

# Homework Quiz #5A

solution outline

You wish to make p-type germanium.

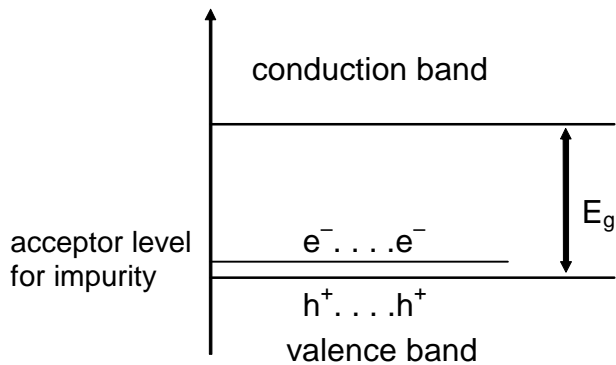
(i) Name a suitable dopant.

You need to dope with an electron donor, which means an element from Group 13. So this gives you B, Al, Ga, and In as candidates.

(ii) Name the majority charge carrier in the doped material.

The majority charge carrier is the hole, which moves in the valence band.

(iii) Draw a schematic energy band diagram of the doped material and label (i) the valence band, (ii) the conduction band, (iii) the band gap energy, and (iv) an energy level associated with the impurity. Give the proper name of (iv).



(iv) Name a compound semiconductor containing indium (In).

In is in group 13, so you need to combine it with an element from group 15. This means N, P, As, and Sb are candidates. Your choice of compound is then InN, InP, InAs, or InSb.