The time for half-life period of a certain reaction A → Products is 1 hour when the initial concentration of the reactant 'A' is 2.0 mol L^{-1}, How much time does it take for its concentration to come from 0.50 to 0.25 mol L^{-1} if it is a zero-order reaction?

(1) 1 h

(2) 4 h

(3) 0.5 h

(4) 0.25 h

Solution:

The half life period for a zero order reaction is given by $t_{1/2} = [A_0]/2k$

A_0 is the initial concentration of the reactant.

$K_0 = [A_0]/2t_{1/2}$

$= 2/2 \times 1$

$= 1 \text{ mol } L^{-1}h^{-1}$

Rate constant for a zero order reaction is given by $k = (1/t) [A_0 – A]$

$t = (1/k) [A_0 – A]$

$= 0.50\text{-}0.25/1$

$= 0.25$ h