Assignment 04

Solution

1] What is the primitive lattice for body centred orthorhombic lattice?

a) Rhombohedral

b) Triclinic

c) Primitive orthorhombic

d) Primitive monoclinic

2] What is the site symmetry of voids in a diamond cubic structure and how many are sites are there in the unit cell?

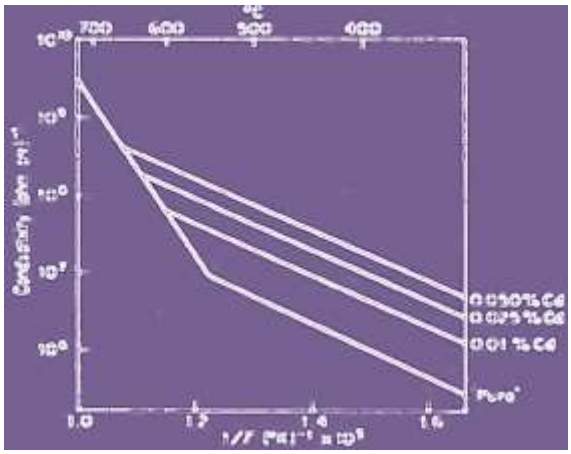
a) -4mm, 08

b) m-3m, 04

c) . -3m, 16

d) -43m, 08

3] In the conductivity vs 1/T plot given for sodium chloride with CdCl2 as impurities, the slope at low temperatures almost remains constant. Identify the most appropriate reason for such a phenomena.



a) At low temperature conductivity doesn't have much fluctuation

b) Constant slope corresponds to zero defects concentration

c) At low temperatures the concentration of schottky defects is very less compared to impurity concentration

d) At low temperatures, impurity concentration is negligible compared to vacancy concentration

4] Choose the most appropriate answer(s) regarding defect concentration measurement by positron annihilation experiment.

a) Count rate of 0.511 MeV gamma ray photon can be directly correlated to nature of defect in the material.

b) Life time of positron decide the nature of defect in the material

c) Life time of positron decide the concentration of defect in the material

d) **Count rate of 0.511 MeV gamma ray photon can be directly correlated to concentration of defect in the material.**

5] Self interstitials are hardly seen in quenched fcc metals because of

a) high bond energy

b) low formation energy

c) high formation energy compared to vacancies

d) low migration energy compared to that for vacancy migration

6] Choose the correct statement(s)

a) Point defects are not mobile in the case of equilibrium defects.

b) The mobility of defects is governed by bond energy

c) Self diffusion is an example of mobility of defects in equilibrium.

d) The mobility of point defects is independent of the type of nature of defects (i.e. vacancy or interstitial) for an element at a particular temperature.

7] If the total change in volume ($\Delta V/V$) produced in a crystal containing 10^4 by adding 10^{-2} defects is 0.3×10^{-5} then what would be the change in lattice parameter

a) 0.20×10^{-5}

b) 0.06×10^{-5}

c) 0.3×10^{-5}

d) Data insufficient

8] The mobility of cations can be derived directly from

a) Configuration of defects in crystal

b) Conductivity of crystal

c) Free energy associated with it.

d) None of the above.

9] The property most frequently studied to quantify defects in quenched metal is

a) Electrical resistivity

b) Density

c) Thermal stress

d) Microstructure

10] Choose the correct statement(s)

a) Production of Schottky defects change the density of material

b) Production of Frenkel defects does not change the density of material

c) Only point defects contribute to electrical resistivity

d) Increase in vacancy concentration does not affect the lattice parameter of a material