Kinetics/Rates of reactions

$$Fe + HCl \longrightarrow H_2 + FeCl_3 + heat$$

↳ warm

$$Li + HCl \longrightarrow H_2 + LiCl + heat$$

↳ explosive

measuring rates

$\frac{\Delta V}{\Delta t}$ $\frac{\Delta T}{\Delta t}$ $\frac{\Delta mass}{\Delta t}$

$\frac{\Delta P}{\Delta t}$ $\frac{\Delta \text{ absorbance}}{\Delta t} \propto \frac{\Delta [\ ]}{\Delta t}$

comparing rates of different components of a reaction

$$A + 2B \longrightarrow C + 3D$$

rate

$$2\frac{\Delta[A]}{\Delta t} = \frac{\Delta[B]}{\Delta t}$$

$$\frac{\Delta[A]}{\Delta t} = \frac{1}{2}\frac{\Delta[B]}{\Delta t} = (-1)\frac{\Delta[C]}{\Delta t} = (-1)\frac{1}{3}\frac{\Delta[D]}{\Delta t}$$

Collision theory:

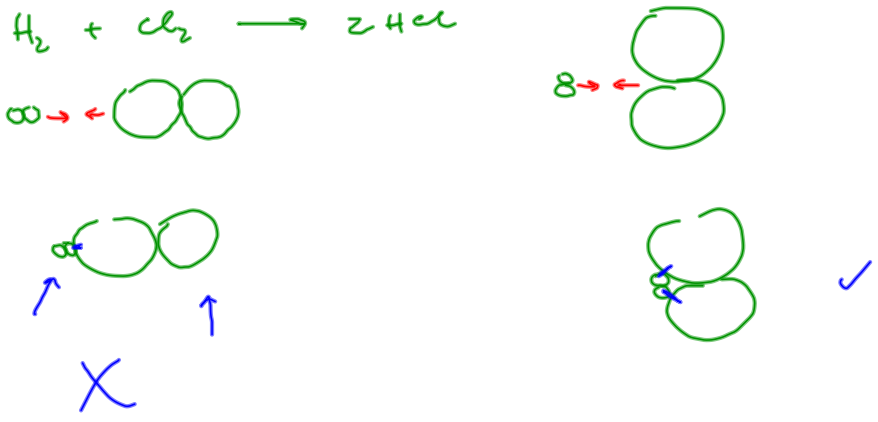
In order to react, $A + 2B \longrightarrow C + 3D$

molecules must collide → same place

with enough energy → to break bonds (Act. Nrg)

and with correct orientation

$H_2 + Cl_2 \longrightarrow 2HCl$



Factors that influence the rate of a reaction:

1. Concentration

2. Temperature

3. Surface area

4. nature of the reactants

5. Presence of catalysts

Concentration

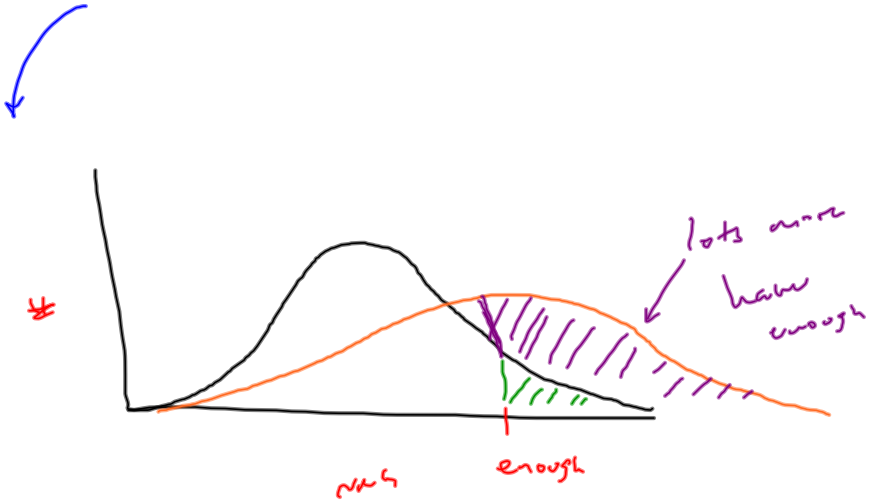
if [ ] ↑ ... more collisions

P ↑ (b/c n↑) = [ ]↑
(b/c V↓)

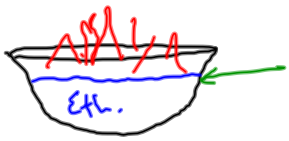
Temperature

T ↑ ... faster ... more collision

more NRG in each collision

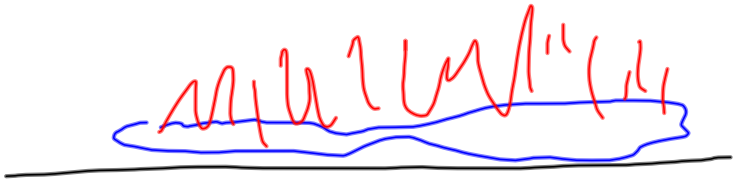


Surface area



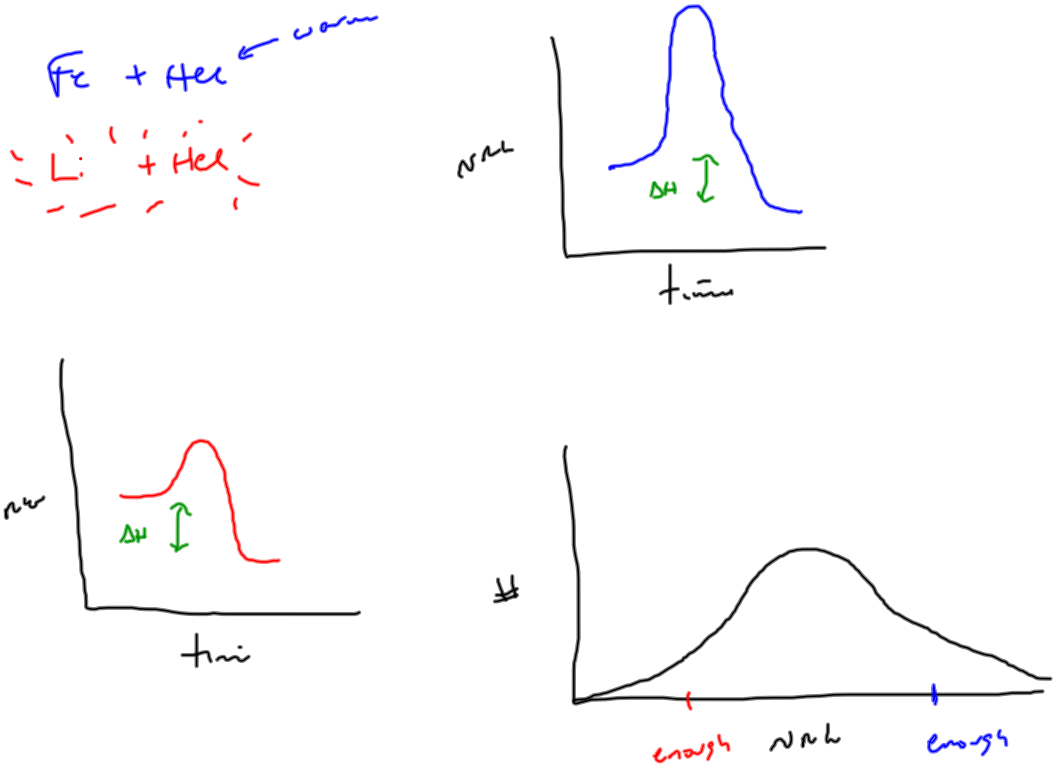
only those contact O_2

$C_2H_5OH + O_2$



contact ↑ ... more collisions

Nature of the reactants



Catalysts - 2 types

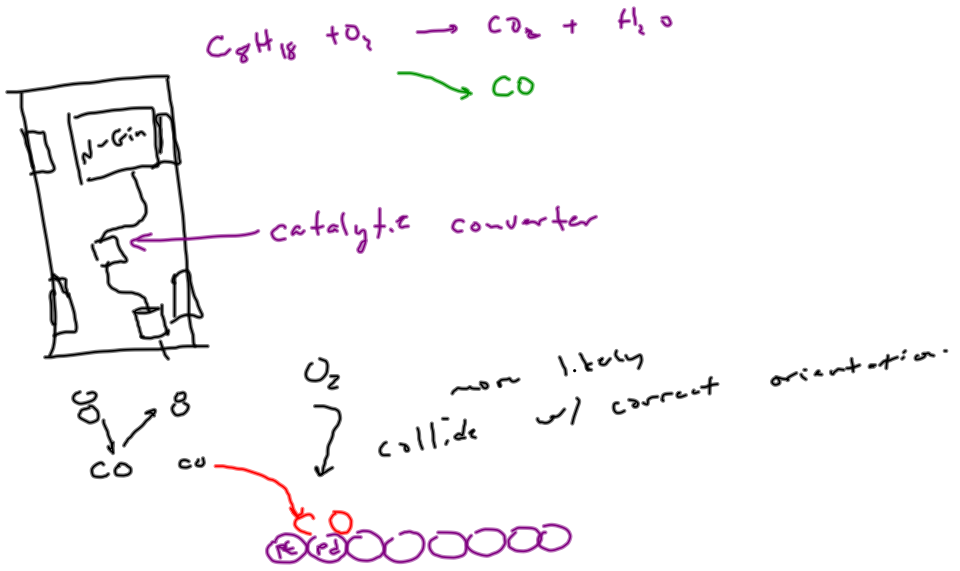
~ heterogeneous (surface)

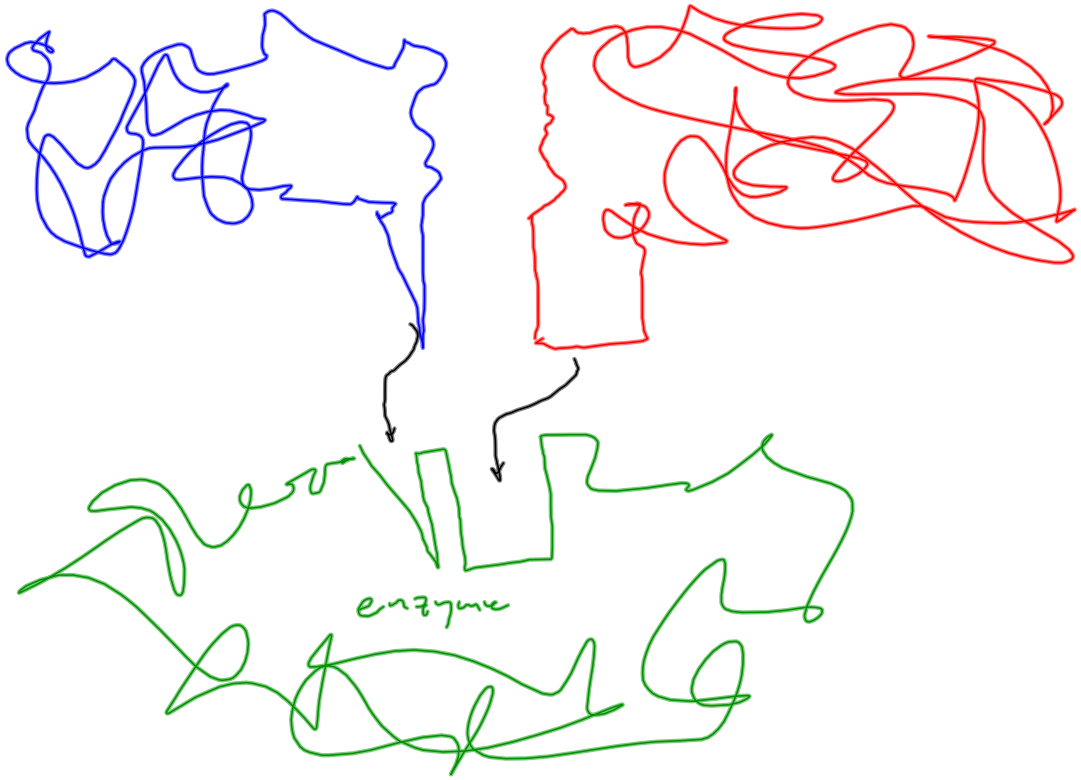
usually solid
most rxns in aq or g

~ homogeneous (get involved)

same phase as reactants

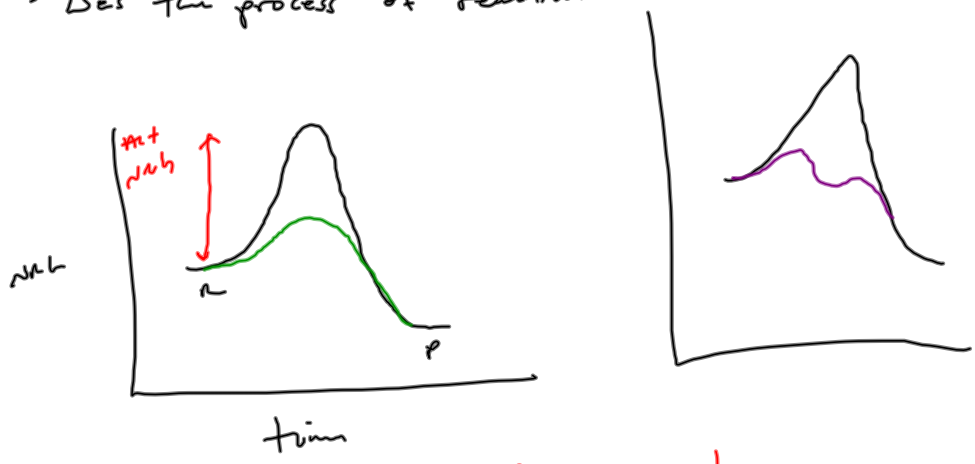
Surface catalysts





Get involved catalyst

↳ Does the process of reaction



Act NRL ↓