PHY 491, Fall 2024 - Homework 5

DUE: Friday 10/04/24, 11:59pm

Problem 2.1 The tetrahedral bond angle of diamond is given by the angle between the body diagonals of a cube.

2.1.1 Use vector analysis to find the angle. (3 points)

Problem 2.2 Consider a cubic crystal.

2.2.1 Calculate the angles between the following planes: (8 points)

- (100) and (110)
- (100) and (111)
- (100) and (010)
- (111) and (113)

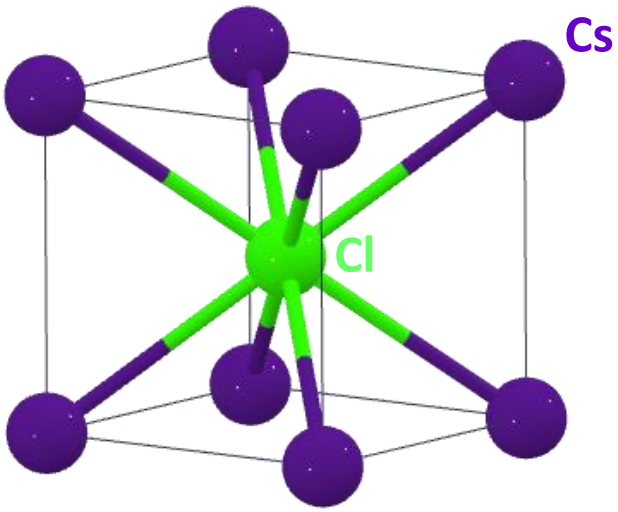
Problem 2.3 For the four crystal structures on the following page, identify:

2.3.1 type of lattice (crystal system and centering type) (3 points)

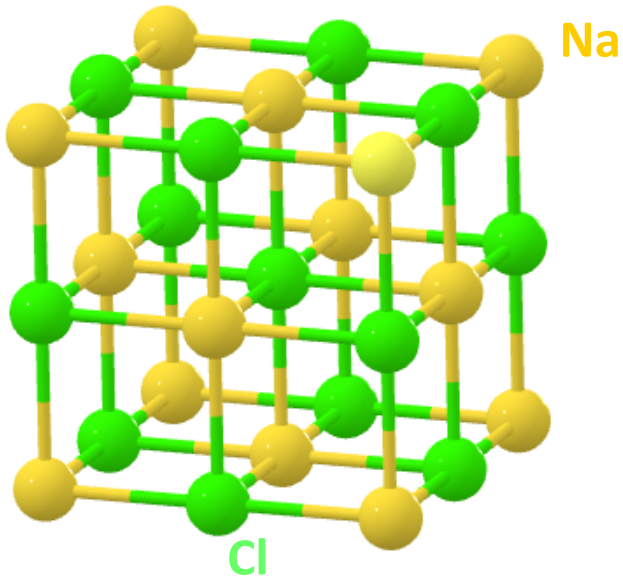
2.3.3 position of all atoms in basis (3 points)

2.3.3 number of each type of atom per unit cell (3 points)

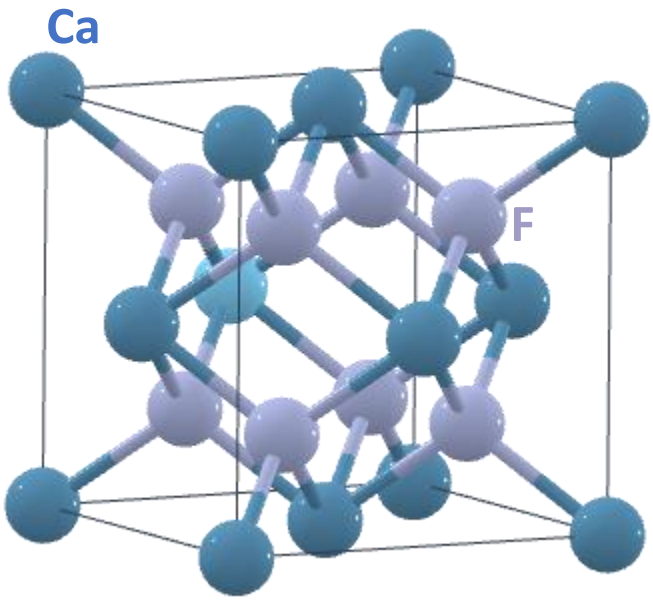
Cesium Chloride (CsCl)



Sodium Chloride (NaCl)



Calcium Fluoride (CaF_2)



Barium Titanate ($BaTiO_3$)