$$H_2O_2(aq) \longrightarrow H_2O(l) + \frac{1}{2}O_2(g)$$

$$R = -\frac{\Delta[H_2O_2]}{\Delta t}$$

$$\Delta[H_2O_2] = [H_2O_2]_f - [H_2O_2]_i$$

$$= 0.697 \frac{mol}{L} - 0.882 \frac{mol}{L}$$

$$= -0.185 \frac{mol}{L}$$

$$\Delta t = t_f - t_i$$

$$= 60s - 0s$$

$$= 60s$$

$$H_2O_2(aq) \longrightarrow H_2O(l) + \frac{1}{2}O_2(g)$$

$$R = -\frac{\Delta[H_2O_2]}{\Delta t}$$

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

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

$$H_2O_2(aq) \rightarrow H_2O(l) + \frac{1}{2}O_2(g)$$

$$R = -\frac{\Delta[H_2O_2]}{\Delta t}$$

$$\Delta[H_2O_2] = [H_2O_2]_f - [H_2O_2]_i$$

$$= 0.094 \frac{mol}{L} - 0.120 \frac{mol}{L}$$

$$= -0.026 \frac{mol}{L}$$

$$\Delta t = t_f - t_i$$

$$= 600\,s - 540\,s$$

$$= 60\,s$$

$$R = -\frac{\Delta[H_2O_2]}{\Delta t}$$

$$= -\frac{-0.026 \frac{mol}{L}}{60\,s}$$

$$= +4.3 \times 10^{-4} \frac{mol}{L\,s}$$

$$2A + B \rightarrow C + 3D$$

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

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

$$C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(\ell)$$

$$2A + B \rightarrow 2C$$

$$R = K[A]^X[B]^Y$$

$$5.7 \times 10^{-5}\ mol\,L^{-1}\,s^{-1} = K(0.0039\ mol\,L^{-1})^X(0.0045\ mol\,L^{-1})^Y$$

$$1.9 \times 10^{-5}\ mol\,L^{-1}\,s^{-1} = K(0.0013\ mol\,L^{-1})^X(0.0045\ mol\,L^{-1})^Y$$

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

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

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

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

$$\frac{3.8 \times 10^{-5}\ \text{mol L}^{-1}\text{s}^{-1}}{1.9 \times 10^{-5}\ \text{mol L}^{-1}\text{s}^{-1}} = \frac{k(0.0013\ \text{mol L}^{-1})^1(0.0090\ \text{mol L}^{-1})^Y}{k(0.0013\ \text{mol L}^{-1})^1(0.0045\ \text{mol L}^{-1})^Y}$$

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

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

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

$$\downarrow \text{ solve for } k$$

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

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

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

$$\uparrow$$

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

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