

國立成功大學

114學年度碩士班招生考試試題

編 號：67

系 所：資源工程學系

科 目：材料科學導論

日 期：0211

節 次：第 3 節

注 意：1. 可使用計算機
2. 請於答案卷(卡)作答，於
試題上作答，不予計分。

1. Assuming MnS with the following radii, $r(S^{2-}) = 1.84 \text{ \AA}$, $r(Mn^{2+}) = 0.67 \text{ \AA}$, then determine the coordination numbers. (10%)
2. (a) Explain "unit cell" and "lattice", (4%) and (b) Explain how the idea of lattice comes up with seven unit cell shapes, (4%) (c) Please plot the seven unit cell geometries and list related parameters (axial and interaxial angles). (12%)
3. Explain the difference between Miller indices and Laue indices. (10%)
4. Give the electron configurations for the ^{24}Cr , and the ionic states, Cr^{2+} and Cr^{3+} (10%)
5. Calculate the fraction of lattice sites that are Schottky defects for cesium chloride at its melting temperature (645°C). Assume an energy for defect formation of 1.86 eV. (Avogadro's number: 6.023×10^{23} atoms/mol; Boltzmann's constant: 8.62×10^{-5} eV/K) (10%)
6. Explain Perovskite, and why this can be widely applied to material science. (10%)
7. Zinc selenide has a band gap of 2.58 eV. Over what range of wavelengths of visible light is it transparent? (Hint: visible light 400~700nm, Planck's constant: 4.13×10^{-15} eV-s, velocity of light: 3×10^8 m/s) (10%)
8. (a) Explain the meaning of point T_a , T_b , and curve C and D (8%) (b) Explain what kind of materials system result in this type of phase diagram, (4%) (c) Qualitatively determine the mineral composition during the mineral X cooling pathway at 1500°C , 1300°C , 1250°C and 1000°C . (8%)

