**PHYS 321 Extrinsic Semiconduction Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

18.28 *Will each of the following elements act as a donor or an acceptor when added to the indicated semiconducting material? Assume that the impurity elements are substitutional.*

|  |  |
| --- | --- |
| ***Impurity*** | ***Semiconductor*** |
| *P* | *Ge* |
| *S* | *AlP* |
| *In* | *CdTe* |
| *Al* | *Si* |
| *Cd* | *GaAs* |
| *Sb* | *ZnSe* |

18.29 *(a) The room-temperature electrical conductivity of a silicon specimen is 5.93 × 10–3 (Ω-m)–1. The hole concentration is known to be 7.0 × 1017 m–3. Using the electron and hole mobilities for silicon in Table 18.3, compute the electron concentration. (b) On the basis of the result in part (a), is the specimen intrinsic, n-type extrinsic, or p-type extrinsic? Why?*

18.31 *The following electrical characteristics have been determined for both intrinsic and p-type extrinsic indium phosphide (InP) at room temperature:*

|  |  |  |  |
| --- | --- | --- | --- |
|  | **σ (Ω -*m*)–1** | ***n* (*m*–3)** | ***p* (*m*–3)** |
| *Intrinsic* | *2.5 × 10-6* | *3.0 × 1013* | *3.0 × 1013* |
| *Extrinsic (n-type)* | *3.6 × 10-5* | *4.5 × 1014* | *2.0 × 1012* |

*Calculate electron and hole mobilities.*