

CHEM 281 Name: _____

HW 6. Chapter 3. Ionic Solid Structures

Key Questions (relatively simple to answer using the Focus Information)

1. Explain the solid state structures of ionic compounds using the concepts applied for solid state metallic structures.

a) Body-centered Cubic (BCC)

i. CsCl Structure:

ii. CaTiO₃ Pervoskite Structure

b) Cubic Close Packing (CCP or FCC)

i Rock Salt Structure:

ii Fluorite Structure:

iii Sphalerite Structure:

c) Hexagonal Close Packing (hcp)

i. Wurtzite:

ii. Rutile:

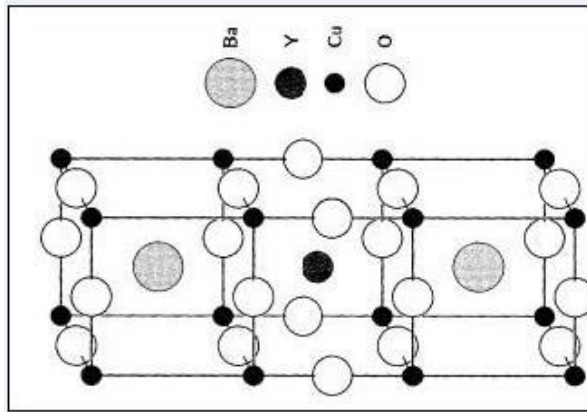
2. Give coordination number for both anion and cation of the following ionic lattices.

a) CsCl Structure:

b) Rock Salt Structure:

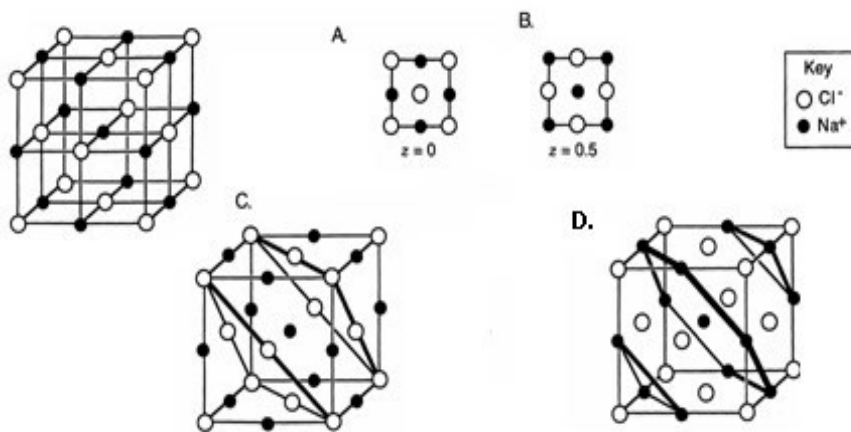
- c) Fluorite Structure:
- d) Sphalrite Structure:
- e) Wurtzite:
- f) Rutile:

3. Give the number of ions per unit cell of the pervoskite structure of superconducting



material (1-2-3:Y-Ba-Cu) given below:

- 4. Explain the factor affecting the ion coordination number in an ionic compound.
- 5. Why, in the study of an ionic lattice, is the anion packing considered to be the frame into which the cations fit?
- 6. Draw the Miller indices of the planes in the sodium chloride structures below:



7. What is radius ratio rule?

8. Suggest the probable crystal structure of (a) barium fluoride; (b) potassium bromide; (c) magnesium sulfide. You can use comparisons or obtain ionic radii from data tables.

9. Use a model to draw a partial ionic lattice diagram for the antifluorite structure of lithium oxide

10. In a sodium chloride lattice, the ions usually touch along the edge of the unit cell. If the ionic radii are in r^+ , and r^- , calculate the length of each side of the unit cell.

11. In a cesium chloride lattice, the atoms usually touch along the diagonal from one corner through the center of the cell to the opposite corner. If the ionic radii are r_+ and r_- , calculate the length of each side of the unit cell.

12. The ions in cesium chloride are arranged in a body-centered cubic unit cell. Calculate the radius of a cesium ion if the density of cesium chloride is 3.97 g-cm^{-3} , and it is assumed that the ions touch through the diagonal of the unit cell.