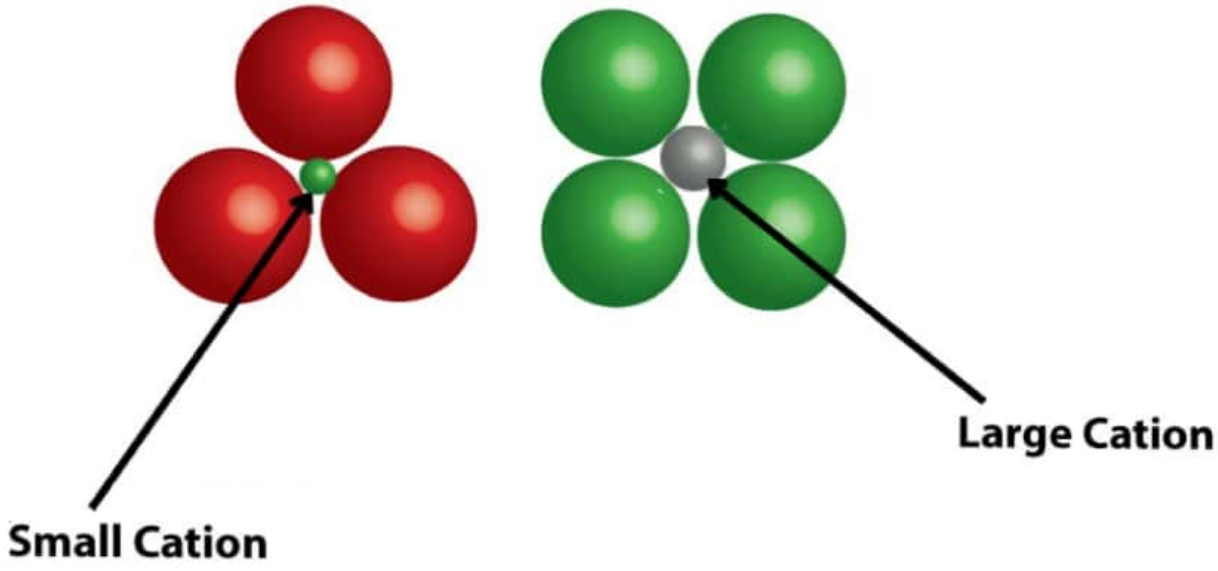
Coordination Number and Radius Ratio - II

In an ionic solid, cations are surrounded anions and vice versa

Cations try to surround themselves with as many anions as possible.

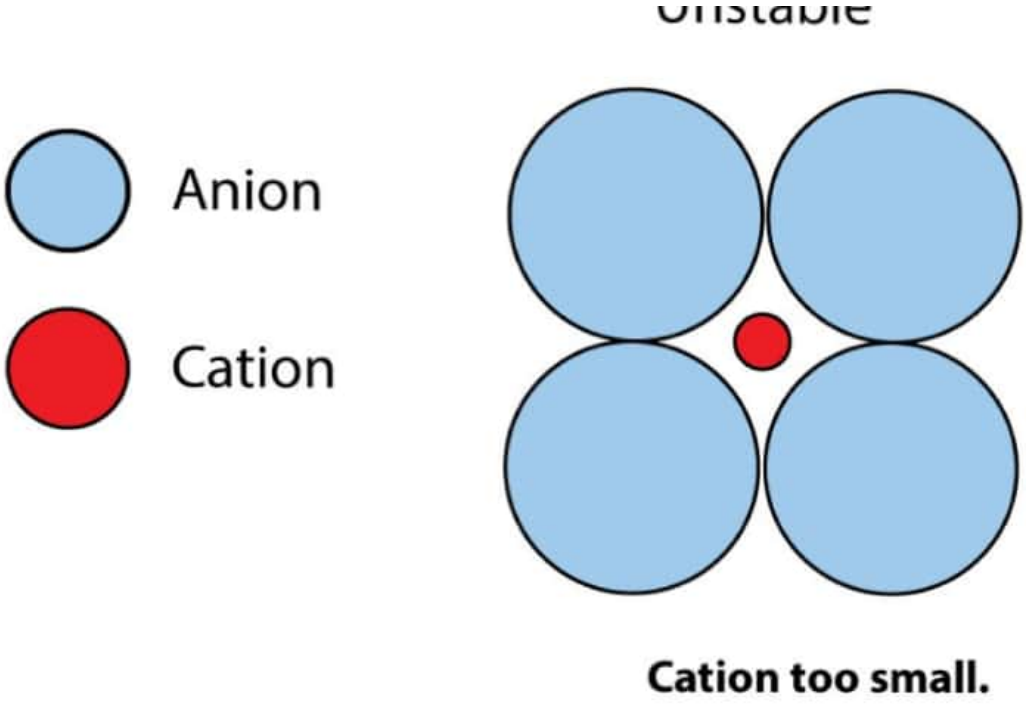


However the number of anions that can surround the cation are limited by the size of cation itself

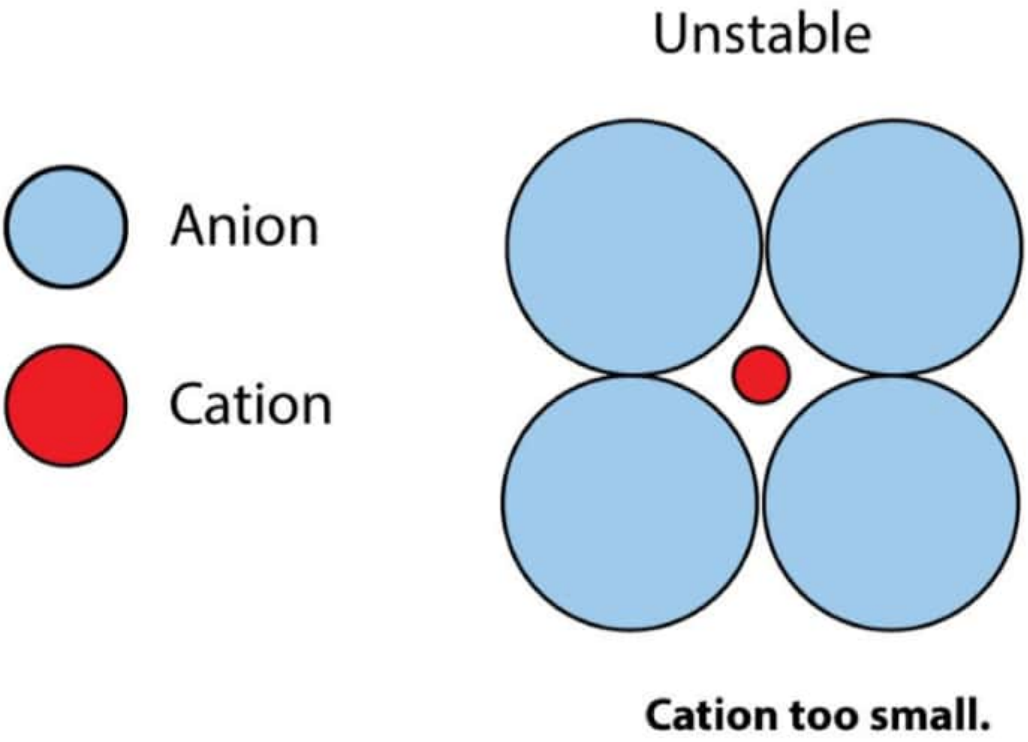
$$\text{Radius ratio, Rr} = \frac{r^+}{r^-} = \frac{\text{Radius of Cation}}{\text{Radius of anion}}$$

The number of anions that can surround the cation is decided by their Radius Ratio

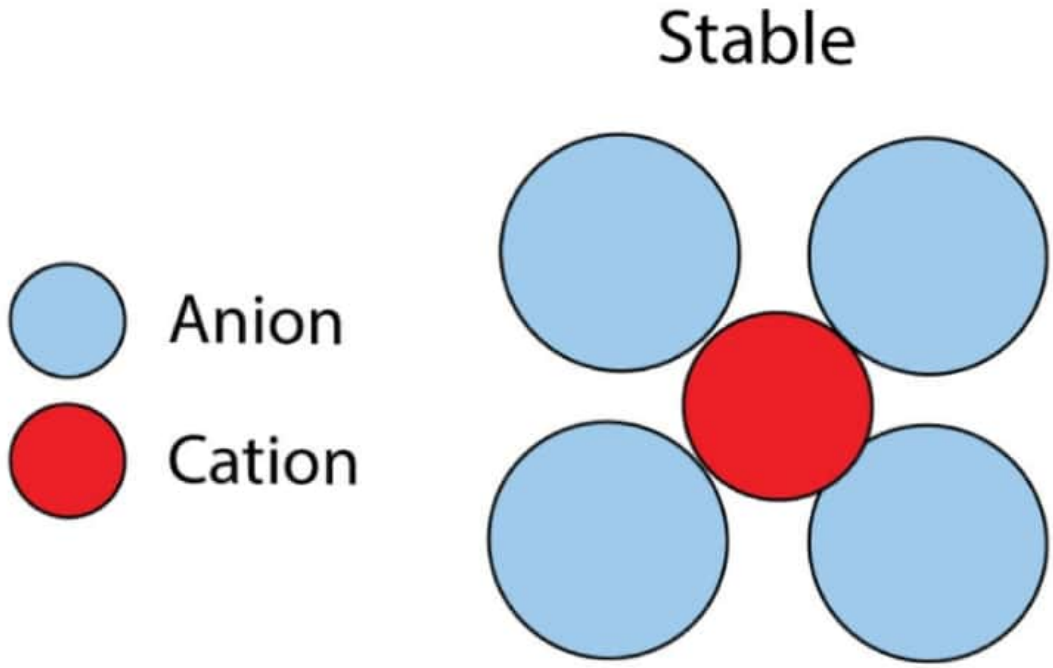
Let’s see how radius ratio of the ions predicts number of anions around a cation



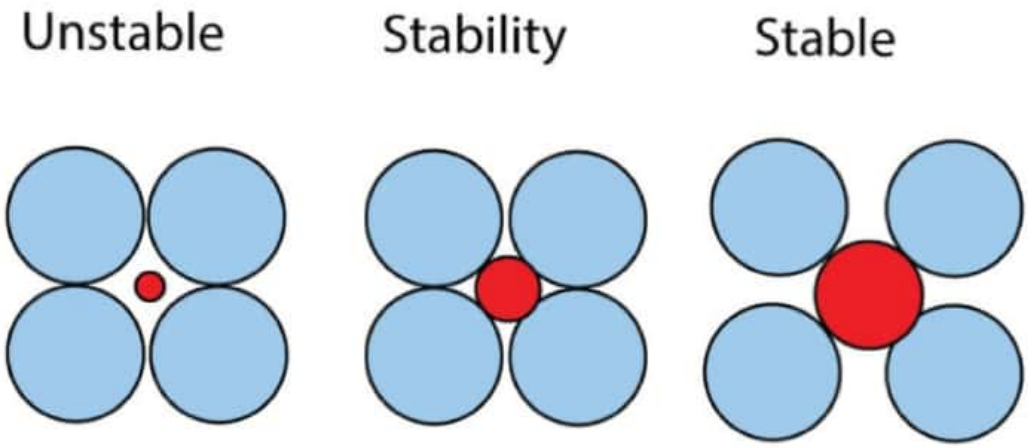
If radius ratio of ions is too small, it means cation is too small



So a large number of anions cannot surround it as the structure formed will be unstable

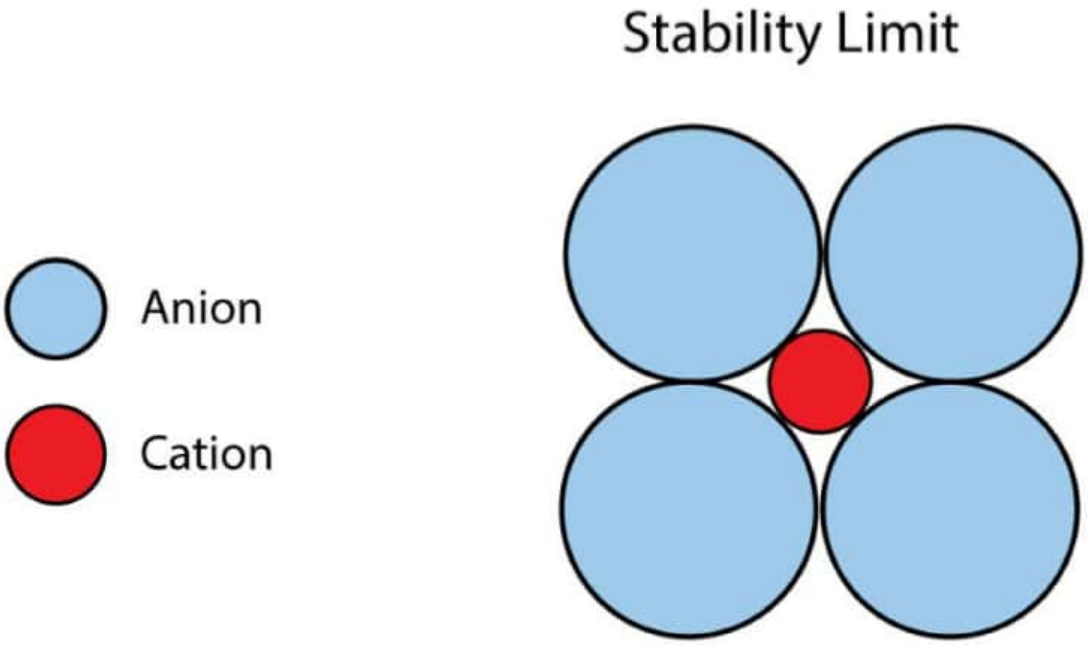


But if the radius ratio of ions is sufficiently large, a stable structure will be formed



Cation too small.

As we keep on increasing the radius ratio, we will reach a point where the structure just becomes stable for a particular coordination number



This minimum value for the radius ratio at which the structure is stable is known as limiting radius ratio