

### Answer on Question #61902, Physics / Solid State Physics

Calculate the Hall coefficient for potassium which has a bcc structure with a lattice constant of 0.538 nm.

**Solution:**

$$R_h = \frac{1}{en}$$

Where, n is concentration of electrons; e is electron charge.

$$\frac{\text{atomic weight}}{\rho} \times 10^{-6} = a^3 \frac{N_a}{n}$$

$$n = \rho a^3 \frac{N_a}{\text{atomic weight} \times 10^{-6}}$$

Then,

$$R_h = \frac{\text{atomic weight} \times 10^{-6}}{e \rho a^3 N_a}$$

Where, atomic weight for potassium (39,0983 g/moll),  $\rho$  density (0,856 g/cm<sup>3</sup>), a is a lattice constant (5,38\*10<sup>-8</sup> cm),  $N_A = 6,022 \cdot 10^{23} \text{ moll}^{-1}$

$$R_h = \frac{39,0983 \text{ g/moll} \times 10^{-6}}{1.6 \cdot 10^{-19} \text{ C} \times 0,856 \text{ g/cm}^3 \times (5,38 \cdot 10^{-8} \text{ cm})^3 \times 6,022 \cdot 10^{23} \text{ moll}^{-1}} = 3.4 \cdot 10^{12} \text{ C}^{-1}$$

**Answer:  $3.4 \cdot 10^{12} \text{ C}^{-1}$**