The System $CaO-SiO_2$:

The system $CaO-SiO_2$ illustrates many of the reactions. As shown in fig.(28), there are four intermediate compounds, which are:

1- The compound **$CaO.SiO_2$** undergoes an β-α transformation at 1125°C and melts congruently at 1544°C.

2- The compound **$3CaO.2SiO_2$** melts incongruently at 1464°C to form α $2CaO.SiO_2$ and liquid.

3- The compound **$2CaO.SiO_2$** transforms from the γ to the α' form when heated to 725˚C and at 1450°C transforms from α' to α before melting congruently at 2130°C.

4- The compound **$3CaO.SiO_2$** is stable between 1250°C and 2070°C. At the latter temperature, it melts incongruently to form CaO and liquid.

In the system $CaO-SiO_2$**,** two liquids are in equilibrium above 1705°C for compositions containing approximately 2-28% CaO. Since the Ca-O bond is considerably stronger than the Na-O bond, stable liquid-liquid separation occurs. The attraction of the calcium ion for oxygen is of sufficient magnitude to cause the melt to separate into two liquids: one liquid containing a small percentage of Ca and the other a relatively large percentage.

There is no apparent solid solution between any of the phases in the system. There are three eutectic points at (1436, 1460 and 2050)°C, two peritectic points at (1464 and2070)°C and one monotectic point at (1705)°C.

The system Na_2O-SiO_2 exhibits no stable liquid immiscibility (which is represented by metastable subliquidus in phase diagram).

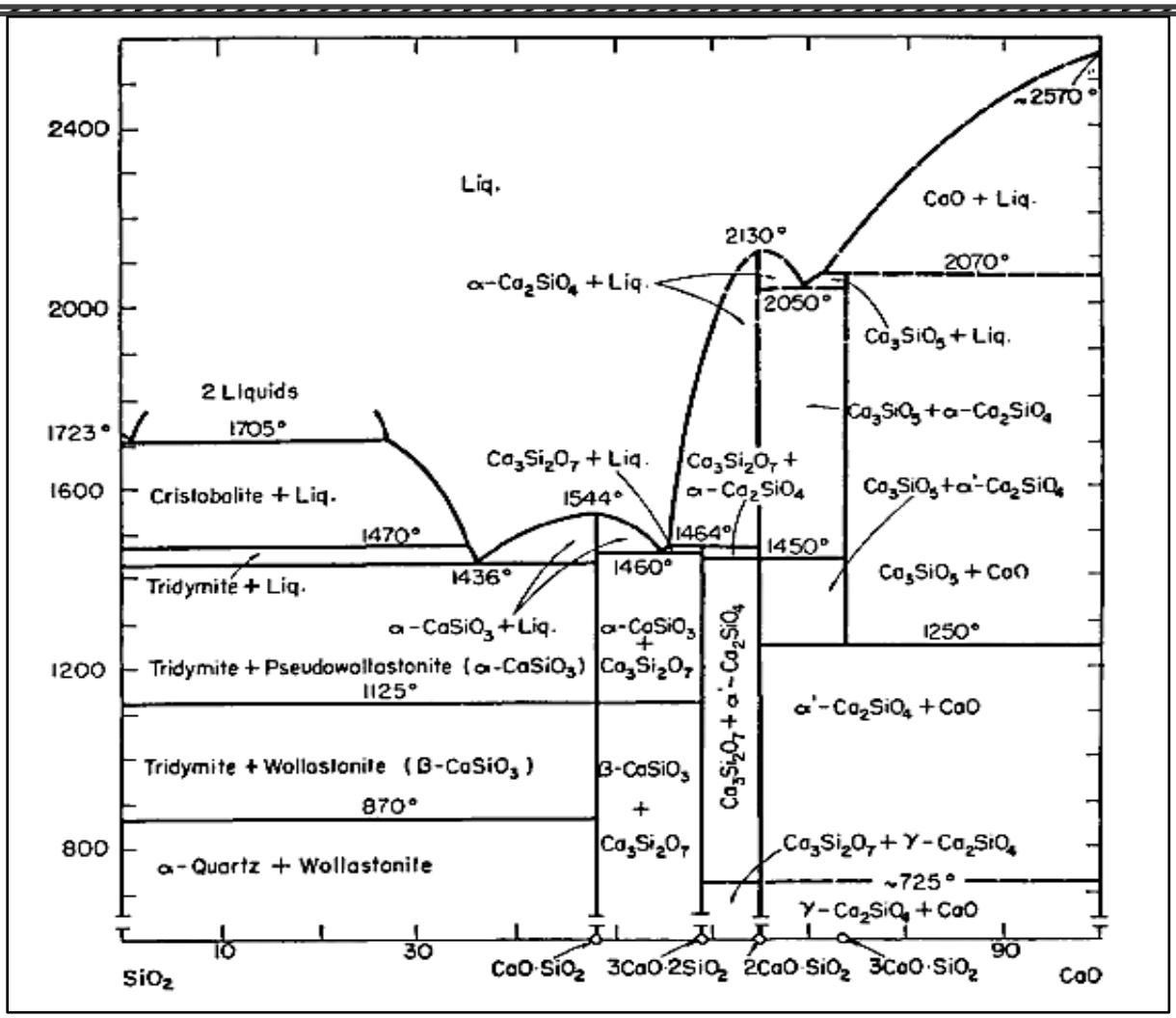

Fig.(28) System CaO-SiO_2.

Example: System R-G is shown in fig.(29).

1- Make an isoplethal study for a melt of composition 20wt% G and 80wt% R.

2- What are the reactions which occur in this system?

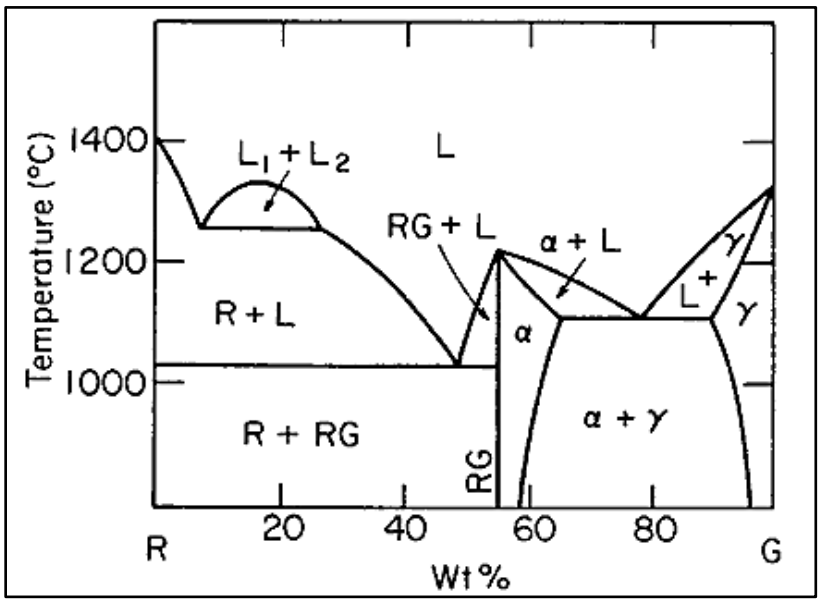

Fig. (29) System R-G