

BINARY PHASE DIAGRAMS - PERITECTIC BEHAVIOR

1. Examine figure 1 on the attached sheet for the Wollastonite (CaSiO_3) -Walstromite ($\text{BaCa}_2\text{Si}_3\text{O}_9$) - BaSiO_3 system. On the attached diagram, outline each liquidus line in green, each solidus line in brown.

a. What is the minimum number of components necessary to describe all of the phases shown? _____

b. How many phases are present in the region labeled $\beta\text{-CaSiO}_3$ + -Walstromite ($\text{BaCa}_2\text{Si}_3\text{O}_9$)?

c. How many phases are present in the region labeled $\alpha\text{-CaSiO}_3$ + Liq?

d. How many phases are there in the region labeled BaSiO_3 + Liq.?

e. How does the number of degrees of freedom change on going from $\alpha\text{-CaSiO}_3$ + Liq to $\text{BaCa}_2\text{Si}_3\text{O}_9$ + Liq.? _____

f. How does the number of degrees of freedom change on going from $\text{BaCa}_2\text{Si}_3\text{O}_9$ + Liq. to $\text{BaCa}_2\text{Si}_3\text{O}_9$ + BaSiO_3 ? _____

g. List the phases present at the peritectic point.

h. How many degrees of freedom does the sample have at the peritectic point?

i. List the phases present at the eutectic point.

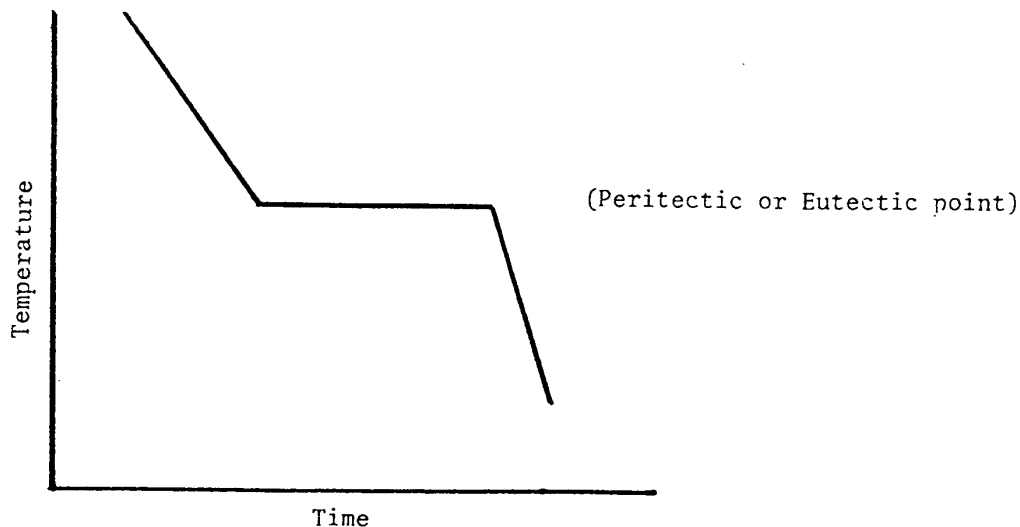
j. How many degrees of freedom does the sample have at the eutectic point?

k. How do your answers to g through j explain the observed cooling curve (figure 2) which could apply to either the peritectic or eutectic points?

2. Starting with a composition of 49% BaSiO₃, trace the behavior of the melt from 1600°C to 1200°C. Show the path followed by the liquid in red, the path followed by the solid in blue.
- At what temperature does the solid first appear? _____
 - What is the composition of the first solid? _____
 - At 1325°C, what phases are present? _____
 - What percent of each phase is present? _____
- (HINT: See Lever Rule file)
- At 1300°C, what phases are present? _____
 - At 1300°C, what percent of each phase is present? _____
 - What phases are present at 1200°C? _____
 - At 1200°C what is the percent of each phase present?

 - What temperature does the last liquid disappear? _____
 - What is the composition of the last liquid? _____

FIGURE 2



Wollastonite (CaSiO_3) - Walstromite ($\text{BaCa}_2\text{Si}_3\text{O}_9$) - BaSiO_3

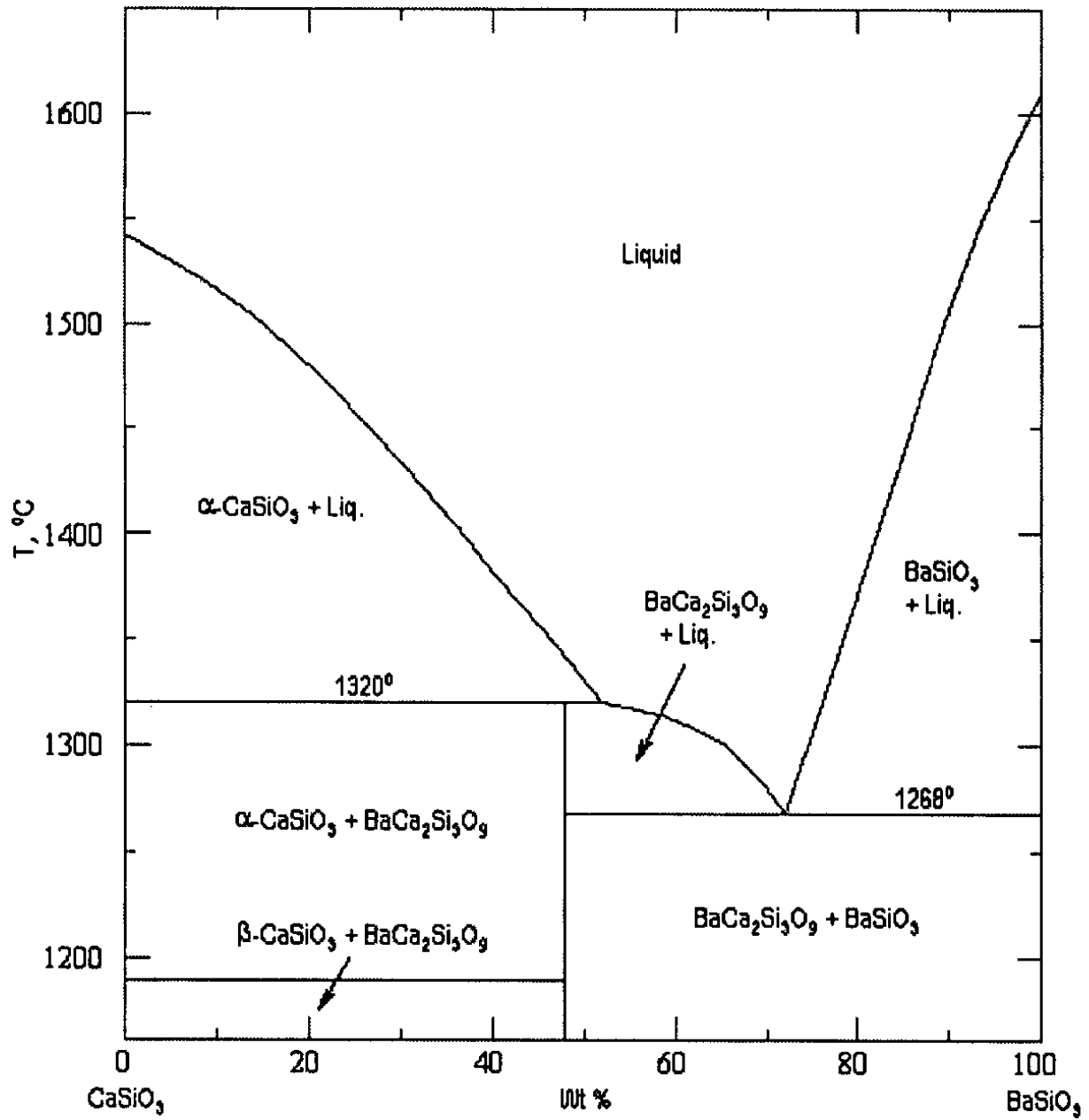


Figure 1

