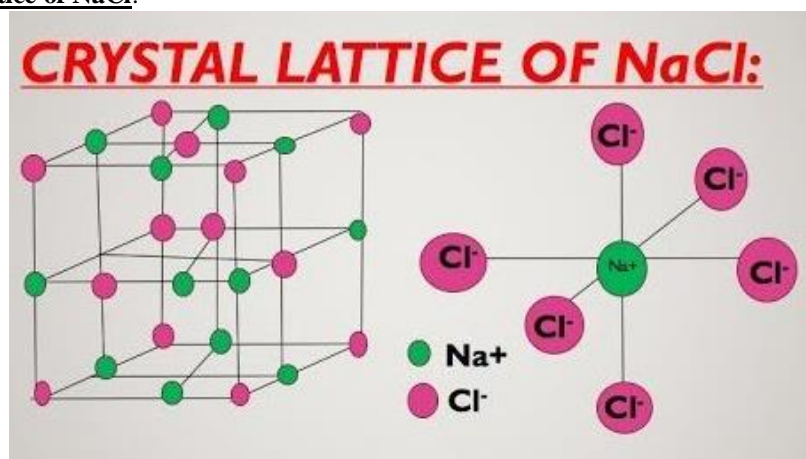# Home Assignment on the Topic Solid State Chemistry

1. What are the differences between crystalline and amorphous solids?
2. When a certain crystal was studied by Bragg's method using X-rays of wavelength 229 pm, first order X-ray reflection was observed at an angle of 23°20':
   (i)   What is corresponding inter-planar spacing?
   (ii)   When another X-ray source was used, a reflection was observed at 15°26'. What was the wavelength of these X-rays?
3. Write short notes on the following:
   (i)   Law of rational indices
   (ii)   Law of constancy of interfacial angle
   (iii) Schottky defect and Frenkel defect.
   (iv)   Unit cell and space lattice
   (v)   Law of crystallography
   (vi)   Liquid crystal
4. Determine the value of d_{hkl} in terms of the cell constants for the orthorhombic and tetragonal unit cells.
5. What are Miller indices? How are they determined?
6. Derive Bragg's equation of X-ray crystallography.
7. How many independent Bravais lattices are there in a cubic crystal system? Name them. Using a diagram show 100 and 110 planes in a primitive cubic lattice.
8. Determine the interplanar spacing between the (221) planes of a cubic lattice of length 450 pm.
9. The distance between two consecutive (110) planes of a crystal is 1.678×10^{-10} m. What will be the glancing angle for an X-ray of wavelength 0.65×10^{-10} m incident on the plane for first order reflection?

Crystal Lattice of NaCl:

Crystal Lattice of KCl: