



Materials Science and Engineering

TOPIC 6. CERAMIC MATERIALS

Exercises

1. Draw the unit cell and describe the following ceramic structures:
 - a) NaCl structure
 - b) CsCl structure
 - c) Perovskite structure

2. ZnSe has a Zn-blende structure. Calculate:
 - a) The volume of the unit cell and volumetric density expressed in g/cm^3 .
 - b) The packing factor.
 - c) The linear density (ions/mm) in the direction [111].
 - d) The planar density (ions/ mm^2) in the plane (111).Data $r(\text{Zn}^{2+}) = 0.060 \text{ nm}$; $r(\text{Se}^{2-}) = 0.191 \text{ nm}$, $M(\text{Zn}) = 65.37$, $M(\text{S}^{3+}) = 78.96$

3. What is the glass transition temperature? Describe how the specific volume changes with temperature for a glass and for a crystalline material, when these materials are cooled from the liquid state.

4. Describe the structure and give an example for each one of the following silicates:
 - a) Orthosilicates
 - b) Pyrosilicates
 - c) Layered silicates