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_2O_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_2O	0.09	61.98
K_2O	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 ($LiBH_4$) crystallizes in orthorhombic system with 4 molecules pe 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)