

Tutorial IV

Structures

1. Draw the structure of NaCl and shade the atoms forming the (111) plane.
2. How are the Ca^{+2} and F^- ions arranged in the Fluorite structure ?
3. What is the main structural difference between NaCl and NiAs structures.
4. Give brief (one or two lines) justification for :
 - a) huge difference of lattice energy between MgO and NaCl
 - b) existence of two possible structures for GeO_2
 - c) less stability of face-shared octahedral compared to vertex shared octahedral structures
5. Draw the unit cell generated from a cubic close packing of **A** atoms and shade the close packed layers.
6. What is the main structural difference between CdI_2 and CdCl_2 structures.
 - 7(a) Draw the crystal structure of the K_2NiF_4 structure. (b) Compare the structure with an idealised perovskite unit cell.
8. A solid $\text{A}_2\text{B}_2\text{O}_5$ has a structure related to the perovskite structure. Give two possible ways in which the structure may accommodate the oxygen vacancies.
9. Draw the crystal structure of $\text{YBa}_2\text{Cu}_3\text{O}_7$. (b) Compare the structure with an idealised perovskite unit.
10. Give an example each of a structural distortion due to (i) a lone pair and (ii) crystal field effect.
11. Draw the crystal structure of $\text{YBa}_2\text{Cu}_3\text{O}_7$. (b) Compare the structure with an idealised perovskite unit cell.
12. How is the structure of CsCl described?
13. What kind of packing does diamond have ?