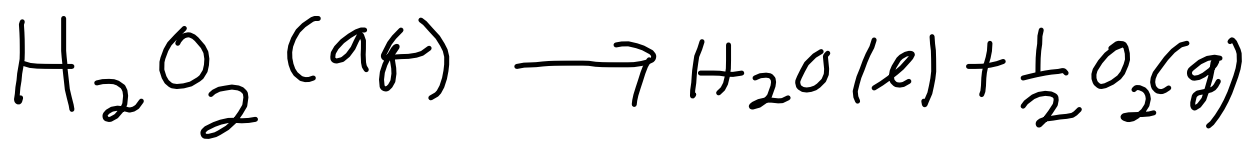




$$R = - \frac{\Delta[\text{H}_2\text{O}_2]}{\Delta t}$$

$$\begin{aligned}\Delta[\text{H}_2\text{O}_2] &= [\text{H}_2\text{O}_2]_f - [\text{H}_2\text{O}_2]_i \\ &= 0.697 \frac{\text{mol}}{\text{L}} - 0.882 \frac{\text{mol}}{\text{L}} \\ &= -0.185 \frac{\text{mol}}{\text{L}}\end{aligned}$$

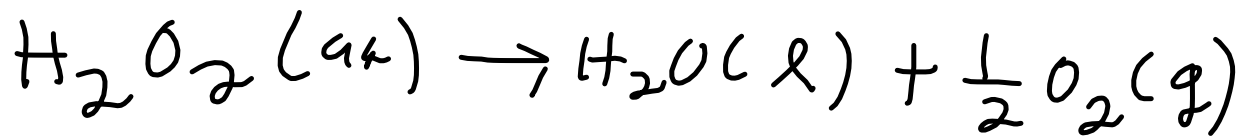
$$\begin{aligned}\Delta t &= t_f - t_i \\ &= 60 \text{ s} - 0 \text{ s} \\ &= 60 \text{ s}\end{aligned}$$



$$R = - \frac{\Delta[\text{H}_2\text{O}_2]}{\Delta t}$$

$$= - \frac{-0.185 \frac{\text{mol}}{\text{L}}}{60 \text{ s}}$$

$$= + 3.08 \times 10^{-3} \frac{\text{mol}}{\text{L s}}$$



$$R = - \frac{\Delta[\text{H}_2\text{O}_2]}{\Delta t}$$

$$\begin{aligned}\Delta[\text{H}_2\text{O}_2] &= [\text{H}_2\text{O}_2]_f - [\text{H}_2\text{O}_2]_i \\ &= 0.094 \frac{\text{mol}}{\text{L}} - 0.120 \frac{\text{mol}}{\text{L}} \\ &= -0.026 \frac{\text{mol}}{\text{L}}\end{aligned}$$

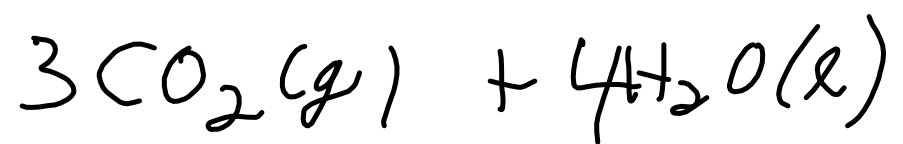
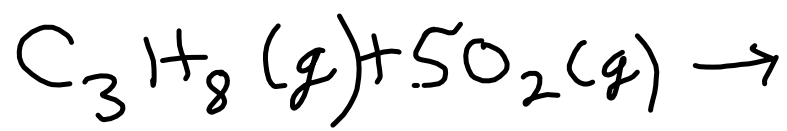
$$\begin{aligned}\Delta t &= t_f - t_i \\ &= 600 \text{ s} - 540 \text{ s} \\ &= 60 \text{ s}\end{aligned}$$

$$\begin{aligned}R &= - \frac{\Delta[\text{H}_2\text{O}_2]}{\Delta t} \\ &= - \frac{-0.026 \frac{\text{mol}}{\text{L}}}{60 \text{ s}} \\ &= +4.3 \times 10^{-4} \frac{\text{mol}}{\text{L s}}\end{aligned}$$



$$R = k[A]^x[B]^y$$

$$R \stackrel{?}{=} k[A]^2[B]^1 \quad \text{only if the reaction is elementary}$$





$$\frac{5.7 \times 10^{-5} \text{ mol L}^{-1} \text{ s}^{-1}}{1.9 \times 10^{-5} \text{ mol L}^{-1} \text{ s}^{-1}} = \frac{k (0.0039 \text{ mol L}^{-1})^x (0.0045 \text{ mol L}^{-1})^y}{k (0.0013 \text{ mol L}^{-1})^x (0.0045 \text{ mol L}^{-1})^y}$$

$$\frac{5.7}{1.9} = \left(\frac{0.0039 \text{ mol L}^{-1}}{0.0013 \text{ mol L}^{-1}} \right)^x$$

$$3 = (3)^x \rightarrow x = 1$$

$$\frac{a^x}{b^x} = \left(\frac{a}{b}\right)^x$$

$$R = k[A]^1[B]^Y$$

$$\cancel{3.8 \times 10^{-5} \text{ mol L}^{-1} \text{ s}^{-1}} = k \left(\cancel{0.0013 \text{ mol L}^{-1}} \right)^1 \left(\cancel{0.0090 \text{ mol L}^{-1}} \right)^Y$$

$$\cancel{1.9 \times 10^{-5} \text{ mol L}^{-1} \text{ s}^{-1}} = k \left(\cancel{0.0013 \text{ mol L}^{-1}} \right)^1 \left(\cancel{0.0045 \text{ mol L}^{-1}} \right)^Y$$

$$\frac{3.8}{1.9} = \left(\frac{\cancel{0.0090 \text{ mol L}^{-1}}}{\cancel{0.0045 \text{ mol L}^{-1}}} \right)^Y$$

$$2 = (2)^Y \rightarrow Y = 1$$

$$R = k[A][B]$$

↓ solve for k

$$k = \frac{R}{[A][B]}$$

$$= \frac{1.9 \times 10^{-5} \text{ mol L}^{-1} \text{ s}^{-1}}{(0.0013 \text{ mol L}^{-1})(0.0045 \text{ mol L}^{-1})}$$

$$= 3.2 \text{ mol}^{-1} \text{ L s}^{-1}$$

$$\frac{\text{mol L}^{-1} \text{ s}^{-1}}{\text{mol}^2 \cdot \text{L}^{-2}} = \text{mol}^{-1} \cdot \text{L s}^{-1}$$

$$R = 3.2 \text{ mol}^{-1} \text{ L s}^{-1} [A][B]$$