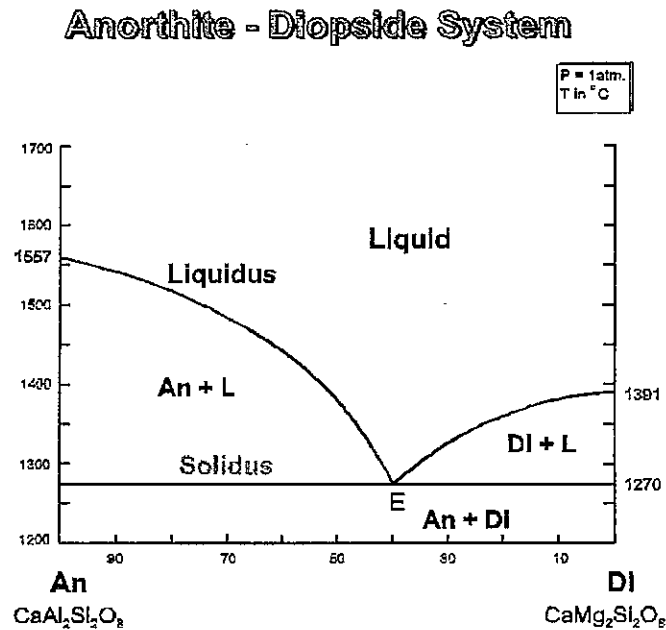


※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. The below phase diagram represents the equilibrium crystallization of anorthite

(An)-diopside (DI) system. The bulk composition of X at 1500°C is 20% Anorthite-80% Diopside.



(1-1) What phase will be the first observed crystal for X as it cools from 1500°C? (5%)

(1-2) Calculate the ratio of liquid and the solid phase for X at 1300°C during cooling from 1500°C? (5%)

2. Define and describe the differences between the reconstructive, displacive and order-disorder transformation. (15%)

3. Please explain the nouns as below: (25%)

(3-1) sintering

(3-2) Fick's second law

(3-3) ferroelectric materials

(3-4) solid solution

(3-5) exsolution

4. Please list the kinds of point defects for ceramic materials (10%)

5. What is the crystal system for the below symmetry? (10%)

(5-1) 4/m

(5-2) 2/m 2/m 2/m

6. For a single component system, why do the polymorphs stable at high temperatures have higher enthalpies than polymorphs stable at low temperatures, e.g. $H(\gamma\text{-Fe}) > H(\alpha\text{-Fe})$? (10%)

7. If the anions are arranged in a face-centered cubic lattice, draw the 3-D structure and identify the octahedral and tetrahedral sites which cation can be incorporated. (10%)

8. Solid solution

(8-1) What are the two most important factors that determine whether solid solution will take place or not? (5%)

(8-2) What is effect of temperature on solid solution? (5%)