

(18.6) A 10.0 g sample of iodobenzene is shaken with 100 ml of 1 M KI solution containing 2500 cpm  $^{131}\text{I}$ . The activity of the iodobenzene at the end of 2 h is 250 cpm. What percent of the iodine atoms in the iodobenzene have exchanged with the iodide solution?

$$M_{wC} := 12.01 \cdot \frac{\text{gm}}{\text{mole}} \quad M_{wH} := 1.008 \cdot \frac{\text{gm}}{\text{mole}} \quad M_{wI} := 126.90 \cdot \frac{\text{gm}}{\text{mole}}$$

$$N_A := 6.0221367 \cdot 10^{23} \cdot \text{mole}^{-1} \quad \text{Bq} := \text{sec}^{-1}$$

$$R_I := 2500 \cdot \text{min}^{-1} \quad v_{KI} := 100 \cdot \text{mL} \quad C_{KI} := 1 \cdot \frac{\text{mole}}{\text{liter}}$$

$$S_{KI} := \frac{\frac{R_I}{v_{KI}}}{N_A \cdot C_{KI}} \quad S_{KI} = 6.919 \cdot 10^{-22} \cdot \text{Bq} \quad \text{Bq/Iodine atom in KI}$$

$$m_{ib} := 10 \cdot \text{gm} \quad M_{wib} := 6 \cdot M_{wC} + 5 \cdot M_{wH} + M_{wI} \quad R_{ib} := 250 \cdot \text{min}^{-1} \quad N_{ib} := \frac{m_{ib}}{M_{wib}} \cdot N_A$$

$$S_{ib} := \frac{R_{ib}}{N_{ib}} \quad \text{Bq/molecule of iodobenzene, but one I-atom per molecule}$$

$$n := \frac{S_{ib}}{S_{KI}} \quad \text{I-atoms from KI/molecule iodobenzene } \text{exch} := 100 \cdot n \quad \text{exch} = 20.4 \quad \%$$