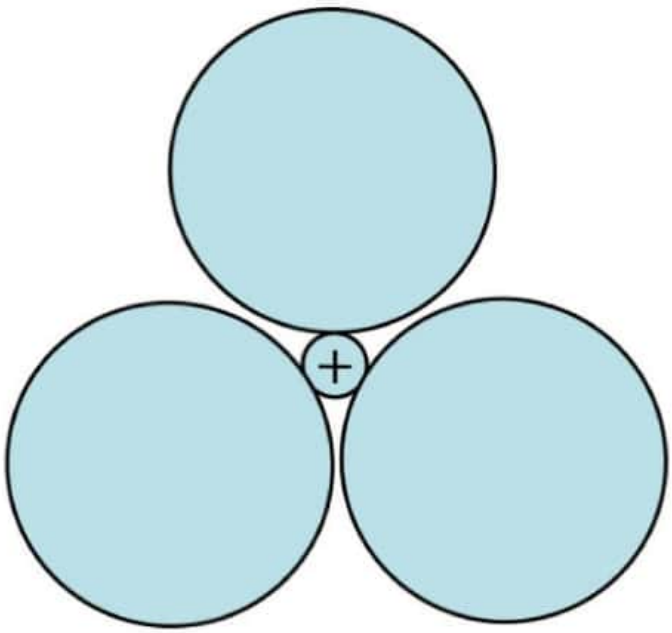
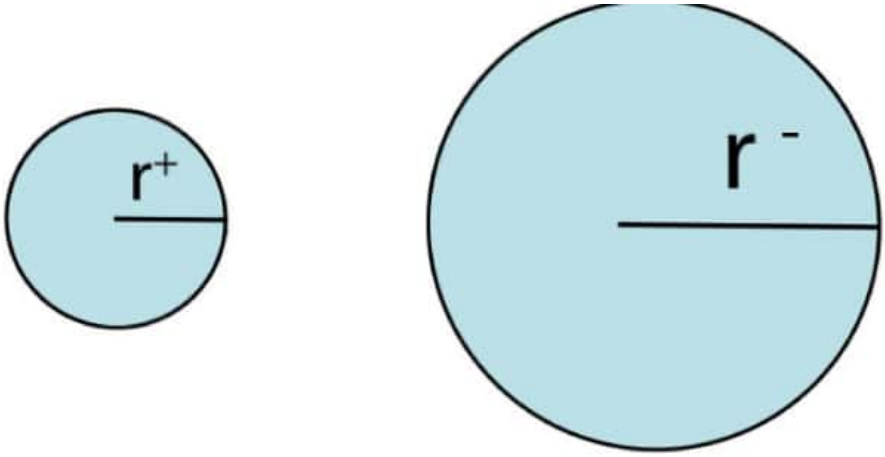
Each coordination number has a particular value of limiting radius ratio at which it becomes stable

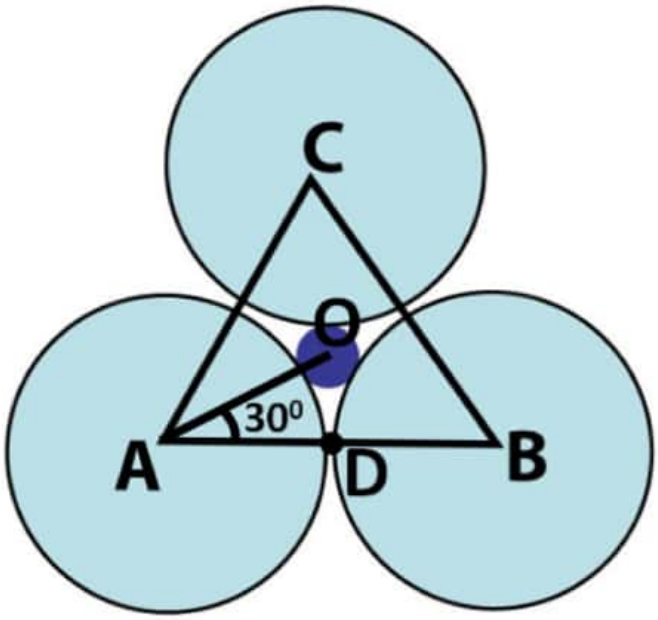
Let’s start by looking at limiting radius ratio for coordination number 3



For coordination number to be 3 the cation should be surrounded with 3 anions. The geometry here is triangular geometry



Let us calculate limiting radius ratio for C.N. 3. We will take the radius of anion as r^- and radius of cation as r^+



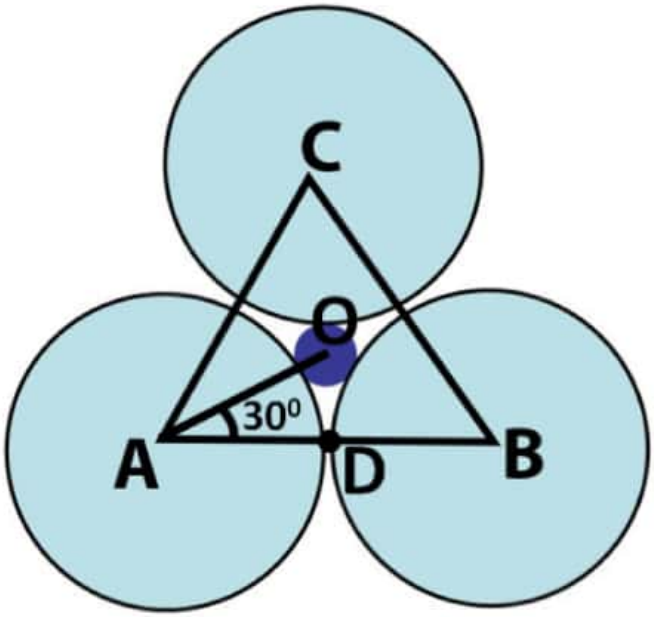
Take the centers of anions as A, B, C and center of cation as O. D is the midpoint of A and B

$$OA = r^+ + r^-$$

$$\angle OAB = 30°$$

$$\therefore \cos 30° = \frac{AD}{AO} = \frac{r^-}{r^+ + r^-}$$

$$\frac{r^-}{r^+ + r^-} = \cos 30° = \frac{\sqrt{3}}{2}$$



The triangle formed by the joining of centers of anions is an equilateral triangle. So △OAD is right-angled triangle

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

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

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

$$r^- \left(1 - \frac{\sqrt{3}}{2}\right) = \frac{\sqrt{3}}{2} r^+$$

$$\frac{r^+}{r^-} = 0.155$$

Hence triangular geometry is stable if radius ratio >= 0.155. For any value less than 0.155, compound will have linear geometry