

Homework Assignment 1

Review: Covering Sections 1-all, 2.3-8, 3.1-4, 4.1-3
Ceramic Structures and defects: Covering Sections 12.1-5

Solve Questions 12.4, 12.6, 12.14, 12.25 (a and d only), 12.26, 12.34

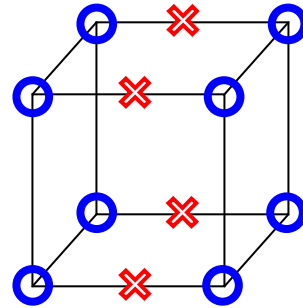
AND:

Extra Question 1)

- Draw a unit cell of a perovskite crystal.
- Identify/draw the [110]. Include atoms $\frac{1}{2}$ d-spacing above/below this plane (remember, a d spacing is $1/\sqrt{a^2+b^2+c^2}$).

Extra Question 2)

- How many of each atom are there in the following crystal?
- Draw the {110} for this crystal



Extra Question 3)

How many Frenkel defects will there be in a silver chloride crystal at 25 degrees Celsius if the energy for defect formation is 1.1 eV and the AgCl density is 5.5 g/cm^3 at this temperature?

Extra Question 4)

If CaO is added to CaCl_2 , what kinds of defects other than vacancies might form to compensate for the charge imbalance AND WHY?

- IDENTIFY 2 options. NOTE: you may substitute any other atom you wish if you so choose, create any interstitials you like (but NOT anionic interstitials EVER), or use combined sets of defects.
- How will each of your selections adjust the stoichiometry of the crystal?