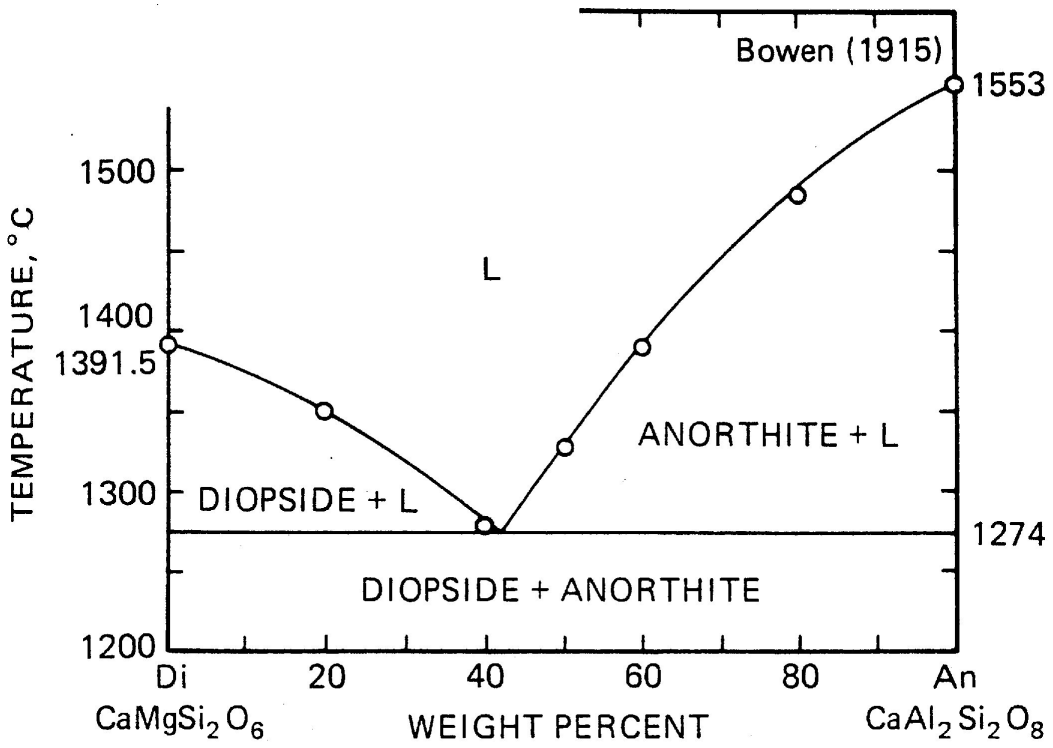
ESS103A Igneous Petrology Name_____
April 25, 2005
Diopside-anorthite diagram

Consider the following system:



1. Consider the following compositions:

A: X_{An} = 10% (X_{Di} = 90%)

B: X_{An} = 50% (X_{Di} = 50%)

How many components **C** are needed to describe each of these systems?

2. How many phases are present at: composition **A**, 1500°C? composition **A**, 1300°C? composition **B**, 1300°C?

3. This is a typical binary phase diagram for two phases that do not form a solid solution. Where is the liquidus in this diagram? Where is the solidus?

4. Use the **lever rule** to determine the weight percent of the melt and the solid at 1325°C for composition **A**.

Here's how the **lever rule** works:
Assume our bulk system is at composition **A**, and at a particular temperature the composition of the solid is represented by **X** and the composition of the liquid is represented by **Y**.

X A Y

Wt% liquid = 100 x XA/(XY) where XA = distance between A and Y, etc.
Wt% solid = 100 x AY/(XY)

5. Which system, **A** or **B**, crystallizes over a larger temperature range?

6. Which system, **A** or **B**, contains a greater wt% melt when it reaches 1274°C?

7. At 1274°C, the point at which the di+liquid and an+liquid fields meet is called the **eutectic**. Complete the reaction equation that describes what happens at this point:

Liquid = _____

This is called a **discontinuous** reaction.

8. What is the composition of **B** at 1200°C? Explain how **B** reached this final composition as it cooled from 1500°C.