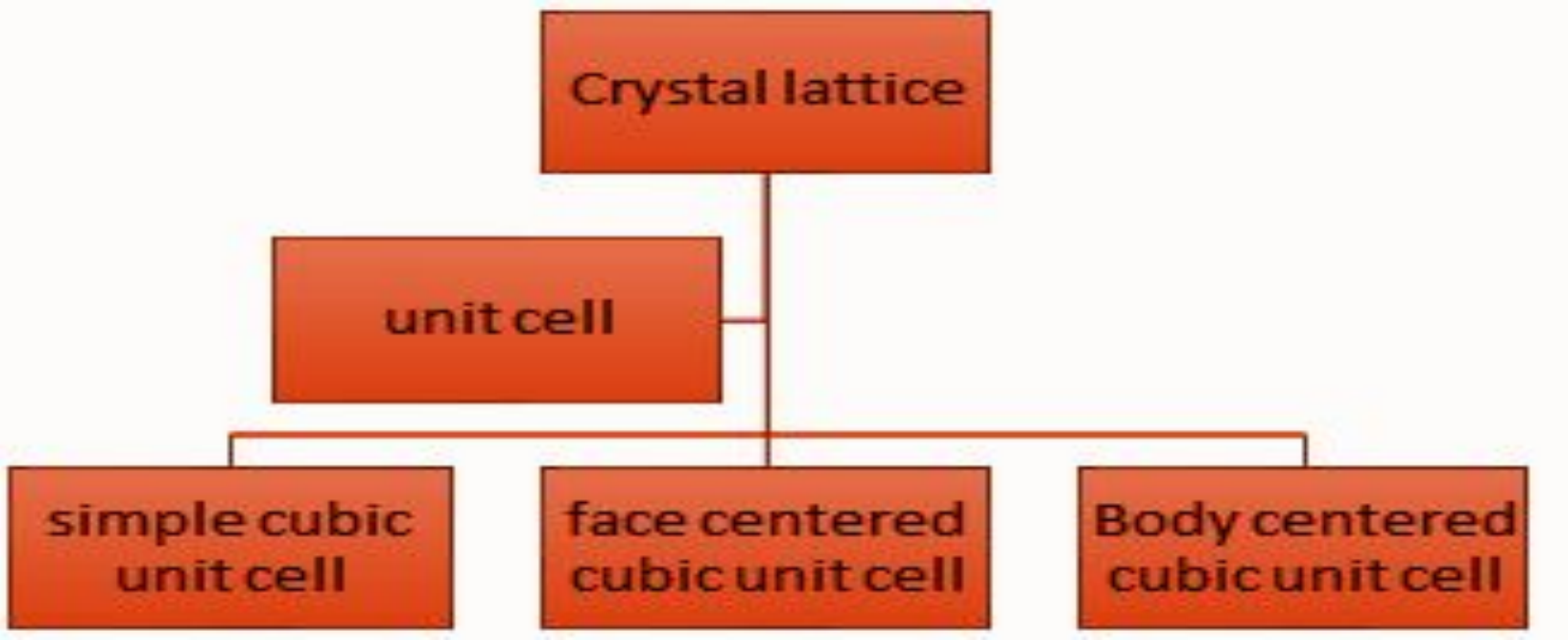
Crystal lattice and types of unit cell

Content


Crystal lattice
unit cell
simple cubic unit cell
face centered cubic unit cell
Body centered cubic unit cell

Space lattice/Crystal lattice

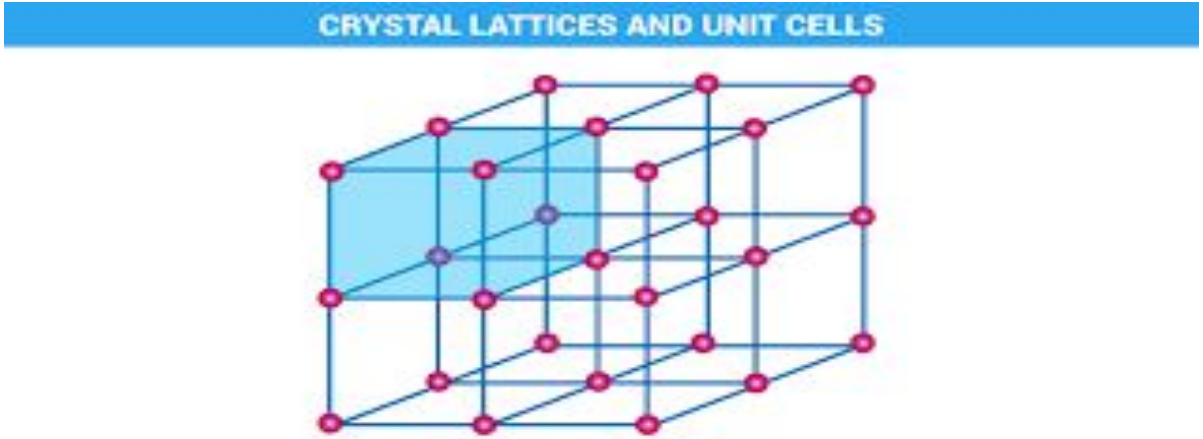
"A **space lattice** / **Crystal lattice** is three dimensional arrangement of constituent particles (atoms,ions and molecules) in space eg Buildings

The **unit cell** may be defined as, "the smallest repeating unit in space lattice which, when repeated over again, results in a crystal of the given substance". Eg *:* rooms in a building.

Lattice points are the constituent particles(atoms,ions and molecules)

Eg :Bricks of the room

Space lattice/Crystal lattice



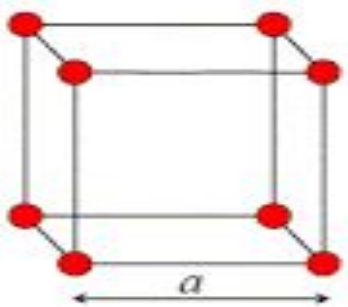
Types of unit cell

There are three types of cubic unit cells which are

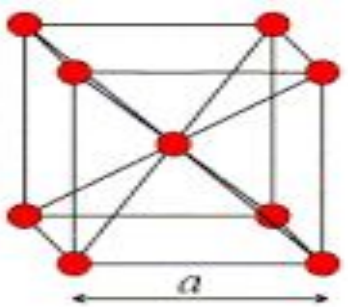
(a) Simple cubic

(b) Body centered cubic

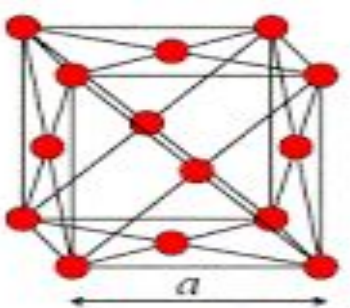
(c) Face centered cubic



(a)



(b)



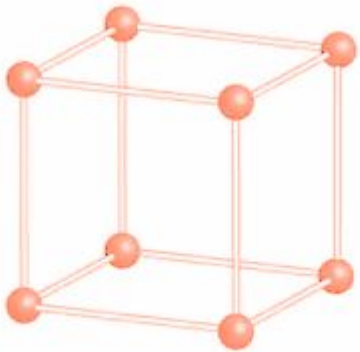
(c)

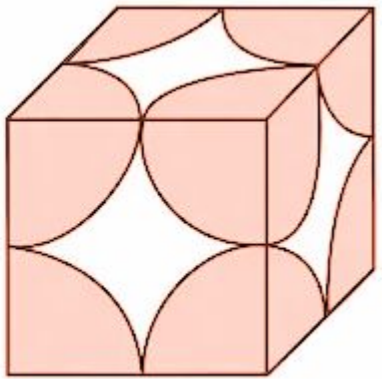
Simple cubic unit cell /Primitive unit cell

In simple cubic unit cell the constituent particles are present at the corners of cube,hence total number of atom in simple cubic unit cell is 8.

A corner atom is shared equally by 8 unit cell in a crystal lattice,So each corner atom contributes on ⅛ atom to particular unit cell

therefore no of atoms in one simple cubic unit cell is ⅛*8=1 atom





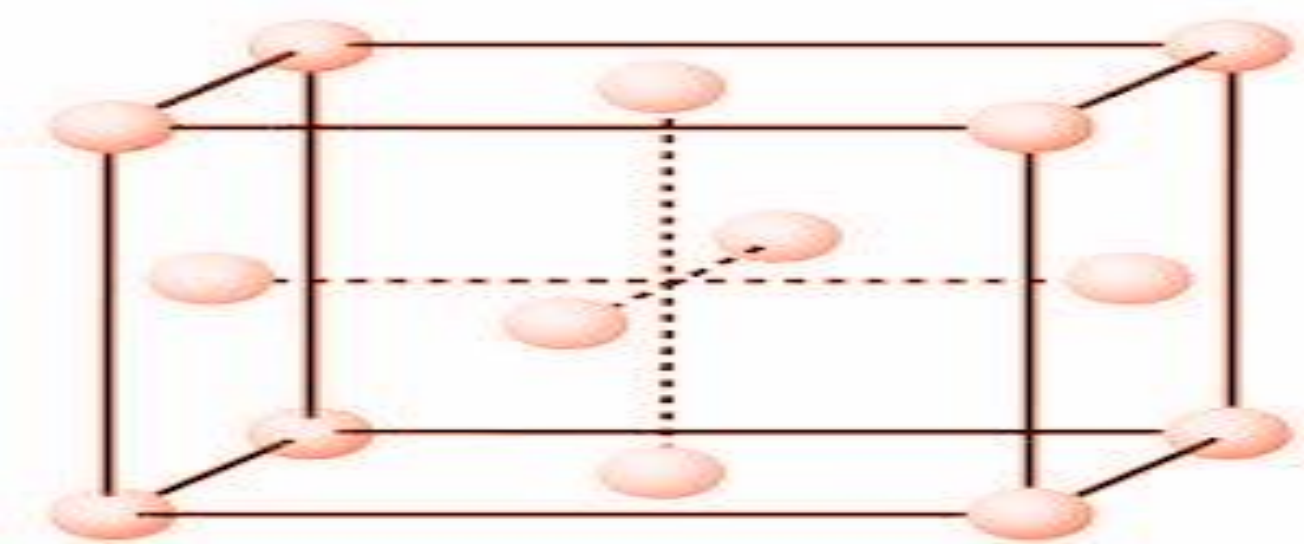
Face centered cubic unit cell

In Face centred cubic unit cell the constituent particles are present at the corners of cube, and one in each face ,there are 6 faces to a cube hence total number of atom in Face centered cubic unit cell is 8+6=14

A corner atom is shared equally by 8 unit cell in a crystal lattice,So each corner atom contributes on ⅛ atom to particular unit cell and atom on each face is shared by two unit cell so the contribution will be ½ *6=3

therefore no of atoms in one face centered cubic unit cell is ⅛*8 +½ *6=1+3=4

Face centered cubic unit cell



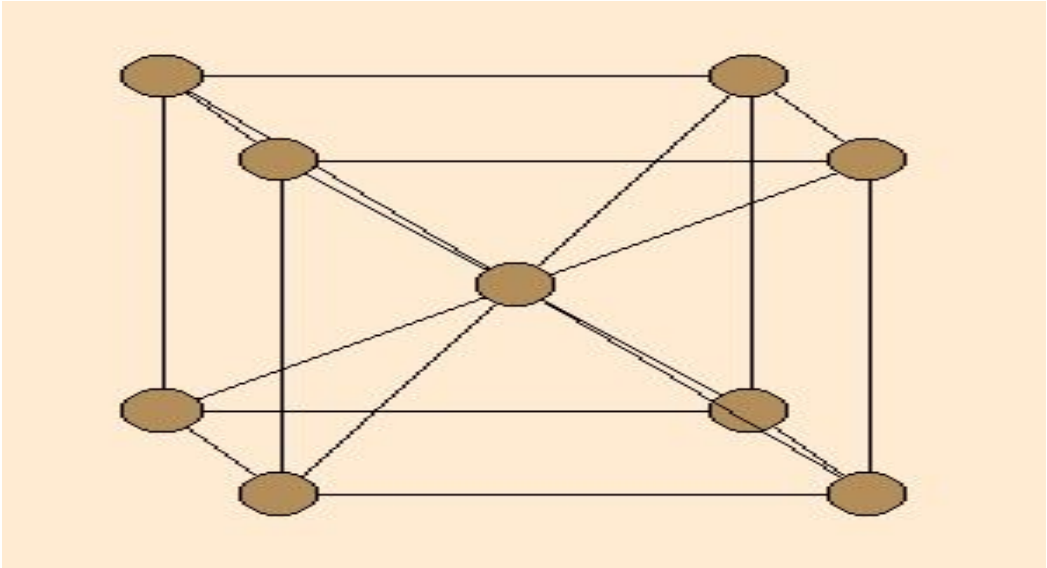
Body centered cubic unit cell

In Body centred cubic unit cell the constituent particles are present at the corners of cube, and one in centre hence total number of atom in body centered cubic unit cell is 8+1=9

A corner atom is shared equally by 8 unit cell in a crystal lattice,So each corner atom contributes on ⅛ atom to particular unit cell and atom inn centre is not shared by any other unit cell

therefore no of atoms in one body centered cubic unit cell is ⅛*8 +1=1+1=2

Body centered cubic unit cell



Questions

1. In crystal lattice ,lattice points are arranged in_____
2. Total number of atoms present in simple cubic unit cell is_____
3. _____is the smallest repeating unit of crystal lattice
4. Total number of atoms present in FCC unit cell_____
5. Total number of atoms present in BCC unit cell_____
6. A SC unit cell contributes _____ no of atom in a entire crystal
7. A FCC unit cell contributes _____ no of atom in a entire crystal
8. A BCC unit cell contributes _____ no of atom in a entire crystal