CINÈTICA QUÍMICA, VELOCITATS DE REACCIÓ:

A + 2B → productes.

t= 0 [A]= $[A]_0$ i [B]= $[B]_0$

t= t' [A]= $[A]_0$-x i [B]= $[B]_0$-x/2

tornant a la mecànica de les equacions de velocitat, tenim que dx/dt= k. ($[A]_0$-x). ($[B]_0$-x/2)$^2$ (*)

recordem que en àcid- base també usem els constants de velocitat "k" i segueixen el mateix criteri quan a exponents:

aA+ bB → cC+ dD K= ctnt d'equilibri= $\frac{[C]^c.[D]^d}{[A]^a.[B]^b}$

(*) se resol usant el mètode de les *integrals racionals*:

tenim dx/($[A]_0$-x). ($[B]_0$-x/2)$^2$= k.dt llavors

$$\int \frac{dx}{(A_0 - x)(B_0 - \frac{x}{2})^2} = \int k.dt$$

Que resoldrem usant les integrals racionals:

$$\frac{M}{(A_0-x)} + \frac{N}{(B_0-\frac{x}{2})} + \frac{Q}{(B_0-\frac{x}{2})^2} =$$

$$\frac{M(B_0-\frac{x}{2})^2}{(A_0-x)(B_0-\frac{x}{2})^2} + \frac{N(A_0-x)(B_0-\frac{x}{2})}{(A_0-x)(B_0-\frac{x}{2})^2} + \frac{Q(A_0-x)}{(A_0-x)(B_0-\frac{x}{2})^2}$$

1= $M(B_0 - \frac{x}{2})^2$+ $N(A_0 - x)(B_0 - \frac{x}{2})$+ $Q(A_0 - x)$

Ara toca dilucidar M, N, Q:

x= $A_0$ : 1= M. $(B_0 - \frac{A_0}{2})^2$ M=$\frac{1}{(B_0-\frac{A_0}{2})^2}$

$\left(B_0 - \frac{x}{2}\right) = 0$   x= $2B_0$   1= Q. $(A_0 - \ 2B_0)$   Q= $\frac{1}{(A_0 - 2B_0)}$

I suposem x= $C_0$ :

1= $\frac{1}{(B_0-\frac{A_0}{2})^2}$. $(B_0 - \frac{C_0}{2})^2$+ N. $(A_0 - C_0)(B_0 - \frac{C_0}{2})$+

$\frac{1}{(A_0 - 2B_0)} . (A_0 - C_0 \ )$

N.$(A_0 - C_0)(B_0 - \frac{C_0}{2})$= 1- $\frac{1}{(B_0-\frac{A_0}{2})^2}$. $(B_0 - \frac{C_0}{2})^2$-

$\frac{1}{(A_0 - 2B_0)} . (A_0 - C_0 \ )$

N.$(A_0 - C_0)(B_0 - \frac{C_0}{2})$= 1- $\frac{(B_0-\frac{C_0}{2})^2.(A_0 - 2B_0)-(A_0-C_0 \ ).(B_0-\frac{A_0}{2})^2}{(B_0-\frac{A_0}{2})^2.(A_0 - 2B_0)}$

N.$(A_0 - C_0)(B_0 - \frac{C_0}{2})$=
$\frac{(B_0-\frac{A_0}{2})^2.(A_0 - 2B_0)-(B_0-\frac{C_0}{2})^2.(A_0 - 2B_0)-(A_0-C_0 \ ).(B_0-\frac{A_0}{2})^2}{(B_0-\frac{A_0}{2})^2.(A_0 - 2B_0)}$

N= $\frac{(B_0-\frac{A_0}{2})^2.(A_0 - 2B_0)-(B_0-\frac{C_0}{2})^2.(A_0 - 2B_0)-(A_0-C_0 \ ).(B_0-\frac{A_0}{2})^2}{(A_0-C_0)\left(B_0-\frac{C_0}{2}\right).(B_0-\frac{A_0}{2})^2.(A_0 - 2B_0)}$

Aleshores:

$\int \frac{dx}{(A_0-x)(B_0-\frac{x}{2})^2} = \frac{1}{\left(B_0-\frac{A_0}{2}\right)^2} . \log(A_0 - x) +$
$\frac{(B_0-\frac{A_0}{2})^2.(A_0 - 2B_0)-(B_0-\frac{C_0}{2})^2.(A_0 - 2B_0)-(A_0-C_0 \ ).(B_0-\frac{A_0}{2})^2}{(A_0-C_0)\left(B_0-\frac{C_0}{2}\right).(B_0-\frac{A_0}{2})^2.(A_0 - 2B_0)}$.log$\left(B_0 - \frac{x}{2}\right)$+

$\frac{1}{(A_0 - 2B_0)}$.(-2).$(B_0 - \frac{x}{2})^{-1}$

$\int \frac{dx}{(B_0-\frac{x}{2})^2}$= $\int (-2). (B_0 - \frac{x}{2})^{-2} dx$ = (-2). $(B_0 - \frac{x}{2})^{-1}$