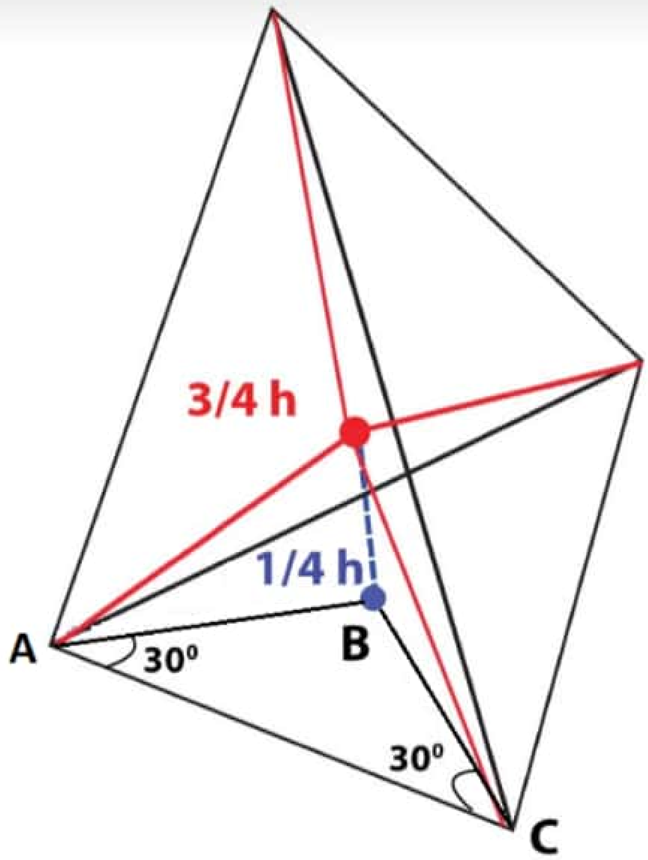
Now cation is located at centre of tetrahedron. In a tetrahedron, centre is located 1/4th of height above the base



Now cation is located at centre and anion at the corner. This means $r^+ + r^- =$

$\frac{4}{\ } h^3$

So if we find h in terms of r^+ and r^-, we can calculate the radius ratio of tetrahedral geometry

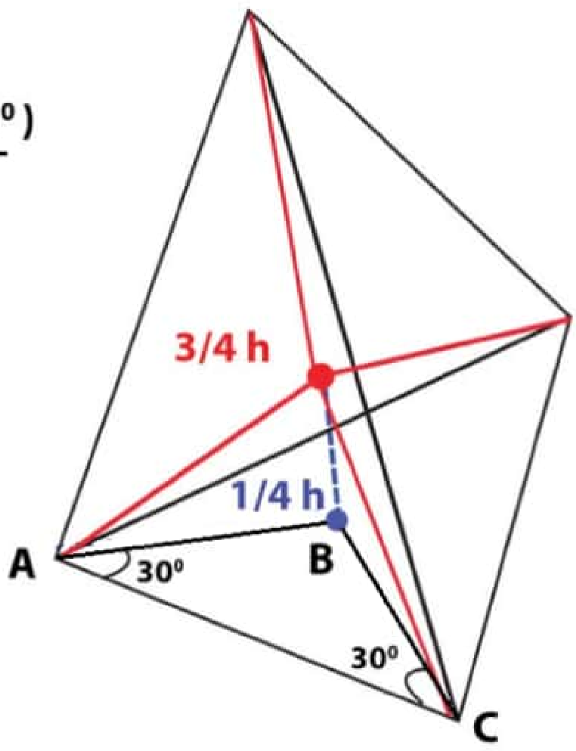


For this, we will draw 2 angle bisectors of base triangle, AB and BC

So $\dfrac{\sin(30^0)}{AB} = \dfrac{\sin(120^0)}{AC}$

$$\frac{\frac{1}{2}}{AB} = \frac{\frac{\sqrt{3}}{2}}{2r^{-}}$$

$$AB = \frac{2r^{-}}{\sqrt{3}}$$

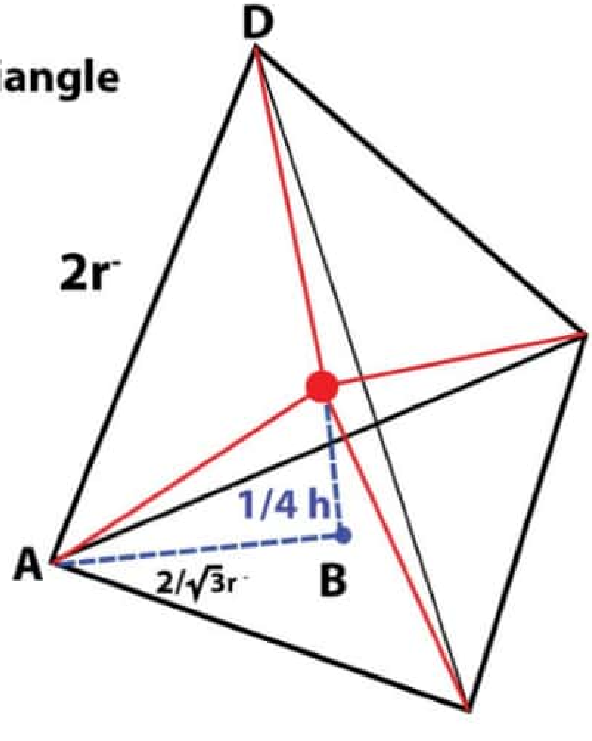


Now $\triangle$ABD is a right-angled triangle

So $h^2 = (2r^-)^2 - (\frac{2}{\sqrt{3}} r^-)^2$

$h^2 = 4r^{-2} - \frac{4}{3} r^{-2}$

$h = \sqrt{\frac{8}{3}}\, r$



Now $\frac{3}{4}h = r^{+} + r^{-}$

So $\frac{3}{4} \times \sqrt{\frac{8}{3}} r^{-} = r^{+} + r^{-}$

$\sqrt{\frac{3}{2}} r^{-} = r^{+} + r^{-}$

$\frac{r^{+}}{r^{-}} = \sqrt{\frac{3}{2}} - 1 = 0.225$