APS110H1f2024 Sept 27 2024

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The Size of Interstitial Sites

$$\sin 45^\circ = \frac{1}{\sqrt{2}} = \frac{1}{1.414}$$

$$\sin 45 = \frac{2R_A}{2R_A + 2R_c}$$

$$\frac{R_c}{R_A} = \frac{1 - \sin 45}{\sin 45}$$

$$= \frac{1 - \frac{1}{1.414}}{\frac{1}{1.414}}$$

$$\frac{R_c}{R_A} = 0.414$$

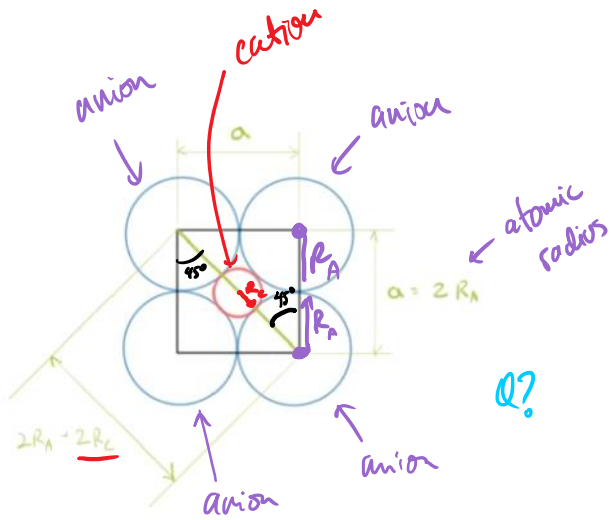
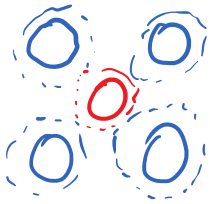


Figure 9: A 2D slice through the octahedral interstitial site at the geometrically ideal radius ratio when the anions are touching one another and the cation is just big enough to fit into the site without pushing the anions apart.



Hexagonal

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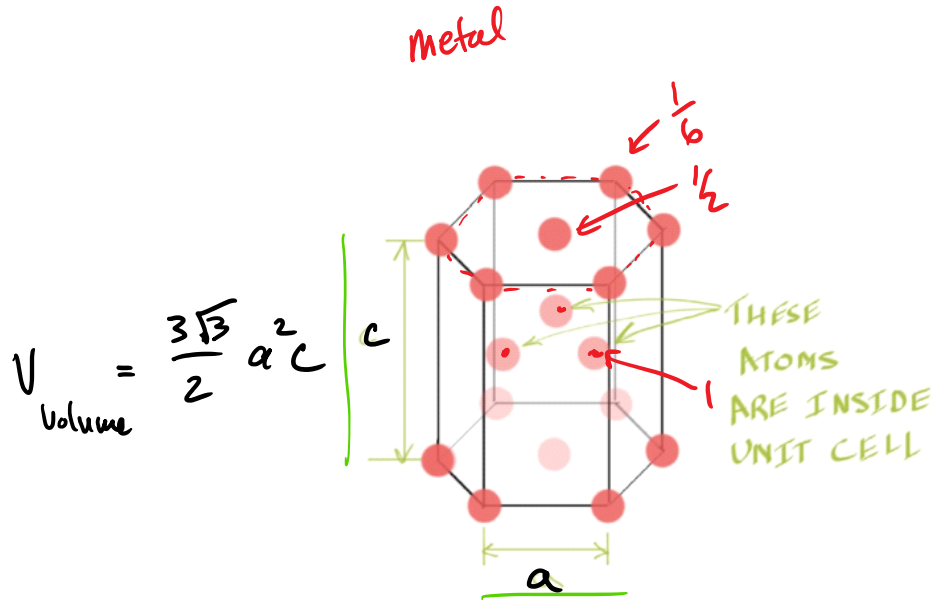

Figure 11: A hexagonal close packed unit cell. Note that the three atoms in the middle are inside the unit cell and are part of a close packed plane that is identical to the top and bottom planes.

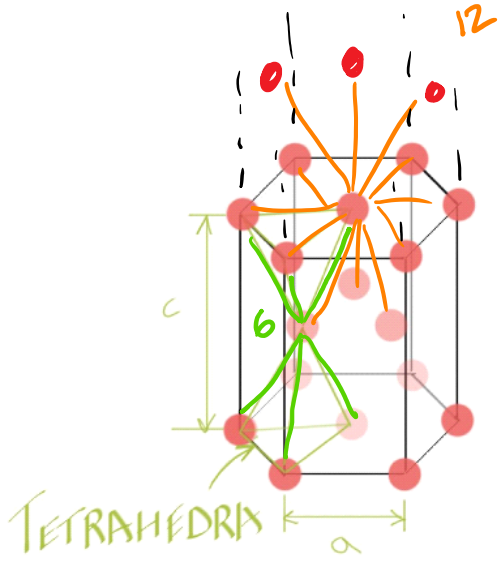

Figure 12: A hexagonal close packed unit cell showing the positioning of the three middle atoms nestled into the low spots between three atoms on the bottom plane.