

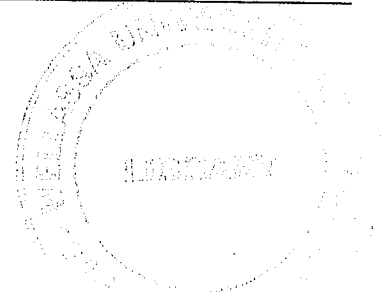
Uva Wellassa University, Sri Lanka
End Semester Examination – August/September 2011

MRT 311-2 - Physics and Chemistry of Minerals

Time: Two (02) hours



Index Number:



Part B

4. State the Paulin's rules and describe their significance in formation of bonds in minerals. (15 marks)

5. Explain three (3) mineral analysis techniques in detail. (15 marks)

6. Describe followings.

- I. Defects in minerals
- II. Strengthening mechanism of minerals
- III. Importance of Bowen's reaction series in mineral crystallization

(15 marks)

7. Given below is an EMPA result of a Garnet. Recalculate its chemical formula on the basis of 12 oxygens.

Oxide	Weight %	Molecular weight (g/mol)
SiO ₂	39.23	60.08
Al ₂ O ₃	20.29	101.96
TiO ₂	0.03	79.88
FeO	4.67	71.85
MnO	0.34	70.94
MgO	0.09	40.31
CaO	35.25	56.08
Na ₂ O	0.09	61.98
K ₂ O	0.04	94.20

Write down the complete formula of the garnet and comment on the composition of it (consider garnet solid solutions).

(15 marks)

8. Perform following calculations.

- I. Lithium iodide (LiI) crystal has a face-centred cubic unit cell. If the edge length of the unit cell is 620 pm, determine the ionic radius of I⁻ ion.
- II. Lithium borohydrides (LiBH₄) crystallizes in orthorhombic system with 4 molecules per cell. The unit cell dimensions are: a = 6.81 Å, b = 4.43 Å and c = 7.17 Å. Calculate the density of the crystal. (atomic mass of Li = 6.941, B = 10.811 and H = 1.008 a.m.u)

(15 marks)