## FREE CARRIER DENSITY

## Chemical analysis of a germanium crystal reveals indium at a level of 0.0003091 atomic percent. Assuming that the concentration of thermally excited charge carriers from the Ge matrix is negligible, what is the density of free charge carriers (free carriers/cm3) in this Ge crystal?

1. BORON DOPING

Determine the amount (in grams) of boron that when substitutionally incorporated into1 kg of silicon will establish a charge carrier density of 3.091×1017 carriers/cm3.

1. H4P4: N-TYPE SILICON

You wish to make n-type silicon.

1. Select **all** suitable dopant atoms from the following list:

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PBMgGaAsInSbAlTlH

1. Name the majority charge carrier in the doped material.

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HolesElectronsElectron-hole pairsThe dopant ion

1. The conduction band is at a higher energy than the valence band. True or false?

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TrueFalse

1. No electronic states lie between the conduction and valence bands in n-type silicon. True or false?

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TrueFalse

## H4P5: ABSORPTION EDGE

Gallium nitride (GaN) is a semiconductor with a bandgap Eg=3.2 eV. Calculate the absorption edge of GaN. Express your answer in units of m.

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