

GEO 306 Min.-Pet. I
Homework #4; 28 Feb. 2003
Due: 5 March 2003

Name _____

- 1) The plagioclase feldspars comprise a continuous compositional series between the endmembers albite (Ab; $\text{NaAlSi}_3\text{O}_8$) and anorthite (An; $\text{CaAl}_2\text{Si}_2\text{O}_8$). For a plagioclase feldspar of composition $\text{Ab}_{36.5}\text{An}_{63.5}$, give:
- a) the composition as a feldspar chemical formula based on eight oxygens
 - b) the composition as weight percent component oxides.
 - c) the name given to a feldspar of this composition (Hint: see Klein, Fig. 11.47)
- 2) From the following chemical analysis for an alkali feldspar, express the composition of this feldspar in terms of the endmember feldspar compositions (e.g., $\text{Or}_x\text{Ab}_y\text{An}_z$, where $x+y+z=100$).

Oxide	(weight %)
SiO_2	65.98
Al_2O_3	20.71
Na_2O	8.97
K_2O	2.66
CaO	1.69

- 3) Sketch and label a ternary feldspar compositional diagram and plot on it the feldspars from questions 1) and 2).
- 4) The unit cell of garnets is cubic, with total cell content $Z = 8$ (for a formula based on 12 oxygens). For grossular, the length of the unit cell edge measured by X-ray diffraction is 11.85\AA . Calculate **a)** the unit cell volume, expressed as cm^3 ; **b)** the formula weight (12 oxygens); **c)** the mass of one mole of unit cells of grossular (in grams); **d)** the mass of one unit cell (grams); **e)** the theoretical density (expressed as g/cm^3) for grossular; and **f)** the specific gravity (Hint: see pp. 33-34; the density of pure water at 4°C is $1.0000\text{ g}/\text{cm}^3$).

Note: correct units must be supplied with all answers.