GEO 2K03

DAY CLASS   Dr. A.P. Dickin
DURATION OF EXAMINATION: 2 Hours

McMaster University Final Examination   December 2007

THIS EXAMINATION PAPER INCLUDES 1 PAGE AND 7 QUESTIONS. YOU ARE
RESPONSIBLE FOR ENSURING THAT YOUR COPY OF THE PAPER IS COMPLETE.
BRING ANY DISCREPANCY TO THE ATTENTION OF YOUR INVIGILATOR.

Special Instructions: Answer any four questions. Each question is of equal weight.

1. Write notes on three of the following subjects, with illustrations where appropriate:
a) Bravais lattices   b) Electronegativity and bonding in silicate minerals
c) Miller index   d) Ionic radius and co-ordination number of cations in minerals

2. Answer both parts:
a) give an account (including cross sections) of how the 'Becke line' phenomenon is caused for a
mineral in 'grain mount'.
b) draw the shape of the unit cell for each of the 6 crystal systems, labelling the lengths of sides and
angles between faces, and describing the shape of the indicatix for each.

3. Use diagrams to explain the principles (ie optic theory) of how a uniaxial figure is produced on
a petrological microscope. Briefly compare with a biaxial figure.

4. Compare the structure of forsterite, enstatite, tremolite, talc, and tridymite (use diagrams where
possible). Describe a typical occurrence (paragenesis) for each mineral.

5. Describe (with compositional diagrams and formulae) the chemistry of the feldspars, the spinel
group, and the ortho- and clino pyroxenes and amphiboles.

6. Use diagrams to compare structure/chemistry and briefly describe the typical occurrence of these
six sheet silicates: kaolinite, serpentine, muscovite, phlogopite, chlorite and illite.

7. Write illustrated notes on three of the following:
a) the solvus in alkali feldspars
b) the structure, chemistry and occurrence of two ring silicates
c) the structure and P-T stability of silica polymorphs
c) equilibrium and fractional crystallisation in the olivine system.

THE END