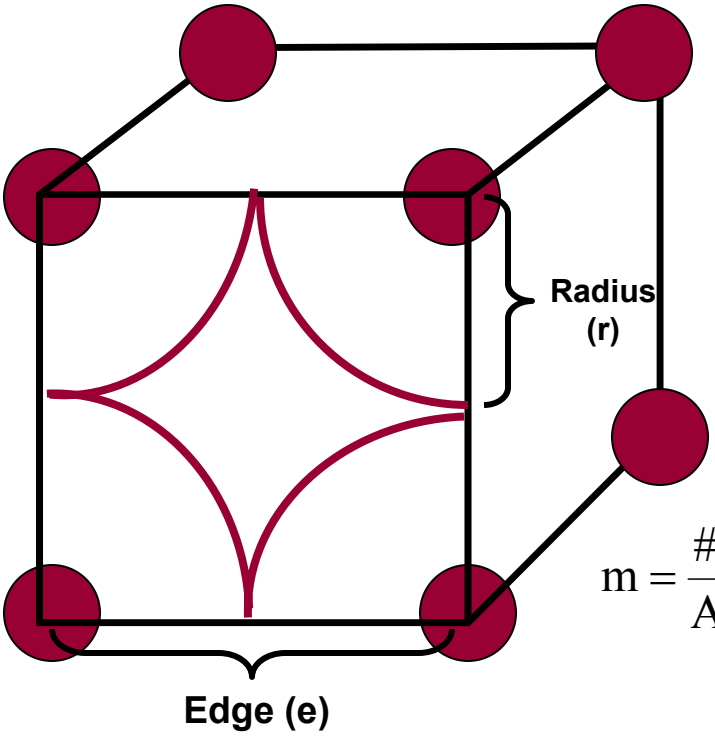
# Cubic Cell Units




## Simple Cubic

$$r = e/2$$

$$\text{Density} = m/V_{UC}$$

$$V_{UC} = (e)^3$$

$$m = \frac{\#\text{ atoms in Unit Cell}}{\text{Avagadro's Number}} \bullet \frac{\text{Molar Mass}}{1\text{ mol}}$$

## Face Centered Cubic

$$d = 4r$$

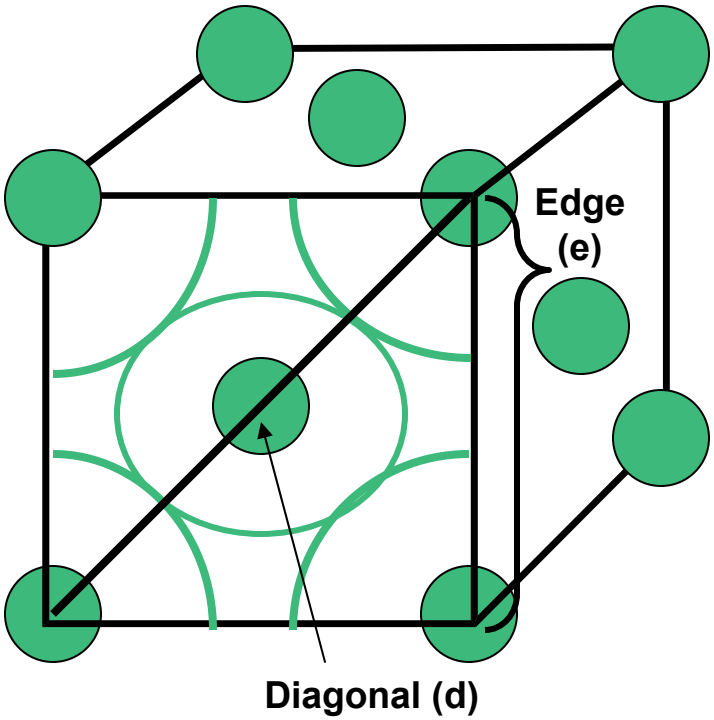
$$d^2 = e^2 + e^2$$

$$(4r)^2 = 2e^2$$

$$r = e/\sqrt{8}$$

$$\text{Density} = m/V_{UC}$$

$$V_{UC} = (e)^3$$




$$m = \frac{\#\text{ atoms in Unit Cell}}{\text{Avagadro's Number}} \bullet \frac{\text{Molar Mass}}{1\text{ mol}}$$

# Cubic Cell Units

## Body Centered Cubic

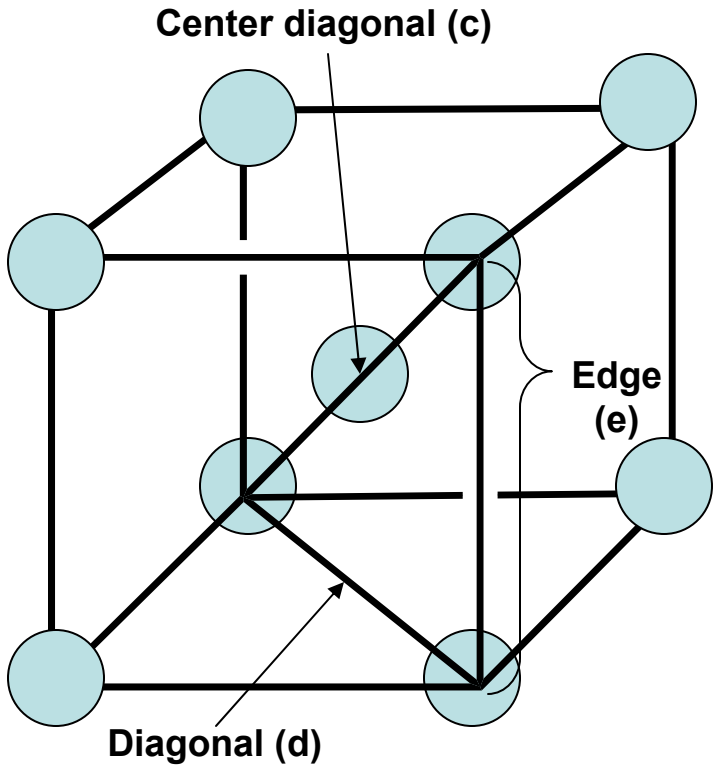
$$c = 4r$$

$$c^2 = d^2 + e^2$$

$$(4r)^2 = 2e^2 + e^2$$

$$16r^2 = 3e^2$$

$$r = e(\sqrt{3}/16)$$

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$$\text{Density} = m/V_{UC}$$

$$V_{UC} = (e)^3$$

$$m = \frac{\#\,\text{atoms in Unit Cell}}{\text{Avagadro's Number}} \bullet \frac{\text{Molar Mass}}{1\,\text{mol}}$$

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**% of occupied space:**

$$\%\,\text{Occupied Space} = \frac{\text{Volume of Atom(s)}}{\text{Volume of the Unit Cell}} \bullet 100$$

$$V_{Atom(s)} = (\#\text{atoms in unit cell}) \bullet \frac{4}{3}\pi r^3$$

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**For each unit cell, you should be able to calculate the radius of an atom, the edge of the unit cell, the density of the compound or element and the % of occupied space.**