18.38 Here we are asked to calculate the room-temperature electrical conductivity of silicon that has been doped with 2 x 10^{24} m⁻³ of boron atoms. Inasmuch as B is a group IIIA element in the periodic table (Figure 2.6) it acts as an acceptor in silicon. Thus, this material is *p*-type extrinsic, and it is necessary to use Equation 18.17, with $p = 2 \times 10^{24}$ m⁻³ since at room temperature all of the B acceptor impurities are ionized. The hole mobility, from Figure 18.18 at an impurity concentration of 2×10^{24} m⁻³, is 0.0065 m²/V-s. Therefore, the conductivity is equal to

$$\sigma = p/e |\mu_e| = (2 \times 10^{24} \text{ m}^{-3})(1.602 \times 10^{-19} \text{ C})(0.0065 \text{ m}^2/\text{V}-\text{s}) = 2080 (\Omega - \text{m})^{-1}$$

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