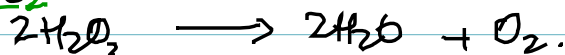


Simplify ..

Kinetics ③ Rate and Time Dependence - 1st order

Decomposition of H_2O_2 is 1st order with respect to H_2O_2



The rate constant at 20°C is $1.8 \times 10^{-5} \text{ s}^{-1}$. If starting conc. of H_2O_2 is 0.75 M , Determine

- (a) conc. of H_2O_2 after 3 hr.
→ (b) how long will it take for H_2O_2 conc. to drop to 0.10 M ?

Ans

$$\ln \frac{[A]_t}{[A]_0} = -kt$$

$$\ln \frac{[\text{H}_2\text{O}_2]_t}{0.75 \text{ M}} = -1.8 \times 10^{-5} / \text{s} \times (10,800) \text{ s} \quad (\text{3 hr.})$$

inverse of natural log ($\ln$) $(e^{-0.1944})$

$$\frac{[\text{H}_2\text{O}_2]_t}{0.75 \text{ M}} = 0.823$$

$$[\text{H}_2\text{O}_2]_t = 0.823 \times 0.75 \text{ M} = \boxed{0.62 \text{ M}}$$

(b) $\ln \frac{[0.10] \text{ M}}{[0.75] \text{ M}} = -1.8 \times 10^{-5} / \text{s} \times t$

$$-2.015 = -1.8 \times 10^{-5} / \text{s} \times t$$

$$\frac{-2.015}{-1.8 \times 10^{-5} / \text{s}} = t$$

$$= \boxed{1.12 \times 10^5 \text{ s}}$$

Sapna Gupta ..

Kinetics (3) Rate and Time Dependence - 1st order

Decomposition of H_2O_2 is 1st order with respect to H_2O_2



The rate constant at 20°C is $1.8 \times 10^{-5} \text{ s}^{-1}$. If starting conc. of H_2O_2 is 0.75 M , Determine

- (a) conc. of H_2O_2 after 3 hr.
- (b) how long will it take for H_2O_2 conc. to drop to 0.10 M ?

Ans

$$\ln \frac{[A]_t}{[A]_0} = -kt$$

$$\ln \frac{[A]_t}{[A]_0}$$

$$(a) \ln \frac{[\text{H}_2\text{O}_2]_t}{0.75 \text{ M}} = -1.8 \times 10^{-5} \text{ s}^{-1} \times (10,800 \text{ s})$$

$$= -0.1944$$

inverse of natural log ($\ln$) $(e^{-0.1944})$

$$\frac{[\text{H}_2\text{O}_2]_t}{0.75 \text{ M}} = 0.823$$

$$[\text{H}_2\text{O}_2]_t = 0.823 \times 0.75 \text{ M} = \boxed{0.62 \text{ M}}$$

$$(b) \ln \frac{(0.10) \text{ M}}{(0.75) \text{ M}} = -1.8 \times 10^{-5} \text{ s}^{-1} \times t$$

$$-2.015 = -1.8 \times 10^{-5} \text{ s}^{-1} \times t$$

$$\frac{-2.015}{-1.8 \times 10^{-5} \text{ s}^{-1}} = t$$

$$= \boxed{1.12 \times 10^5 \text{ s}}$$