XRD

Previous Year Question in Gate

1. In the X-ray diffraction pattern of a FCC crystal, the first reflection occurs at a Bragg angle (θ) of 30°. The Bragg angle (in degree) for the second reflection will be: (round off to 1 decimal place). **(GATE-MT-2021)**

2. X –ray diffraction pattern from an elemental metal with a FCC crystal structure shows the first peak at a Bragg angle 24.65 degrees. The lattice parameter of this metal is ___nm. Given,

   wavelength of the X-ray used is 0.1543 nm. **(GATE-MT-2020)**

   A. 0.185
   B. 0.262
   C. 0.320
   D. 0.370

3. A FCC crystal with a lattice parameter of 0.3615 nm is used to measure the wavelength of monochromatic X-rays. The Bragg angle (θ) for the reflection from (111) planes is 21.68 The wavelength of X-rays (in nm, rounded off to three decimal places) is _____. **(GATE-MT-2019)**

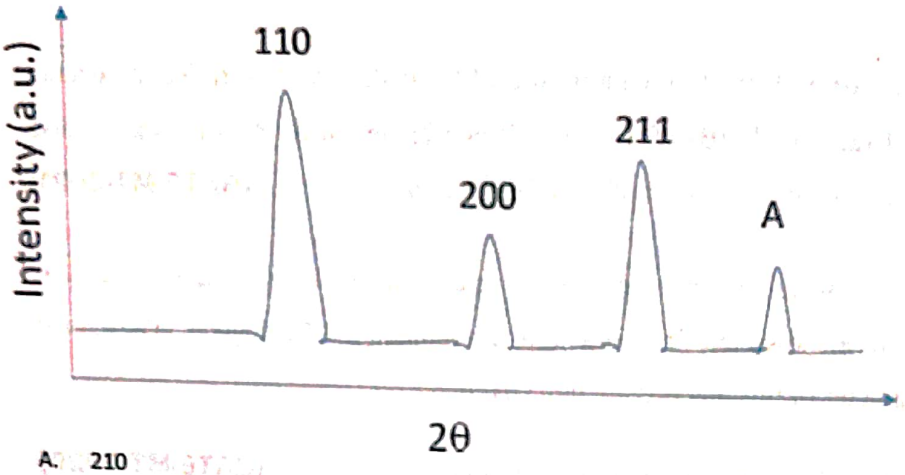
4. In a powder diffraction experiment on BCC iron, the first peak occurs at 2θ = 68.7° The wavelength of X-rays is _____ (in nm to three decimal places).

   Given: The lattice parameter of iron = 0.287 nm **(GATE-MT-2018)**

5. The second peak in the powder X-ray diffraction pattern of a FCC metal occurs at a Bragg angle θ (in degrees)= _____ (answer up to two decimal places) **(GATE-MT-2017)**

   (Given CuKα= 0.154nm; lattice parameter of metal = 0.36nm)

6. A schematic of X-ray diffraction pattern of a single phase cubic polycrystal is given The miller indices of peak A is ____. **(GATE-MT-2016)**



A. 210
B. 220
C. 222
D. 310

7. In a X-Ray powder pattern of a simple cubic crystal the second peak correspond to **(GATE-MT-2015)**

A. (111)
B. (100)
C. (200)
D. (110)

8. For an FCC metal, the ratio of inter planar spacing obtained from the first two peaks of the X-ray diffraction pattern is **(GATE-MT-2013)**

(A) 1.91 (B) 1.63 (C) 1.41 (D) 1.15

9. A peak in the X-ray diffraction pattern is observed at $2\theta = 78^{\circ}$, corresponding to {311} planes of an fcc metal, when the incident beam has a wavelength of 0.154 nm. The lattice parameter of the metal is approximately **(GATE-MT-2012)**

(A) 0.6 nm (B) 0.4 nm (C) 0.3 nm (D) 0.2 nm

10. For a cubic metal with lattice parameter of 3.92 A, the first four diffraction peaks from the x -ray powder diffraction pattern taken with CuK_α radiation (λ =1.5405 A) occur at 2θ values of 39.7, 46.2, 67.5 and 81.3 degrees.The crystal structure of the metal is **(GATE-MT-2011)**

A. Simple Cubic
B. FCC
C. BCC
D. Diamond Cubic

11. The third peak in the XRD pattern of a polycrystalline BCC metal is

A. (111) **(GATE-MT-2010)**
B. (110)
C. (211)
D. (220)

12. Copper has FCC crystal structure With an atomic radius of 0.128 nm. In an X-ray diffraction experiment radiation of Wavelength 0.154 nm Is used .Assuming the order of reflection to be 1, The Bragg angle for the (220) set of planes in copper will be **(GATE-MT-2009)**

A. 12.56°
B. 36.98°
C. 48.98°
D. 74.51°

13. In the diffraction pattern of FCC metal obtained using CuK_α radiation (Wavelength of 0.154 nm) a diffraction peak appears at 2θ = 54.4° the lattice parameter of the crystal is 0.316 nm. **(GATE-MT-2008)**

Q1. The inter planer spacing in nm is

A. 0.158
B. 0.164
C. 0.177
D. 0.185

Answers

1. 34.8 to 36.1
2. C
3. 0.153 to 0.155
4. 0.225 to 0.235
5. 24.00 to 26.00
6. B
7. D
8.
9.
10.
11.