

Do you remember the following definition in chemistry?

- I. **Coordination Number (CN)** is the sum of the total number of neighbors of a central atom.
- II. In an ionic compound, **radius ratio** is the radius of the positive ion, divided by the radius of the negative ion.
- III. In my article (*J. Chem. Educ.*, 1994, 71, 749) I have derived a mathematical relationship between symmetrical coordination numbers, Bond Angles and Radius Ratio as:

$$\alpha = \arcsin \left[\frac{12}{12 - CN} \right]^{-\frac{1}{2}}$$

$$R = \left[\frac{12}{12 - CN} \right]^{\frac{1}{2}} - 1$$

Where, bond angle = α (in degree), and R stands for the radius ratio.

There are five polyhedral (include dodecahedron, CN=12) that are basic building block of crystals.

CN	α	2α	R (critical)	Arrangement
3	60.00	120.00	0.1547	Triangular
4	54.74	109.47	0.2247	Tetrahedral
6	45.00	90.00	0.4142	Octahedral
8	35.26	70.53	0.7320	Cubical

New Reference:

Inorganic Chemistry / Catherine E. Housecroft and Alan G. Sharp,

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