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Crystallography Formulas

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List of 13 Crystallography Formulas

Crystallography ↗

Body Centered Cubic ↗

1) Atomic Radius in BCC ↗

fx $r = \frac{\sqrt{3}}{4} \cdot a_{BCC}$

[Open Calculator ↗](#)

ex $1.35966A = \frac{\sqrt{3}}{4} \cdot 3.14A$

2) Lattice Constant of BCC ↗

fx $a_{BCC} = \frac{4}{\sqrt{3}} \cdot r$

[Open Calculator ↗](#)

ex $3.117691A = \frac{4}{\sqrt{3}} \cdot 1.35A$

3) Total Volume of Atoms in BCC ↗

fx $V_a = \frac{8}{3} \cdot \pi \cdot r^3$

[Open Calculator ↗](#)

ex $20.61199A^3 = \frac{8}{3} \cdot \pi \cdot (1.35A)^3$



Face Centered Crystal ↗

4) Atomic Radius in FCC ↗

fx $r = \frac{a_{\text{FCC}}}{2 \cdot \sqrt{2}}$

[Open Calculator ↗](#)

ex $1.35\text{A} = \frac{3.818377\text{A}}{2 \cdot \sqrt{2}}$

5) Lattice Constant of FCC ↗

fx $a_{\text{FCC}} = 2 \cdot \sqrt{2} \cdot r$

[Open Calculator ↗](#)

ex $3.818377\text{A} = 2 \cdot \sqrt{2} \cdot 1.35\text{A}$

6) Volume of Atoms in FCC ↗

fx $V_a = \frac{16}{3} \cdot \pi \cdot r^3$

[Open Calculator ↗](#)

ex $41.22398\text{A}^3 = \frac{16}{3} \cdot \pi \cdot (1.35\text{A})^3$

Gibbs Phase Rule ↗

7) Degree of Freedom ↗

fx $F = C - p + 2$

[Open Calculator ↗](#)

ex $5 = 7 - 4 + 2$



8) Number of Components ↗

$$fx \quad C = F + p - 2$$

[Open Calculator ↗](#)

$$ex \quad 7 = 5 + 4 - 2$$

9) Number of Phases ↗

$$fx \quad p = C - F + 2$$

[Open Calculator ↗](#)

$$ex \quad 4 = 7 - 5 + 2$$

10) Total Number of Variables in System ↗

$$fx \quad T_v = p \cdot (C - 1) + 2$$

[Open Calculator ↗](#)

$$ex \quad 26 = 4 \cdot (7 - 1) + 2$$

Simple Cubic Cell ↗**11) Atomic Radius in SCC** ↗

$$fx \quad r = \frac{a}{2}$$

[Open Calculator ↗](#)

$$ex \quad 1.35\text{A} = \frac{2.7\text{A}}{2}$$

12) Lattice Constant of SCC ↗

$$fx \quad a = 2 \cdot r$$

[Open Calculator ↗](#)

$$ex \quad 2.7\text{A} = 2 \cdot 1.35\text{A}$$



13) Total Volume of Atoms in SCC ↗

fx
$$V_a = \frac{4}{3} \cdot \pi \cdot r^3$$

Open Calculator ↗

ex
$$10.30599\text{A}^3 = \frac{4}{3} \cdot \pi \cdot (1.35\text{A})^3$$



Variables Used

- a Lattice Parameter (*Angstrom*)
- a_{BCC} Lattice Parameter of BCC (*Angstrom*)
- a_{FCC} Lattice Parameter of FCC (*Angstrom*)
- C Number of Components in System
- F Degree of Freedom
- p Number of Phases
- r Atomic Radius (*Angstrom*)
- T_v Total Number of Variables in System
- V_a Volume of Atoms in Unit Cell (*Cubic Angstrom*)



Constants, Functions, Measurements used

- **Constant:** **pi**, 3.14159265358979323846264338327950288

Archimedes' constant

- **Function:** **sqrt**, sqrt(Number)

A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.

- **Measurement:** **Length** in Angstrom (A)

Length Unit Conversion 

- **Measurement:** **Volume** in Cubic Angstrom (A^3)

Volume Unit Conversion 



Check other formula lists

- Crystallography Formulas 

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