

國立成功大學

113學年度碩士班招生考試試題

編 號：84

系 所：資源工程學系

科 目：材料科學導論

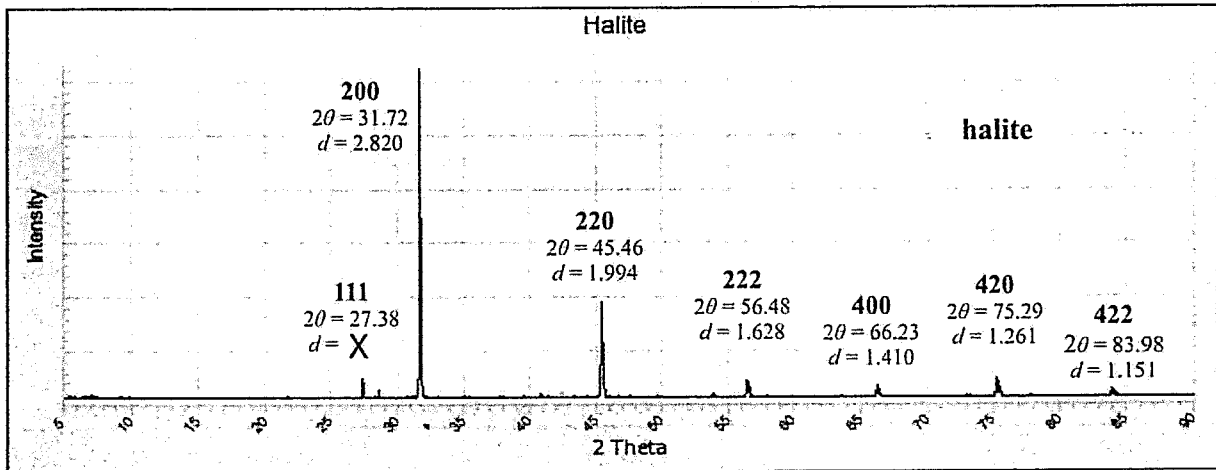
日 期：0201

節 次：第 3 節

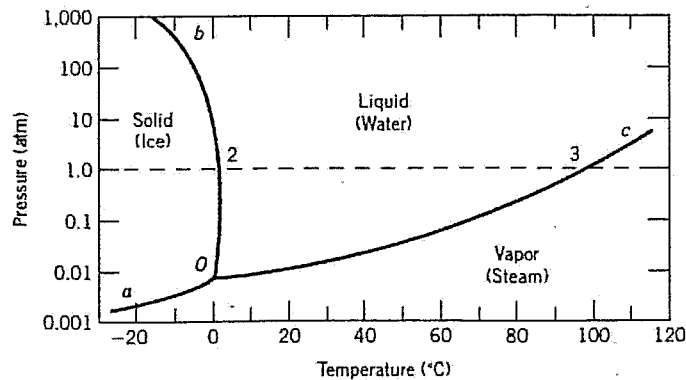
備 註：可使用計算機

※ 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. Give electron configurations for the V^{3+} and S^{2-} ions. (^{16}S , ^{23}V) (10%)
2. List the most efficient packing way for packing equal-sized atoms and explain the stacking sequence. (10%)
3. (a) Using two parallel planes (periodic atomic arrangement) to explain Bragg's law by plotting the relationship among x-ray wavelength, interatomic spacing, and diffraction angle. (b) Write down Bragg's equation and use it to calculate the missing d value (x) in the below figure. (c) Explain the scientific meaning of the x and y axis. (d) Explain why there are no brackets describing the value like 200 or 220. (Cu $K\alpha$: 1.54 Å) (20%)



4. (a) List the seven crystal systems and their lattice parameters (axial and interaxial angles) (b) Plot the representative unit cell geometries for the seven crystal systems (c) Explain the relationship between crystal system, point groups, Bravais Lattice and space group. (20%)
5. Explain how Gibbs' Phase Rule applied to a point, curves, and fields of water P-T diagram. (10%)



6. Calculate the number of Frenkel defects per cubic meter in silver (atomic weight: 107.87 g/mol) chloride (35.45 g/mol) at 350 °C. The energy for defect formation is 1.1 eV, while the density for is 5.50 g/cm³. (Avogadro's number: 6.023 x 10²³ atoms/mol; Boltzmann's constant: 8.62 x 10⁻⁵ eV/K) (10%)
7. (a) Explain the meaning of areas A, B, C and explain the difference between these three areas. (b) Explain the curve a, and point b, (c) Qualitatively determine the mineral composition during the mineral X cooling pathway at 1150°C, 900°C, and 550°C. (20%)

