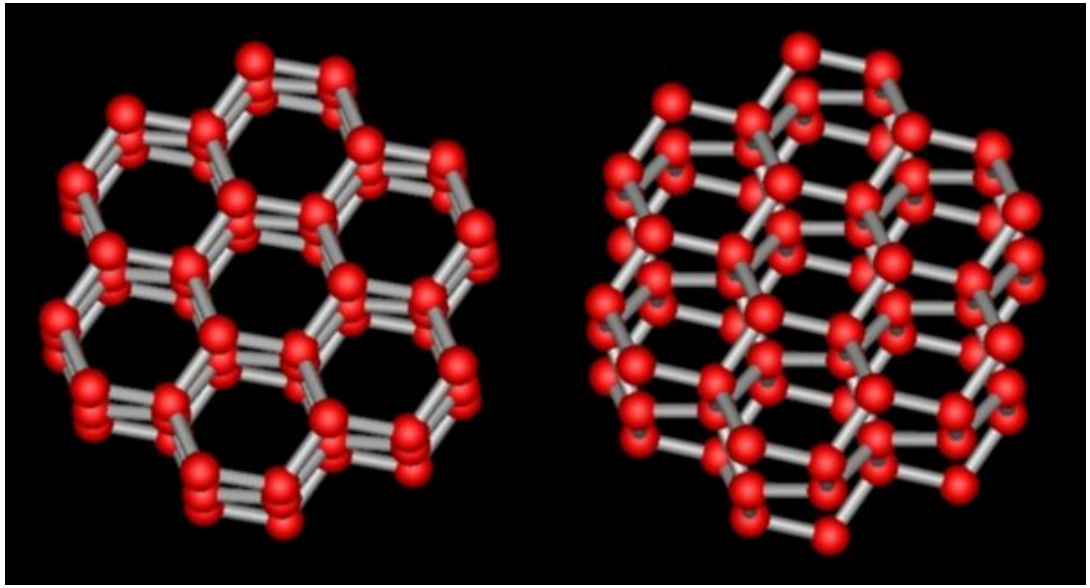
Chapter 3 Crystal Structure

Snowflakes and snow crystals



The structure of crystalline ice

Reading Assignment:

1. W. B-Ott, Crystallography-chapter 3

http://www.cco.caltech.edu/~atomic/snowcrystals/primer/primer.htm

Crystal Structure

Lattice ---→ Crystal

lattice points occupied by atoms, ions, or molecules

lattice points- all identical, collection of objects- must be identical

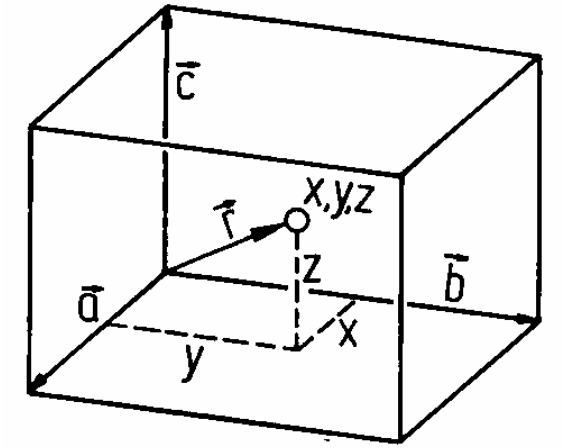
Ex) lattice rectangular unit cell

projected on a,b plane

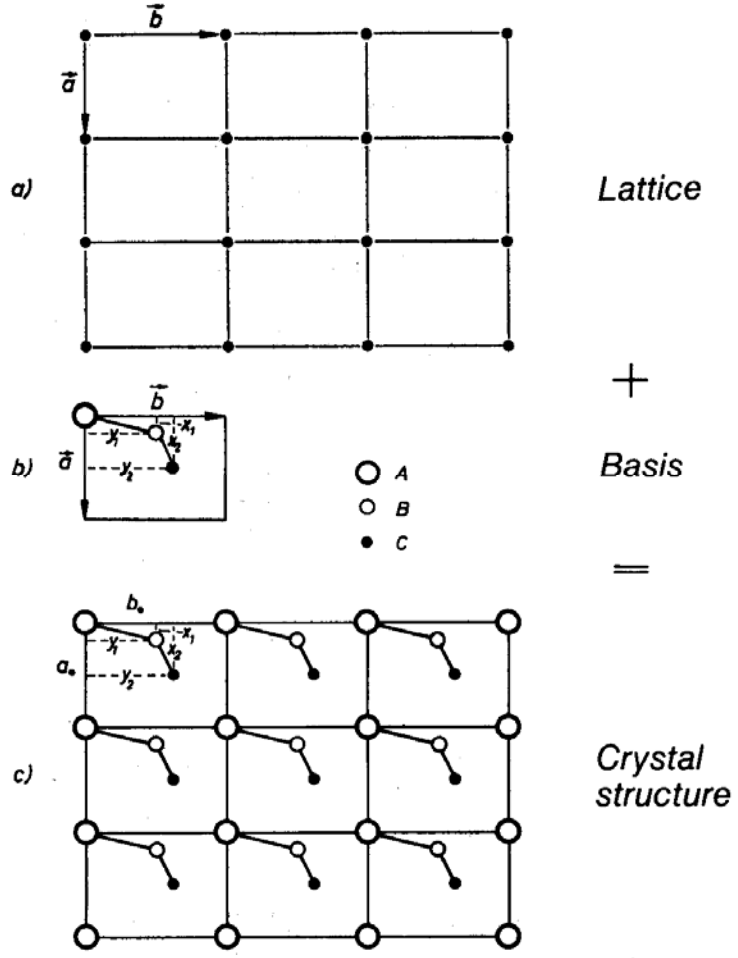
basis molecule ABC

A: 0, 0, 0 B: x_1,y_1,z_1 C:x_2,y_2,z_2

$$\vec{r} = x\vec{a} + y\vec{b} + z\vec{c}$$

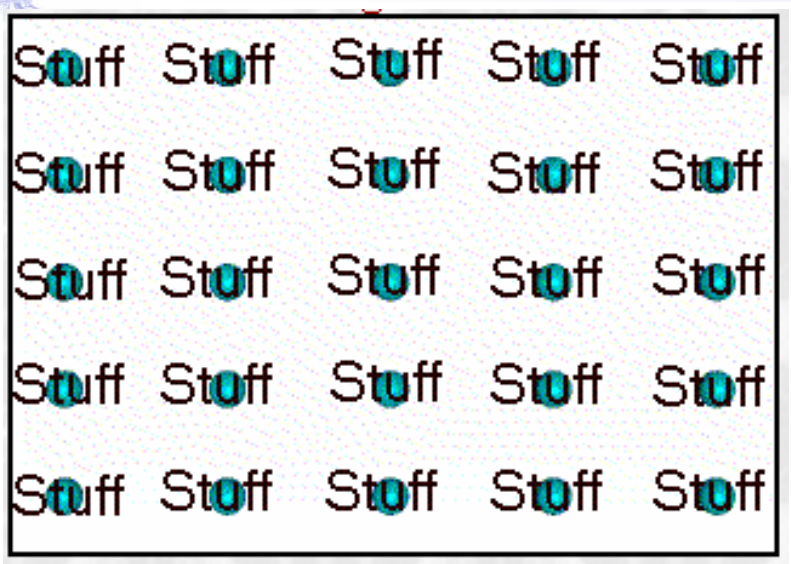


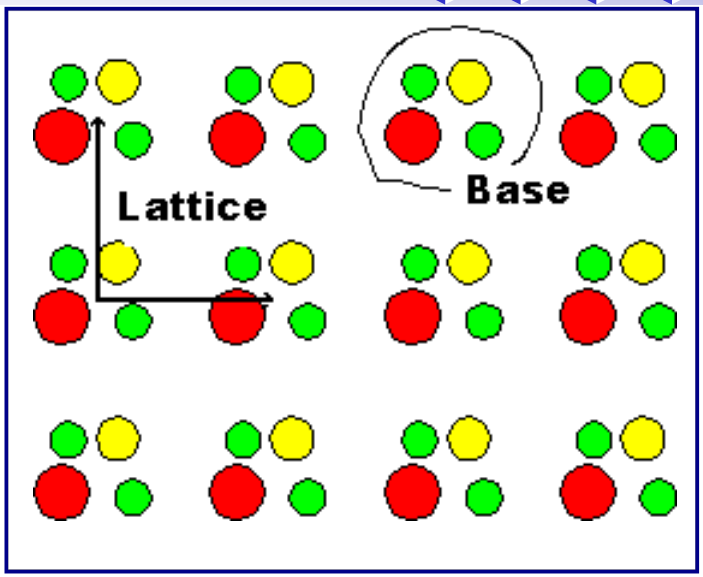
$$0 \le x, y, z \le 1$$

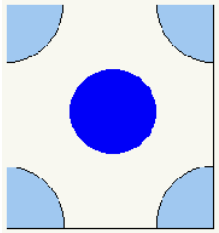


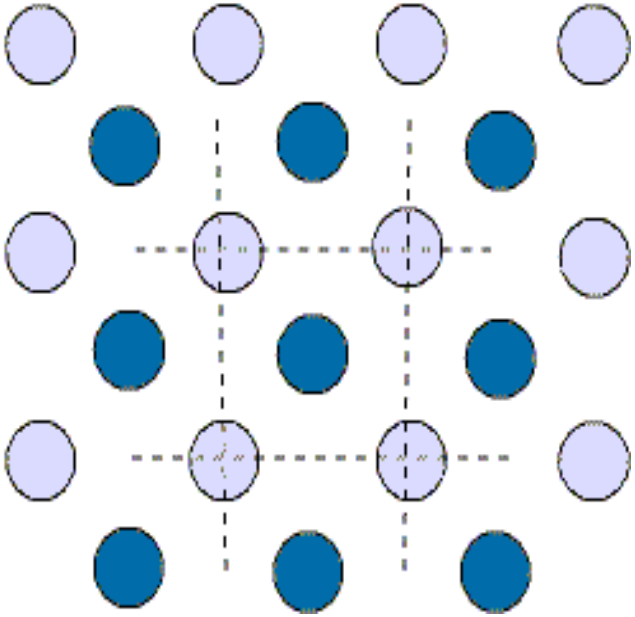
W. B-Ott, Crystallography

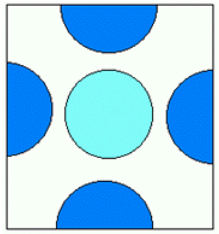
Crystal Structure

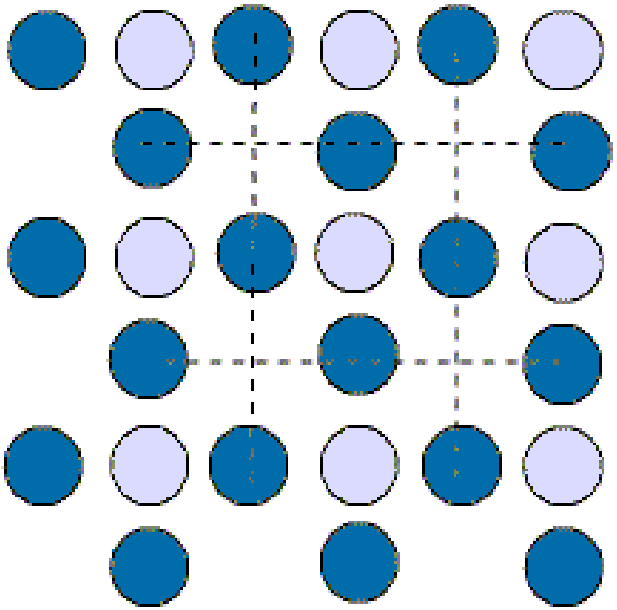






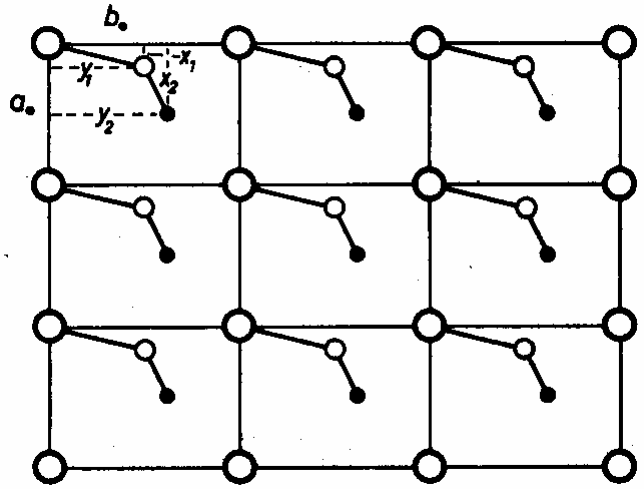


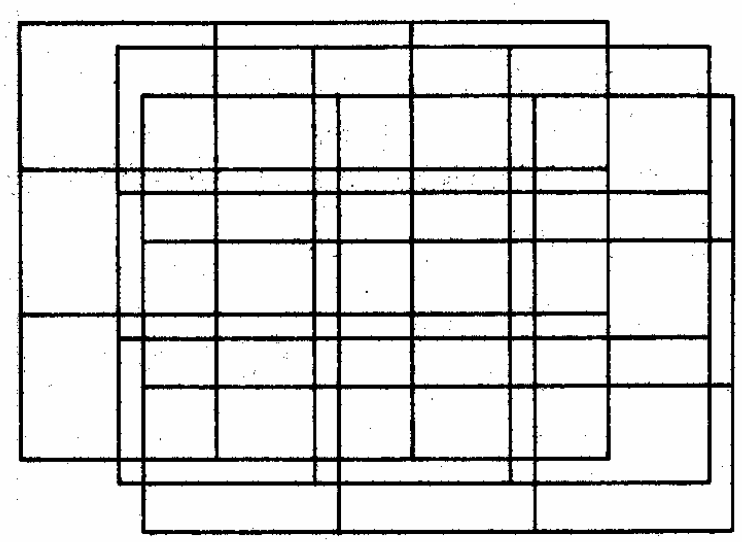




http://www.kings.edu/~chemlab/vrml/

Crystal Structure



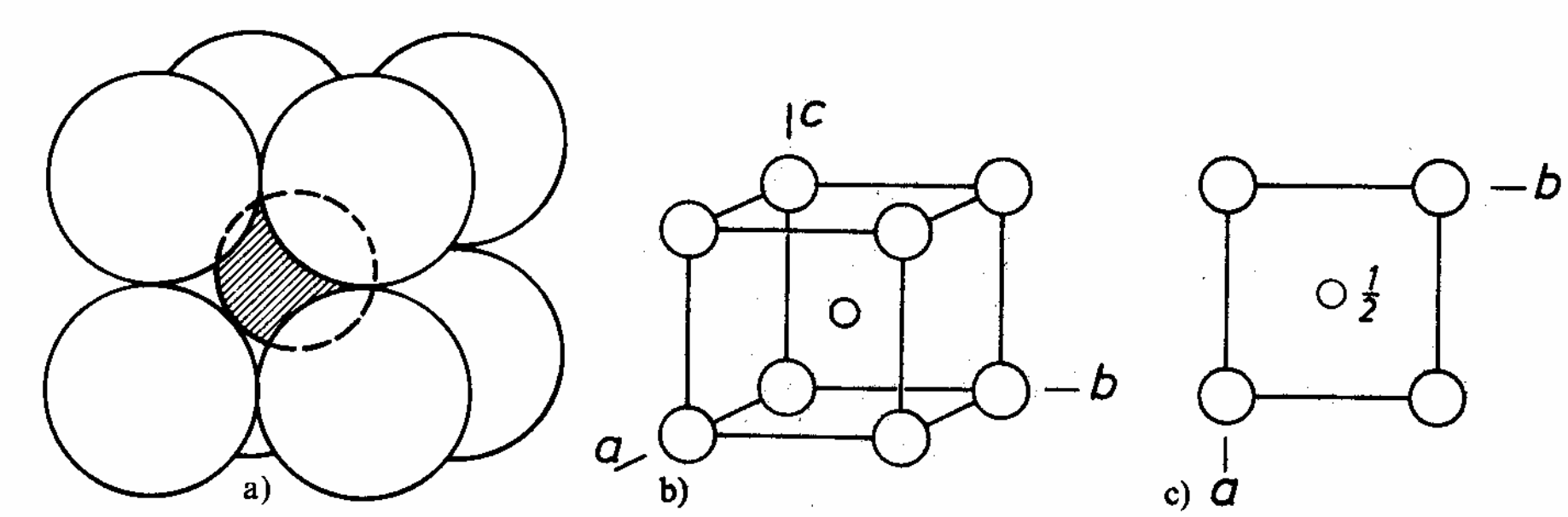


Crystals are solid chemical substance with a three-dimensional periodic array of atoms, ions, or molecules.
This array is a called a **crystal structure**.

Crystal Structure

Ex) caesium iodide (CsI)

$a_o=b_o=c_o=4.57Å$, $\alpha=\beta=\gamma=90^o$
basis I^-: 0,0,0 Cs^+:1/2,1/2,1/2



Specific planes and lines in the cell

planes $x, y, \frac{1}{2}$ $\frac{3}{4}, y, z$

lines $\frac{3}{4}, y, \frac{1}{2}$