

GLY 251 - CRYSTAL OPTICS AND CHEMISTRY

01 June 2007

Internal examiner: Prof R.K.W. Merkle,
External examiner Dr. H. Mouri

Answer all questions. Write legibly. No creative spelling permitted. Use sketches where applicable. Points for each question are given in brackets. Total possible points = 100.

- 1 Quartz and tridymite: what are they, what are their compositions, how are they related, how are they different, how come they are important? **[10]**
- 2 Discuss whether olivine and enstatite have the same relationship as cyanite and andalusite. **[10]**
- 3 Can garnets have any combination of elements and element ratios, or are there rules that have to be obeyed by minerals in general and garnets in particular? **[10]**
- 4 How do you identify a mineral under the microscope? Give all required steps from grain selection to identification of the optical character. **[10]**
- 5 What equation is fundamental for X-ray diffraction (please provide this equation) and what information can you obtain from this technique? **[10]**
- 6 An analysis gives (in weight %): SiO_2 55.05; Al_2O_3 23.35; K_2O 21.59. Discuss whether this mineral analysis represents a feldspar. **[10]**
- 7 A cubic mineral gives an analysis of SiO_2 36.41; Al_2O_3 20.6; MnO 43.00 (in weight %). Discuss whether this is johannsenite (the manganese equivalent of diopside). **[10]**
Calculate a proper mineral formula. **[10]**
- 8 The following analysis (in weight %) is of a spinel. TiO_2 0.7; Al_2O_3 7.5; FeO 54.8; MgO 3.3; ZnO 28.35. Do whatever is required. Discuss whether this analysis is of acceptable quality. **[10]**
Calculate a proper mineral formula. **[10]**