The Solid State

Q.No.1: Sodium metal crystallizes in a body centred cubic lattice with a unit cell edge of 4.29 Å. The radius of sodium atom is approximately : **JEE 2015**

A. 1.86 Å
B. 3.22 Å
C. 5.72 Å
D. 0.93 Å

Q.No.2: Which type of 'defect' has the presence of cations in the interstitial sites? **JEE 2018**

A. Frenkel defect
B. Metal deficiency defect
C. Schottky defect
D. Vacancy defect

Q.No.3: The one that is extensively used as a piezoelectric material is: **JEE 2019**

A. tridymite
B. amorphous silica
C. quartz
D. mica

Q.No.4: At 100°C, copper (Cu) has FCC unit cell structure with cell edge length of *x* Å. What is the approximate density of Cu (in g cm^{-3}) at this temperature? [Atomic Mass of Cu = 63.55 u] **JEE 2019**

A. $\frac{205}{x^3}$
B. $\frac{105}{x^3}$

C. $\frac{211}{x^3}$

D. $\frac{422}{x^3}$

Q.No.5: Which primitive unit cell has unequal edge lengths ($a \neq b \neq c$) and all axial angles different from 90°? **JEE 2019**

A. Triclinic

B. Hexagonal

C. Monoclinic

D. Tetragonal

Q.No.6: A compound of formula A_2B_3 has the hcp lattice. Which atom forms the hcp lattice and what fraction of tetrahedral voids is occupied by the other atoms: **JEE 2019**

A. hcp lattice – A, $\frac{2}{3}$ Tetrahedral voids – B

B. hcp lattice – A, $\frac{1}{3}$ Tetrahedral voids – B

C. hcp lattice – B, $\frac{2}{3}$ Tetrahedral voids – A

D. hcp lattice – B, $\frac{1}{3}$ Tetrahedral voids – A

Q.No.7: A solid having density of 9×10^3 kg m^{-3} forms face centred cubic crystals of edge length $200\sqrt{2}$ pm. What is the molar mass of the solid? [Avogadro constant ≅ 6×10^{23} mol^{-1}, π ≅ 3] **JEE 2019**

A. 0.0432 kg mol^{-1}

B. 0.0216 kg mol^{-1}

C. 0.0305 kg mol^{-1}

D. 0.4320 kg mol^{-1}

Q.No.8: The radius of the largest sphere which fits properly at the centre of the edge of a body centred cubic unit cell is : (Edge length is represented by '*a*')

JEE 2019

A. 0.027 a
B. 0.047 a
C. 0.134 a
D. 0.067 a

Q.No.9: The number of octahedral voids per lattice site in a lattice is _____.
(Rounded off to the nearest integer)

JEE 2021

Q.No.10: A certain element crystallises in a bcc lattice of unit cell edge length 27 Å. If the same element under the same conditions crystallises in the fcc lattice, the edge length of the unit cell in Å will be _____. (Round off to the Nearest Integer.)
[Assume each lattice point has a single atom]
[Assume $\sqrt{3} = 1.73,\ \sqrt{2} = 1.41$]

JEE 2021