

Chapter 1: Crystal Structure

Ideal crystal is constructed by the infinite repetition of identical structural groups of atoms. A group is called the basis. Detecting crystal structure started with x-rays due to the wavelength of the x-ray (≈ 1 angstrom) being comparable to the interatomic spacing in a crystal.

What is a *lattice*? 2D Bravais Lattices [Wikipedia](#) The famous graphene has a hexagonal (honeycomb structure) like lattice, but it does not have the center atom from the true hexagonal lattice. The primitive of this lattice is made of up two atoms than can be translated to form the lattice. Thus graphene is like a diatomic crystal.

3D Bravais Lattices There are 14 Bravais lattices in 3D. In both 2D and 3D, the primitive cells that make up the lattice must fill the least amount of space and have no 'holes' or 'extras' left over. The 2 most common lattices now are the Primitive Hexagonal for its symmetry and the Body Centered Cubic (BCC) which is the lattice of Silicon, the most important material today.

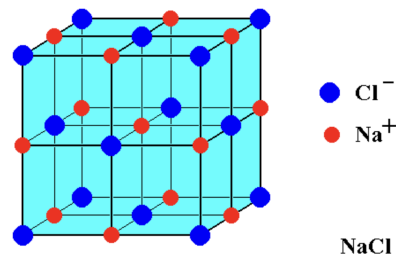


Figure 0.1: Sodium Chloride Structure (FCC)

Example Structures The lattice of Sodium Chloride is FCC as shown in Figure 0.1

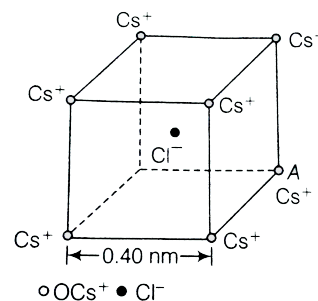


Figure 0.2: Cesium Chloride Structure (SC)

Figure 0.2 shows the lattice of Cesium Chloride which is SC.