

Assignment
Generic Elective
Physical Chemistry, Ist year
Semester II (2020)
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Solids and Liquids

1. Molybdenum forms a body-centred cubic crystals whose density is 10.3 g/cm^3 . Calculate: (a) edge length of the unit cube, (b) distance between the (1, 1, 0) planes and between the (1,1,1) planes. Molar mass of Mo = 95.94 g/mol.
2. KNO_3 crystallizes in orthorhombic system with the unit cell dimensions $a = 542 \text{ pm}$, $b = 917 \text{ pm}$, $c = 645 \text{ pm}$. Calculate the diffraction angles for the first order X-ray reflections from (1,0,0), (0,1,0) and (1, 1, 1) planes using radiation with wavelength = 154.1 pm.
3. Write short notes on the imperfection or defects in crystals.
4. The surface tension of water is 72.8 dynes/cm. Calculate the energy required to disperse one spherical drop of radius 3.0 mm into spherical drops of radius $3.0 \times 10^{-3} \text{ mm}$.
5. Calculate the height to which water will rise in the glass capillary if the radius of the tube is 0.02 cm. The surface tension of water is 72.8 dynes/cm.
6. The viscosity of an oil is $0.05 \text{ Nm}^{-2} \text{ sec}$ and its density is 0.97 g cm^{-3} at 298 K. How long a given volume of the oil will take to flow through a viscometer if the same volume of water takes 50 sec. Given: $\eta(\text{H}_2\text{O}) = 0.00089 \text{ Nm}^{-2}\text{s}$. Take density of water as 1.0 g cm^{-3} .