

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

1. Let's get some information from the phase diagram of alkali feldspar at the various temperatures (Fig.1). Assume very slow (equilibrium) cooling of the alkali feldspar with the composition of $Ab_{38}Or_{62}$.
 - (a) What phases exist at each temperature (1200°C, 800°C and 450°C)? (6%)
 - (b) What are the relative amounts of the phases at each temperature? (6%)
 - (c) Please use the phase rule to explain the degree of freedom at 450°C. (8%)
 - (d) What phenomena for the conversion of single feldspar into two feldspars? Please use the thermodynamics to explain why the single feldspar exists at high temperature and the two feldspars exist at lower temperature. (10%)

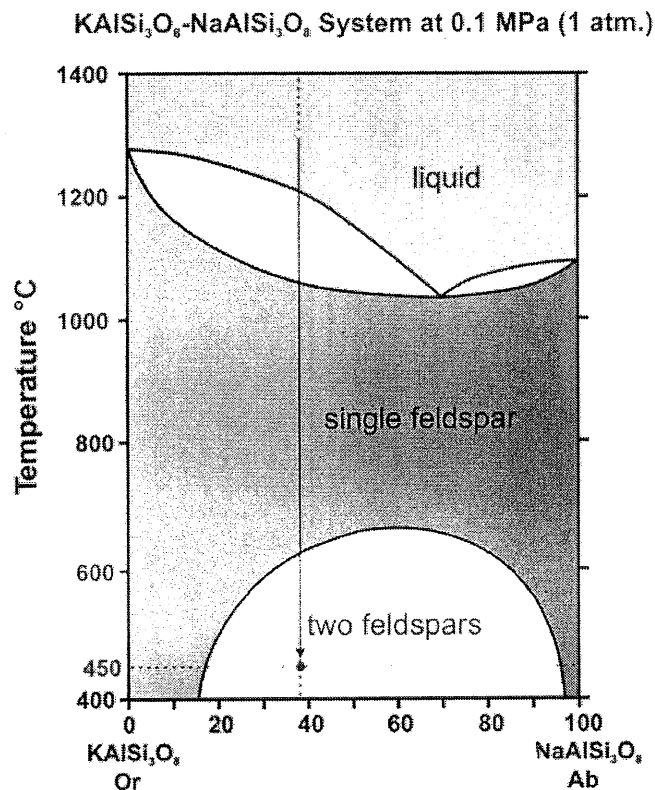


Fig.1

2. The arrangement of the oxygen ions for Fe_3O_4 is face centered cubic packing. (a) Identify and draw the positions of the octahedral and tetrahedral interstices. (10%) and (b) calculate the numbers of oxygen ions and tetrahedral and octahedral interstitial sites in the Fe_3O_4 unit cell. (10%)
3. Please derive the critical nuclei size and activation energy of the homogenous nucleation for the transformation from liquid to solid. (10%)

編號： 86

國立成功大學 109 學年度碩士班招生考試試題

系 所：資源工程學系

考試科目：材料科學導論

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4. Please explain the meaning of the space group, $P2_1/b 2_1/c 2_1/m$, including the symmetry directions, crystal system, Bravais lattice, symmetry element. (20%)

5. Please explain (a) the Schottky defect, Frenkel defect and electronic defect of ZnO (10%) and then (b) write the possible defect reaction equilibrium equations for the substitution of Co_2O_3 for ZnO (10%).