

A first order reaction has a rate constant  $1.15 \times 10^{-3} \text{ s}^{-1}$ . How long will 5 g of this reactant take to reduce to 3 g?

1) 0s   2) 400s   3) 444s   4) 100s

**Ans.**

$$[A]_0 = 5\text{g}; [A] = 3\text{g}; k = 1.15 \times 10^{-3} \text{ s}^{-1}$$

For 1st order reaction,

$$\begin{aligned} t &= \frac{2.303}{k} \log \frac{[A]_0}{[A]} \\ &= \frac{2.303}{1.15 \times 10^{-3} \text{ s}^{-1}} \log \frac{5}{3} \\ &= 2.00 \times 10^3 (\log 1.667) \\ &= 443.8 \text{ s} \approx 444 \text{ s} \end{aligned}$$