**Aqueous Geochemistry Triangular-diagram Laboratory**

**Compound Formula Gfo kcal/mol**

Quartz SiO2 -204.7

Amorphous silica SiO2 -203.3

Lime CaO -144.4

Portlandite Ca(OH)2 -214.7

Periclase MgO -136.1

Brucite Mg(OH)2 -199.2

Wollastonite CaSiO3 -370.4

Forsterite Mg2SiO4 -491.2

Enstatite MgSiO3 -349.4

Talc Mg3Si4O10(OH)2 -1324.7

Tremolite Ca2Mg5Si8O22(OH)2 -2779.9

Chrysotile Mg3Si2O5(OH)4 -964.9

Serpentine Mg3Si2O5(OH)4 -965.1

Water H2O -56.7

**Using thermodynamic data given for the compounds, complete the following:**

1. Compose table of mole percent of CaO, MgO, and SiO2 in each of the compounds. (You need not worry about the mole percent of H2O because we are assuming that water is ubiquitous and is, therefore, not a factor in determining mineral stabilities.)

2. Plot the compositions on a compositional diagram with the components CaO-MgO-SiO2. (**Put SiO2 at the top and MgO to the lower right.**) (Hand this diagram in with your completed lab.)

3. Eliminate any unstable collinear phases or duplicate phases at the apices, and redraw your diagram. (Remember a stable intermediate phase does not eliminate the endpoints of the line, it just means that all three phases are stable.)

4. Draw in **all** the possible tie-lines connecting the stable phases. (Hand this diagram in with your completed lab)

5. Eliminate unstable assemblages by eliminating any crossing tie-lines and redraw your diagram.

6. What is the stable mineral assemblage for the following bulk compositions:

CaO MgO SiO2

a. 30% 10% 60%

b. 4% 44% 52%

c. 24% 40% 36%

d. 0% 50% 50%

**Show all your work and turn in all diagrams and tables to get full credit**.