UNIVERSITY OF PRETORIA

GLY 251 – CRYSTAL CHEMISTRY AND OPTICS

1. Semester test -second attempt

Answer all the questions and use sketches where applicable. Don't waffle!!
Do not contradict yourself !

Theory

1. Discuss the presence of the following symmetry elements in the 7 crystal systems: 3-fold, 4-fold, 5-fold [5]
2. A crystal plane cuts a: 1 step, b: 2 steps, c: 1 step, while another plane cuts at a: 7 steps, b: 2 steps, c:1 step. What are the Miller indices, and which of the 2 planes would you expect for which reasons, on the outside of a crystal? [5]
3. Discuss the relationship between crystal lattice, boding, and cleavage. [5]
4. Why are there only limited numbers of Bravais lattices and point groups? [5]
5. What parts of an atom are responsible for bonding and how does that affect the sizes of ions? [5]
6. Sketch an octahedral coordination. [5]
7. Discuss the effect of increasing pressure on the coordination number in a crystal. [5]
8. What is the difference between isotropic and isostructural? [5]
9. Explain "incompatible element" in such a way that it is scientifically correct and your grandmother would understand it. [5]
10. We all agree that mineralogy is heavy, but what might "heavy mineral" imply? [5]

Practical

11. I have seen chalcopyrite being rimmed by covellite. Use the graph (on the next page) to speculate in not more than 4 sentences about the implication of my observation. [10]