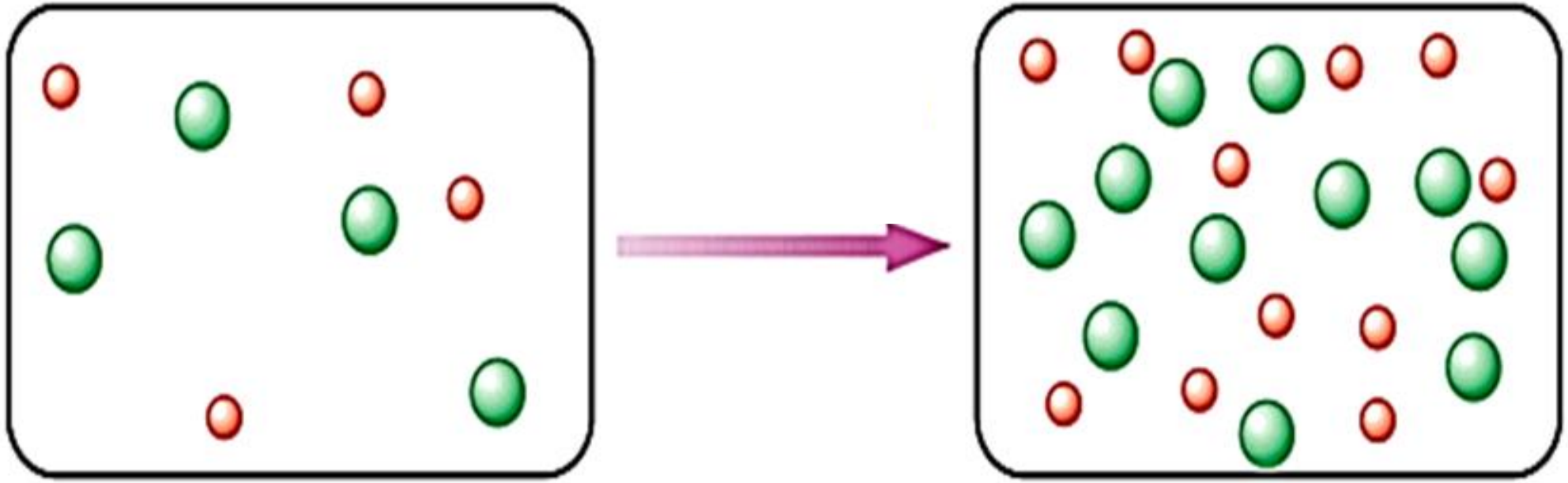
Chapter 3

Kinetic factors

1- influence of the initial concentration of reactant(s):

- The rate of disappearance of reactants and that of the formation of a product increases when the initial concentration of reactant(s).

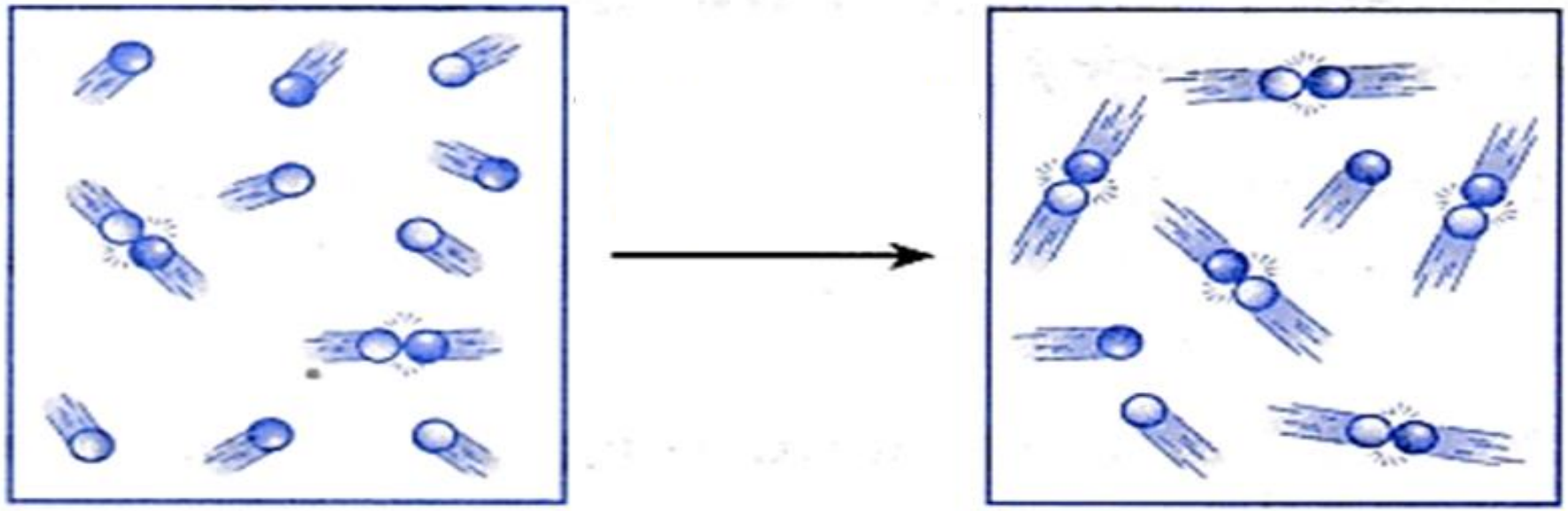


- There are a few molecules.
- There are a few collisions.
- The reaction is slow.

- There are many molecules.
- There are more collisions.
- The reaction is fast

2- influence of temperature

- The rate of disappearance of reactants and that of the products increase when the temperature increase

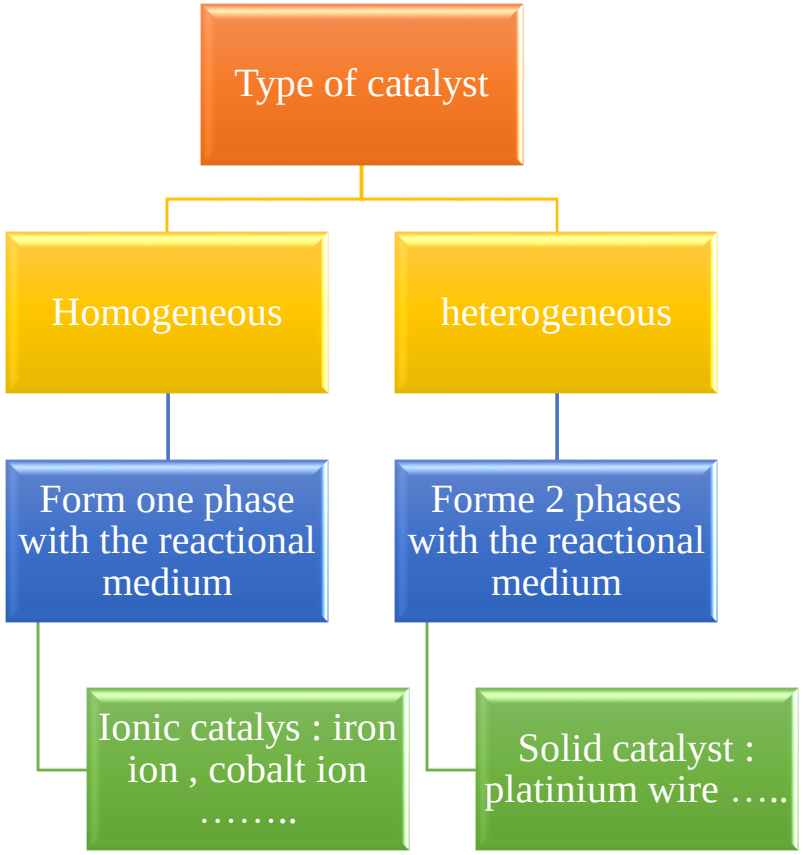


- At low temperature, the particles move more slowly.
- Collision frequency is low.

- At a higher temperature, the particles move faster.
- Collision frequency is higher

3- effect of a catalyst

- **Definition :** a catalyst is a chemical substance that accelerate the reaction and remains unaltered at the end of the reaction.



Characteristics:

- **Selectivity :**

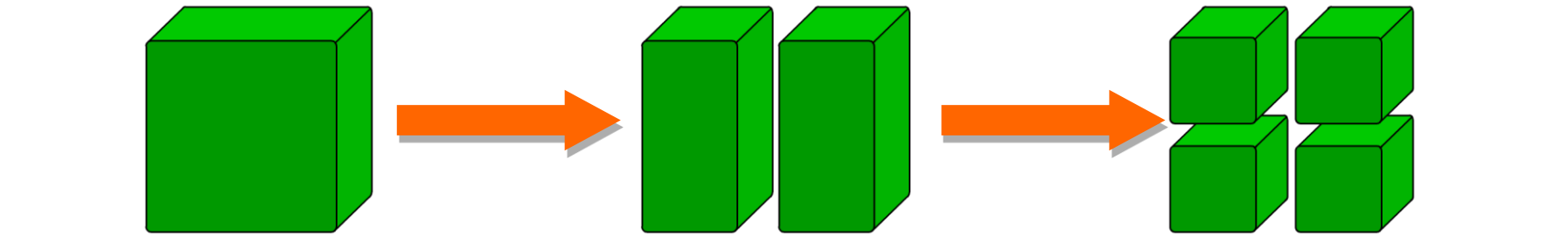
Starting from the same reactants the products of reaction may be different according to the used catalyst

- **Activity :**

The lesser the quantity of the catalyst,which is capable to cause a noticeable incrase in the rate of the reaction,the more active is the catalyst

4- influence of the surface area of contact

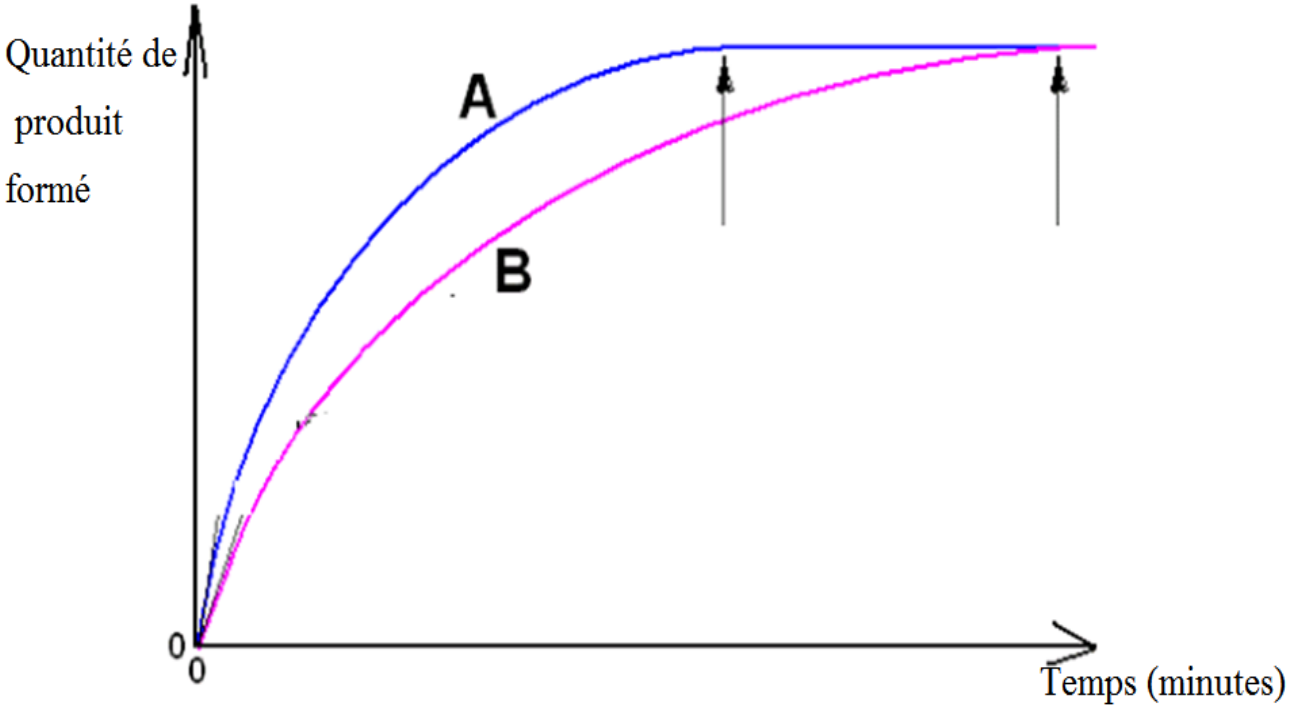
- The rate of disappearance of the reactants and that of the formation of the products increases when the contact surface between the reactants increases.



Low contact surface area **High surface area of contact**

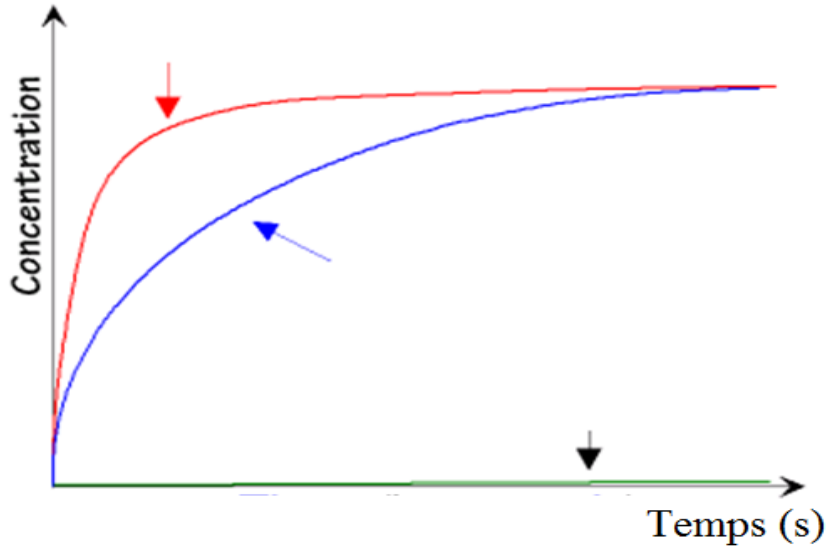
Application 1 :

Identify the faster reaction:



Application 2:

Match each term with the necessary curve. Justify

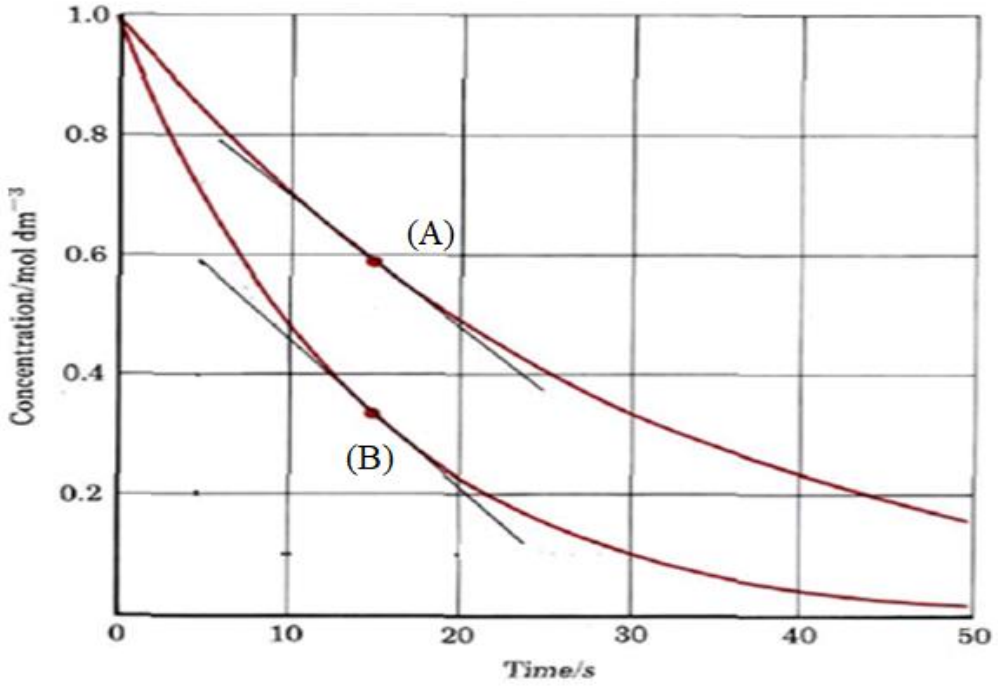


With catalyst

Without catalyst

Application 3:

Match the temperature with the curve needed. justify



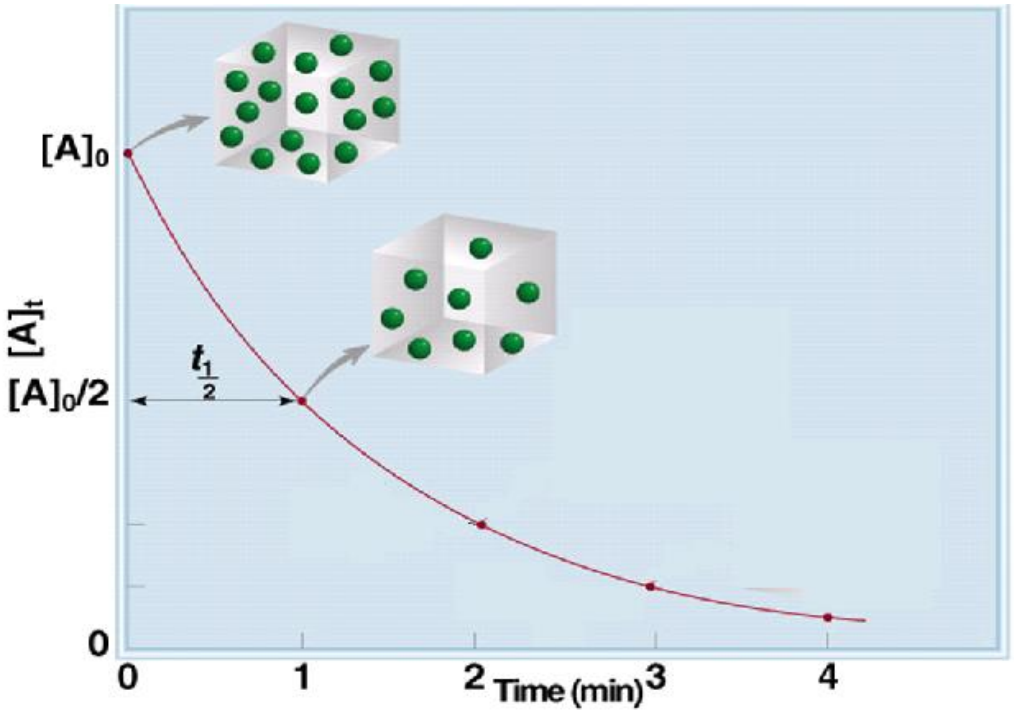
80°C

50°C

Half-life time of the reaction:

1- limiting reactant :

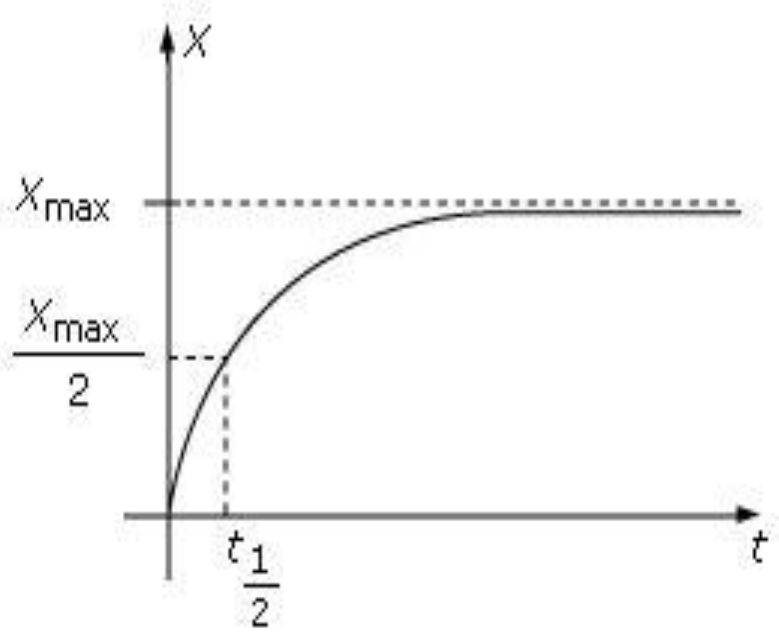
Half-life time of the reaction is the time needed for the half of the initial quantity of the limiting reactant to be consumed



$t_{½}$ corresponds to :
$[A]_0$ / 2 or n initial / 2
graphically $t_{½}$ = time

2- product:

Half-life time of the reaction is the time needed for the maximum quantity of product to be formed



$t_{½}$ corresponds [p]∞ /2 ou n(P)∞ /2
Graphically t $t_{½}$ = time