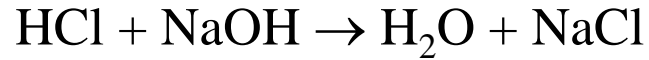


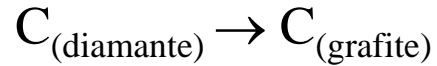
CINETICA CHIMICA

- VELOCITA' → QUANTO RAPIDAMENTE AVVIENE

- MECCANISMO → COME AVVIENE

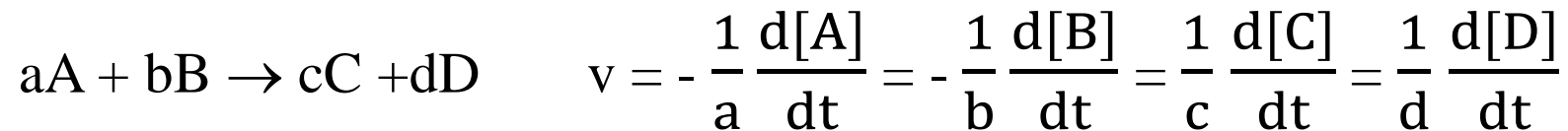
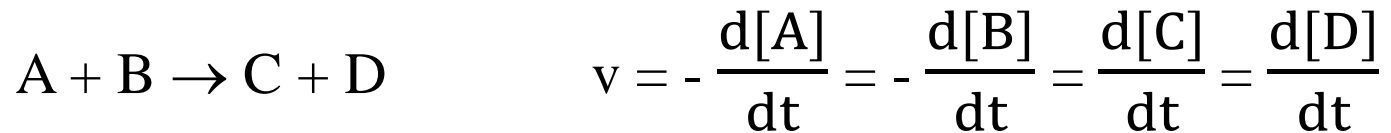
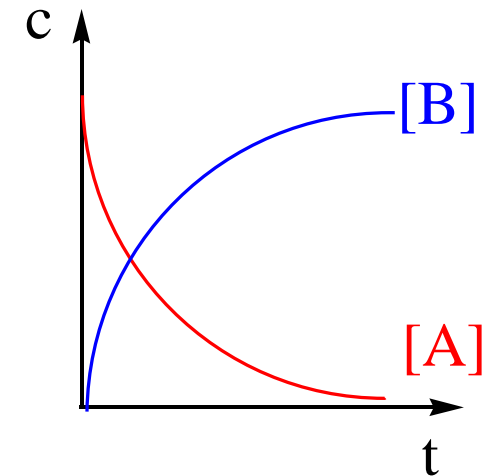


RAPIDA



LENTISSIMA

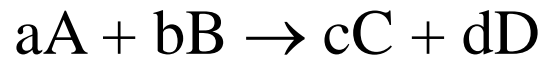
VELOCITA' → DEFINIZIONE



VELOCITA' DI REAZIONE → DIPENDE DA:

- CONCENTRAZIONE DEI REAGENTI
- TEMPERATURA
- RADIAZIONI, CATALIZZATORI

DIPENDENZA da CONCENTRAZIONE



Reazione di ordine α in A

“ di ordine β in B

“ di ordine complessivo $\alpha + \beta$

α, β determinati sperimentalmente

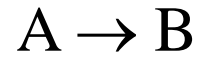
$$v = k[A]^\alpha[B]^\beta$$

k = costante di velocità

α, β ordine di reazione

$\alpha, \beta \neq a, b$

Reazioni del I ordine



$$v = -\frac{d[A]}{dt} = k[A] \rightarrow -\frac{d[A]}{[A]} = kdt$$

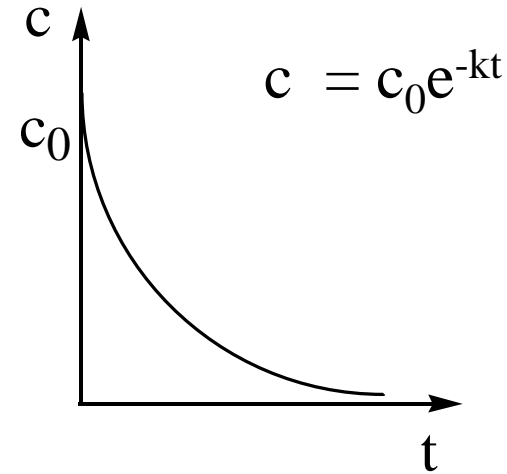
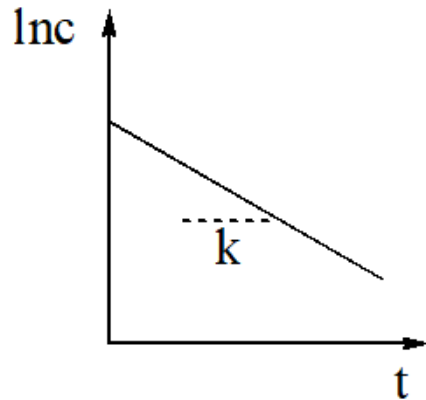
$$t = 0 \quad [A] = c_0$$

$$\int_{c_0}^c \frac{d[A]}{[A]} = -\int_0^t kdt$$

$$\ln c - \ln c_0 = -kt$$

$$\ln \frac{c}{c_0} = -kt$$

$$t \quad [A] = c$$



$\tau =$ tempo di dimezzamento

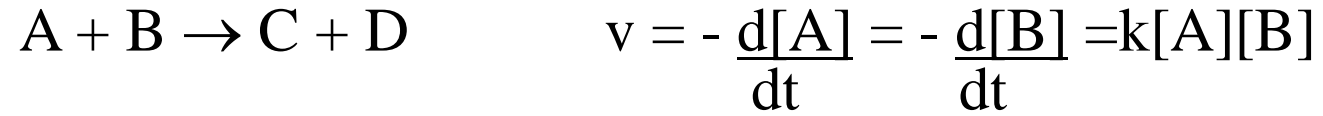
$$t = 0 \quad c = c_0$$

$$t = \tau \quad c = c_0/2$$

$$\ln \frac{c}{c_0} = -kt \rightarrow \ln \frac{c_0/2}{c_0} = -\ln 2 = -k\tau$$

$$\tau = \frac{\ln 2}{k} = \frac{0,693}{k}$$

Reazioni del II ordine



$$[A] = [B] = c \quad v = -\frac{dc}{dt} = kc^2 \rightarrow \frac{dc}{c^2} = -kdt$$

$$t = 0 \quad c = c_0 \quad \int_{c_0}^c \frac{dc}{c^2} = -\int_0^t kdt$$

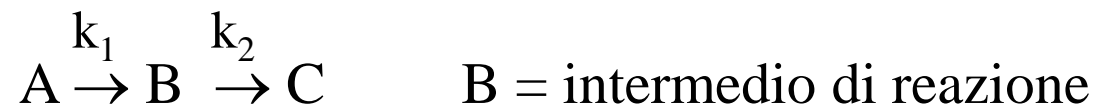
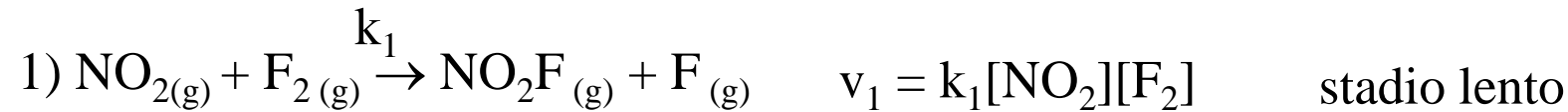
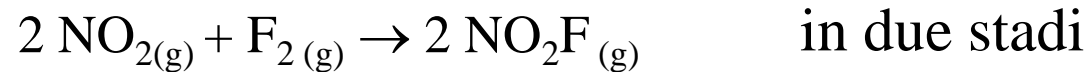
$$\frac{1}{c} - \frac{1}{c_0} = kt$$

$$t = \tau \quad c = c_0/2 \rightarrow \frac{2}{c_0} - \frac{1}{c_0} = \frac{1}{c_0} = k\tau \rightarrow \tau = \frac{1}{kc_0}$$

MECCANISMO DI REAZIONE

REAZIONI → URTI ANELASTICI (TEORIA delle COLLISIONI)

MECCANISMO di REAZIONE → in uno STADIO SINGOLO
→ in PIU' STADI (ognuno con la sua k)

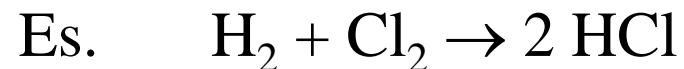


DIPENDENZA da T

TEORIA delle COLLISIONI → REAZIONE = URTO ANELASTICO

Perché due molecole reagiscano:

- devono collidere $v = f(c)$
- “ “ con energia sufficiente (KE) → urti efficaci



rottura vecchi legami (H-H, Cl-Cl) + formazione nuovi legami (H-Cl)



barriera energetica da superare = Energia di attivazione (E_{att})

Perché due molecole reagiscano devono avere

$$\text{KE} > E_{\text{att}}$$

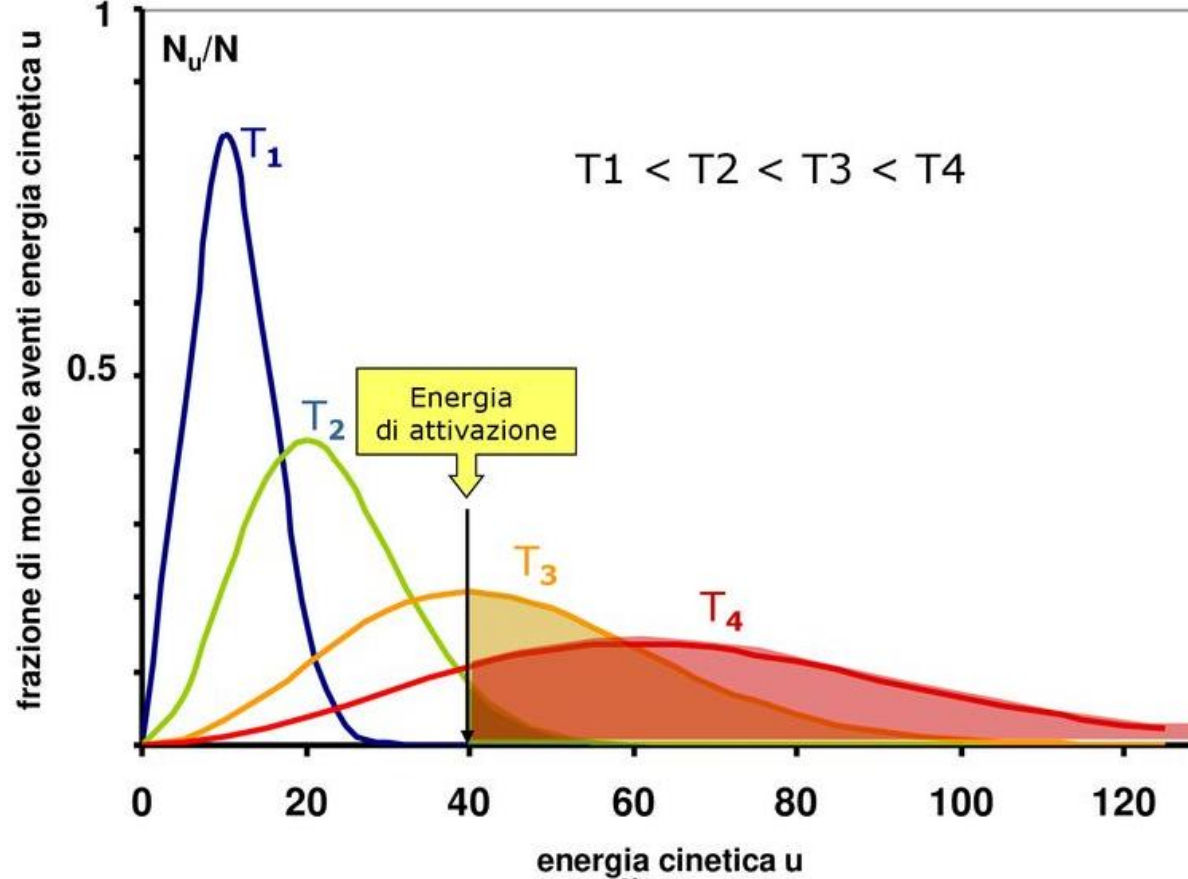
Quante sono le molecole in grado di reagire (N_E)?

$$\frac{N_E}{N} = e^{-\frac{E_{att}}{RT}}$$

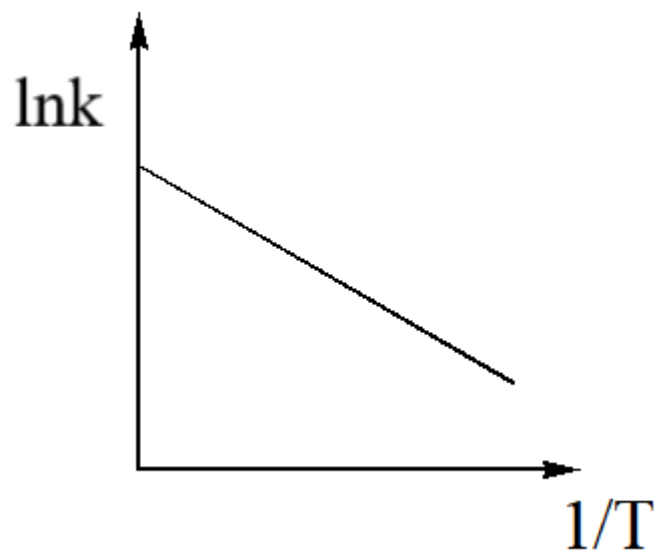
Equazione di Arrhenius

$$k = A \times e^{-\frac{E_{att}}{RT}}$$

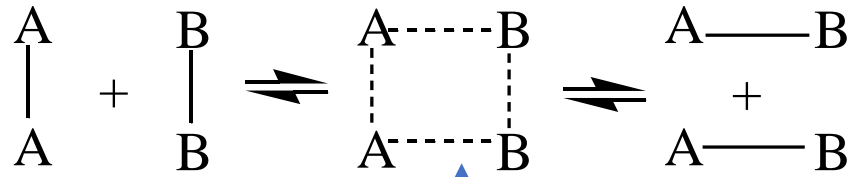
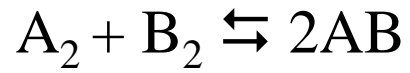
A = fattore di frequenza



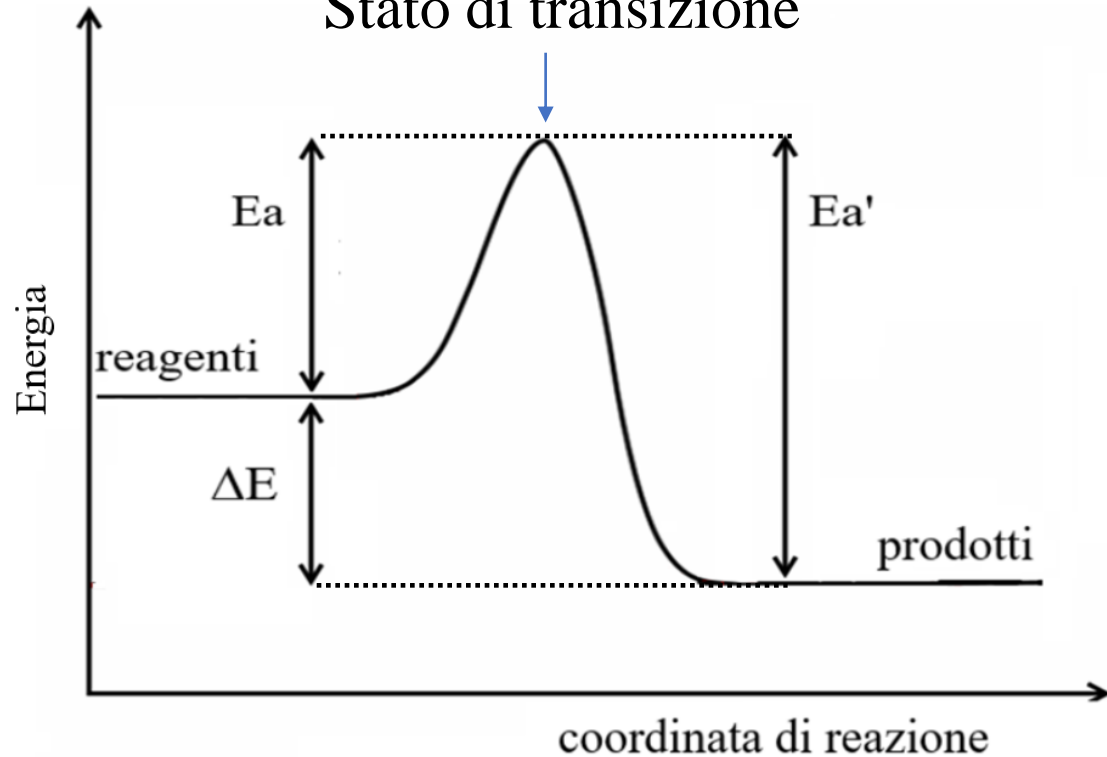
$$\ln k = \ln A - \frac{E_{att}}{RT}$$



TEORIA DELLO STATO DI TRANSIZIONE



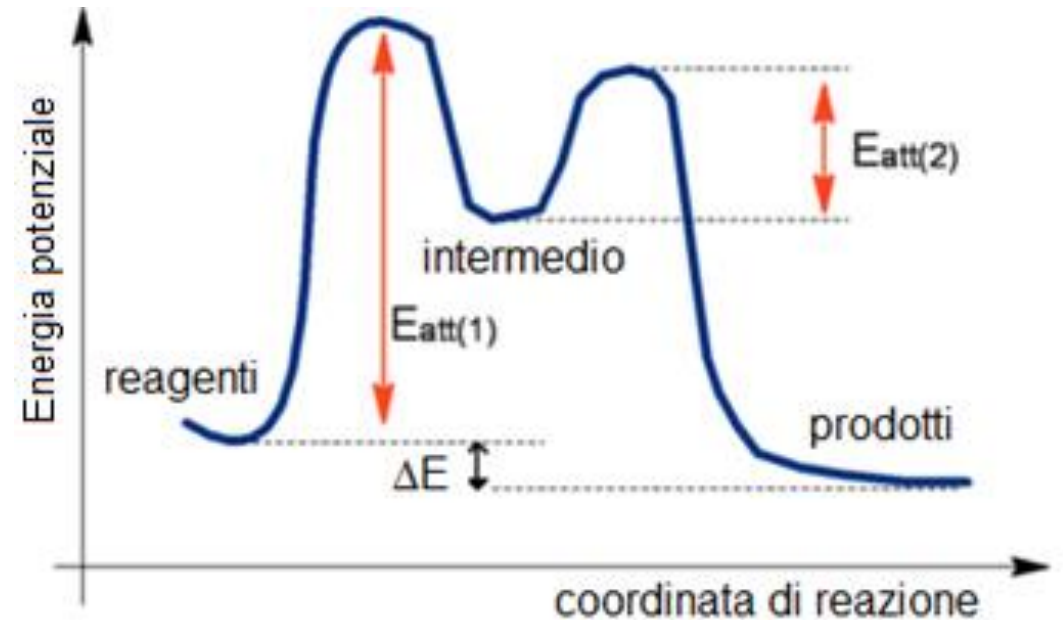
Stato di transizione



$$k_d = A e^{-\frac{E_a}{RT}}$$

$$k_i = A' e^{-\frac{E'_a}{RT}}$$

Reazioni in più stadi



CATALIZZATORE

- fa variare la velocità di una reazione
- non influenza la natura dei prodotti
- non figura nell'equazione stechiometrica

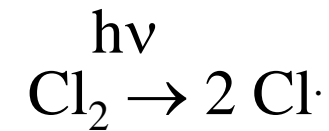
Catalisi:

- omogenea
- eterogenea

Selettività

ENZIMI

FOTOCHIMICA



$$h\nu = E_{\text{att}}$$

