

1. Determine the basis vectors of the primitive unit cell of the CuSO_4 crystal. What Bravais lattice underlies this lattice? Specify the Cartesian coordinates of the basis vectors and all atoms inside the primitive elementary cell. Determine the space group number for the CuSO_4 lattice (use <https://www.cryst.ehu.es/>). Calculate the volume of a primitive elementary cell.
2. Mechanism for resistance appearance in semiconductors. Why resistivity have an exponential dependence on temperature (give the description for this mechanism). Position and temperature dependence for Fermi energy and chemical potential.
3. Tight-binding approximation. Band-gap formation.
4. Don't forget to include the results of the VASP calculation.