

## Tutorial problems and questions

1. Consider NiAl which prefers to order into B2 structure. Suppose the crystal structure deviates slightly from 50 at.%. What happens?

## Answer

The alloys with exact 50 at.% composition are known as stoichiometric. The off-stoichiometry, in ordered alloys, can lead to point defects. One type of point defect is known as anti-site defect. In this case, the off-stoichiometry is accommodated by the excess atoms occupying the lattice position of the other atoms; these atoms are thus at wrong sites and hence the name. In some cases (for example, excess Al in NiAl), this can also lead to vacancies which are twice the off-stoichiometry value. This is because the excess atoms still occupy their own lattice positions (say cube corners); since there is shortage of atoms of the other type, the corresponding sites in the other sublattice (cube centres in this case) are left vacant. Note that off-stoichiometry can also lead to two phase order+disorder coexistence regions if the defects are not accommodated by such point defects.