

## Kinetics (5) Half life.

- ① The decomposition of ethane ( $C_2H_6$ ) to methyl radicals is 1<sup>st</sup> order ~~with~~ with  $k = 5.36 \times 10^{-4} / s$  at  $100^\circ C$ .  
 $C_2H_6 \rightarrow 2CH_3^\bullet$   
What is the half life of the reaction?

Ans

$$t_{1/2} = \frac{0.693}{k} \quad t_{1/2} = \frac{0.693}{5.36 \times 10^{-4} / s} = 1293 s$$

- ② ~~the~~ Iodine atoms combine in gas phase as  
 $I + I \rightarrow I_2$ . The reaction is 2<sup>nd</sup> order  
with  $k = 7.0 \times 10^9 / Ms$  at  $23^\circ C$ . Calculate  
the half life when initial conc. is 0.60M and  
when initial conc. is 0.42M.

Ans

$$t_{1/2} = \frac{1}{k[A]_0}$$

$$t_{1/2} @ 0.60M = \frac{1}{7.0 \times 10^9 / Ms \times 0.60M} = 2.4 \times 10^{-10} s$$

$$t_{1/2} @ 0.42M = \frac{1}{7.0 \times 10^9 / Ms \times 0.42M} = 3.4 \times 10^{-10} s$$