APS110H1f2024 Sept 18 2024

September 16, 2024 4:15 PM

Density

metal

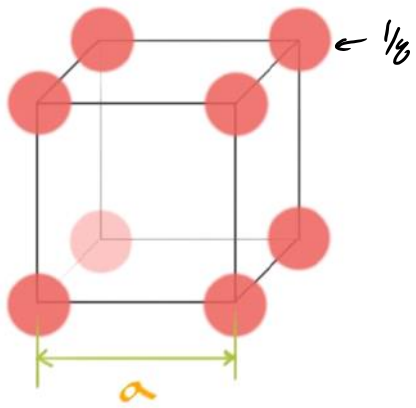



**Figure 4:** The simple cubic unit cell, showing an atom centred at each of the eight corners of a cube. The lighter red dots are the atoms located on the hidden parts of the cube. The cube edge length is known as the lattice parameter and is denoted with the letter a.

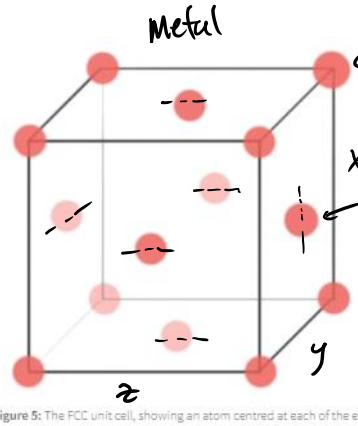



**Figure 5:** The FCC unit cell, showing an atom centred at each of the eight corners of a cube as well as one atom centred at the very centre of each of the six cube faces. The lighter red dots are the atoms located on the hidden parts of the cube.

$\frac{1}{8} \times 8 = 1$

$\frac{1}{2} \times 6 = 3$

$\Rightarrow 4 = n$ atoms in unitcell

unit cell

FCC = face central cubic

$$\text{density} = \rho = \frac{\text{mass of atoms}}{\text{volume of unit cell}} = \frac{m}{V} \left(\frac{g}{cm^3} \text{ or } \frac{kg}{m^3}\right)$$

# of atoms in the unit

$$\rho = \frac{n \cdot A}{V_c \cdot N_A}$$

$n$ ← # of atoms in the unit

$A$ ← molar mass

$N_A$ ← Avagadro's number $= 6.023 \times 10^{23}$

$V_c$ ← volume of unit cell $= x \times y \times z$

1 nano gram $= 1 \times 10^{-9}$ gram

nano

1 gram $= 1 \times 10^{9}$ nano gram

# Ceramics

September 18, 2024 3:39 PM

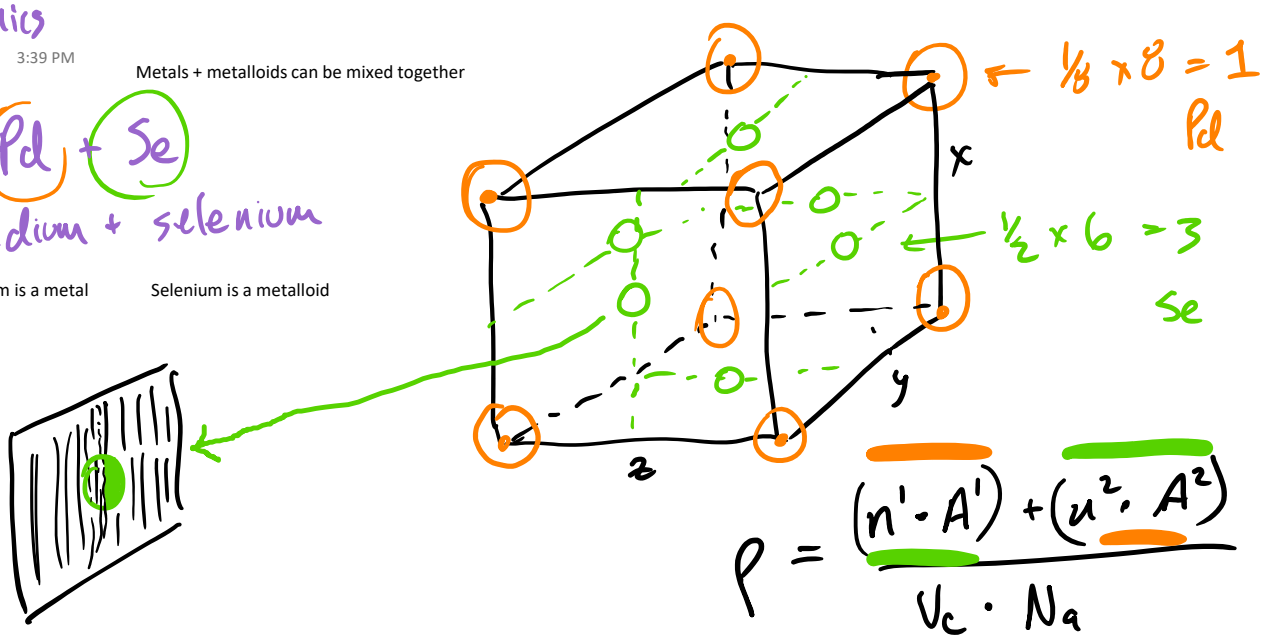
Metals + metalloids can be mixed together

Pd + Se

palladium + selenium

Palladium is a metal

Selenium is a metalloid




FYI - the atomic radius was not considered for this artwork and discussion - if data found you will atomic radiuses

Another example

another example
3 metals present.

3 metals present