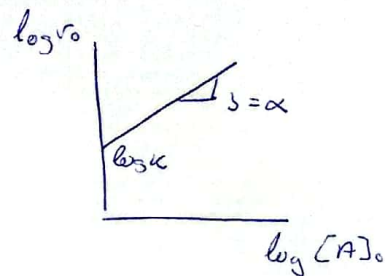


# ZINETIKA REAKSI

## 1. ANALISA



[A] (mol/L)	0.1	0.2	0.4	0.6
$v_0$ (mol L <sup>-1</sup> s <sup>-1</sup> )	$6 \cdot 10^{-4}$	$2.4 \cdot 10^{-3}$	$9.6 \cdot 10^{-3}$	$2.05 \cdot 10^{-2}$

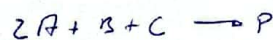


regresi linier  $\rightarrow r = 0.9999 \quad a = -1.2409 \quad b = 1.9769$

$$b = \alpha \approx 1.98 \approx 2 \quad K = 10^a = 10^{-1.2409} = 5.92 \cdot 10^{-2} \text{ L mol}^{-1} \text{ s}^{-1}$$

## 2. ANALISA

[A] <sub>0</sub>	0.2	0.6	0.2	0.6
[B] <sub>0</sub>	0.3	0.3	0.9	0.3
[C] <sub>0</sub>	0.15	0.15	0.15	0.45
$v_0$	0.006	0.0181	0.0538	0.0181



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

$$0.006 = k [0.2]^\alpha [0.3]^\beta [0.15]^\gamma$$

$$0.0181 = k [0.6]^\alpha [0.3]^\beta [0.15]^\gamma$$

$$0.0538 = k [0.2]^\alpha [0.9]^\beta [0.15]^\gamma$$

$$0.0181 = k [0.45]^\alpha [0.3]^\beta [0.45]^\gamma$$

$$\frac{0.0181}{0.006} = \left(\frac{0.6}{0.2}\right)^\alpha \rightarrow 3 = 3^\alpha \rightarrow \alpha = 1$$

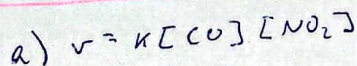
$$\frac{0.0538}{0.006} = \left(\frac{0.9}{0.3}\right)^\beta \rightarrow 9 = 3^\beta \rightarrow \beta = 2$$

$$\frac{0.0181}{0.0181} = \left(\frac{0.6}{0.15}\right)^\gamma \rightarrow 1 = 4^\gamma \rightarrow \gamma = 0$$

$2+1+0=3$   
 3. order total  
 $v = k[A][B]^2$

$$k = \frac{v}{[A][B]^2} = \frac{0.006}{0.2 \cdot 0.3^2} = 0.33 \text{ dm}^3 \text{ mol}^{-2} \text{ s}^{-1}$$

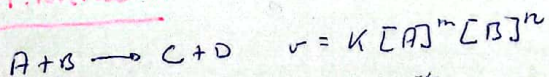
## 3. ANALISA



$$b) 3.4 \cdot 10^{-8} = k \cdot 5 \cdot 10^{-4} \cdot 0.35 \cdot 10^{-4} \rightarrow k = 1.89 \text{ mol}^{-1}$$

$$c) v = 1.89 \cdot 1.5 \cdot 10^{-3} \cdot 0.72 \cdot 10^{-4} = 2.04 \cdot 10^{-7} \text{ mol L}^{-1} \text{ h}^{-1}$$

## 4. ANALISA



$$[A]_0 = 0.4 \text{ M}, [B]_0 = 4 \cdot 10^{-4} \text{ M} \rightarrow [A] = k_1 t \rightarrow v = k[B]^n$$

t	0	120	240	360	$\left. \begin{array}{l} \uparrow \\ 4 \cdot 10^{-4} \\ \downarrow \end{array} \right\}$
[C]	0	$2 \cdot 10^{-4}$	$3 \cdot 10^{-4}$	$3.5 \cdot 10^{-4}$	
[B]	$4 \cdot 10^{-4}$	$2 \cdot 10^{-4}$	$1 \cdot 10^{-4}$	$0.5 \cdot 10^{-4}$	

0. order  $\rightarrow [B]$  vs t indikator  $\rightarrow r = 0.959$

1. order  $\rightarrow \ln [B]$  vs t indikator  $\rightarrow |r| = 1, a = -7.824, b = -5.776$

$$n = 1, \ln [B] = \ln [B]_0 - a k t$$

$$[A]_0 = 4 \cdot 10^{-4} M, [B]_0 = 1 M \rightarrow v = k[A]^m$$

t	0	9000	208000	485000	} $10^{-4}$
[C]	0	$2 \cdot 10^{-4}$	$5 \cdot 10^{-4}$	$35 \cdot 10^{-4}$	
[A]	$4 \cdot 10^{-4}$	$2 \cdot 10^{-4}$	$1 \cdot 10^{-4}$	$0.5 \cdot 10^{-4}$	

0. ordena  $\rightarrow [A]$  vs t  $\rightarrow r = 0.84$

1. ordena  $\rightarrow \ln [A]$  vs t  $\rightarrow r = 0.959$

2. ordena  $\rightarrow 1/[A]$  vs t  $\rightarrow |r = 0.999| \Rightarrow a = 2503.19, b = 0.0036$

$m = 2, \frac{1}{[A]} = \frac{1}{[A]_0} + a t \rightarrow k = 0.036 \text{ mol}^{-2} \text{ dm}^3 \text{ s}^{-1}$

### 5. ANILINETA



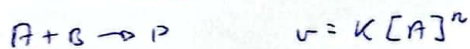
t	3'15	6'2	10	18'3	30'8
[A]	0.00396	0.00796	0.00639	0.00353	0.00207

0. ordena  $\rightarrow [A]$  vs t  $\rightarrow r = 0.97$

1. ordena  $\rightarrow \ln [A]$  vs t  $\rightarrow r = 0.99, a = -4.542, b = -0.054$

$n = 1, \ln [A] = \ln [A]_0 - a t \rightarrow k = 0.054 \text{ h}^{-1}$

### 6. ANILINETA



0. ordena  $\rightarrow [A]$  vs t  $\rightarrow r = 0.91$

1. ordena  $\rightarrow \ln [A]$  vs t  $\rightarrow r = 0.96$

2. ordena  $\rightarrow 1/[A]$  vs t  $\rightarrow r = 0.99, a = 21.51, b = 0.0799$

2. ordena :  $\frac{1}{[A]} = \frac{1}{[A]_0} + a t \rightarrow k = 0.082 \text{ m}^3 \text{ mol}^{-1} \text{ s}^{-1}$

### 7. ANILINETA



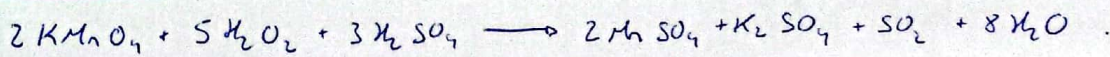
t	0	10	20	30	40	} $12$
[B]	0	0.089	0.153	0.2	0.23	
[A]	0.624	0.446	0.318	0.224	0.164	

0. ordena  $\rightarrow [A]$  vs t  $\rightarrow r = 0.98$

1. ordena  $\rightarrow \ln [A]$  vs t  $\rightarrow r = 0.999, a = -0.785, b = -0.0336$

$\ln [A] = \ln [A]_0 - a t \rightarrow k =$

### 9. ARIKETA



t	5	10	20	30	50
v(KMnO <sub>4</sub> )	3'71	2'98	1'96	1'23	5
mol KMnO <sub>4</sub>	7'42 · 10 <sup>-4</sup>	5'96 · 10 <sup>-4</sup>	3'92 · 10 <sup>-4</sup>	2'46 · 10 <sup>-4</sup>	0'0001
mol H <sub>2</sub> O <sub>2</sub>	0'001855	0'00149	0'00098	0'00065	0'00025
[H <sub>2</sub> O <sub>2</sub> ]	0'371	0'298	0'196	0'123	0'05

1. ordena → ln[A] vs t → r = 0'999, b = -0'0445  
 n = 1, k = 0'0445 min<sup>-1</sup>

### 10. ARIKETA

Graf. Ura marraztu eta deskartatu

t	2	4	8	12	16
A	0'588	0'405	0'36	0'256	0'185
[A]	2'56 · 10 <sup>-4</sup>	1'76 · 10 <sup>-4</sup>	1'56 · 10 <sup>-4</sup>	1'11 · 10 <sup>-4</sup>	0'8 · 10 <sup>-4</sup>

1. ordena → ln[A] vs t → r = 0'99, k = 0'083 min<sup>-1</sup>

### 11. ARIKETA

t	5	10	30	60	120	180	240
mg dis	0	5'2	26'4	57'9	120'4	184'2	247'5
[A]	250	244'8	223'6	192'1	129'6	65'8	2'5

[A] vs t → r = 0'999, b = -1'053 → 0. ordenella

$$k = 1'053 \text{ mg min}^{-1}$$

$$[A] = [A]_0 - a k t \rightarrow 280 = [A]_0 - 1'053 \cdot 0 \rightarrow [A]_0 = 250$$

$$[A] = 250 - 1 \cdot 1'053 \cdot 80 = 165'76 \text{ mg} \rightarrow \text{geratzen dena}$$

$$250 - 165'76 = 84'24 \text{ mg} \rightarrow \text{disolbatutakoa}$$

### 12. ARIKETA

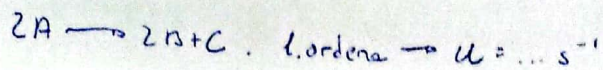
t	5	10	30	60	120	180	240	300
% dis	1'76	3'52	10'55	21'10	42'2	66'3	84'4	99'99
[A]	589'44	578'88	536'7	473'4	346'8	202'2	93'6	0'06

[A] vs t → r = 0'99 → 0. ordenella. b = -2'54

$$k = 2'54 \text{ mg min}^{-1}$$

$$[A] = [A]_0 - a k t \rightarrow [A] = 600 - 2'054 \cdot 76 = 456'22 \text{ mg}$$

### 13. ARIKETA



$$t = 325 s \text{ denon, } \% 35 \text{ bertatu} \rightarrow \% 65 \text{ balditu. } t = 325 s \rightarrow [A] = 0.65 [A]_0$$

$$\text{1. ordena} \rightarrow \ln [A] = \ln [A]_0 - kt$$

$$\ln (0.65 [A]_0) = \ln [A]_0 - k \cdot 325$$

$$650k = \ln [A]_0 - \ln (0.65 [A]_0) \rightarrow 650k = \ln \left( \frac{[A]_0}{0.65 [A]_0} \right) \rightarrow 650k = 0.43 \rightarrow k = 6.6 \cdot 10^{-4} s^{-1}$$

$$2 \cdot 6.6 \cdot 10^{-4} t_{\%70} = \ln \left( \frac{[A]_0}{0.3 [A]_0} \right) \rightarrow t_{\%70} = 926 s$$

$$2 \cdot 6.6 \cdot 10^{-4} t_{\%90} = \ln \left( \frac{[A]_0}{0.1 [A]_0} \right) \rightarrow t_{\%90} = 1771 s$$

### 14. ARIKETA



$$P_0 = 500 \text{ Torr}$$

$$P \cdot V = nRT \rightarrow \frac{P}{RT} = \frac{n}{V} = [ ]$$

$$\ln P_A = \ln P_{A_0} - k t$$

$$P_A = P_0 - 2P \rightarrow 495.2 = 500 - 2P \rightarrow P = 2.4$$

$$\ln P_A = \ln 500 - 4.8 \cdot 10^{-4} \cdot 2 \cdot 10$$

$$P_T = P_0 - 2P + 4P + P \rightarrow P_T = P_0 + 3P$$

$$P_A = 495.2 \text{ Torr}$$

$$P_T = 500 + 3 \cdot 2.4 = 507.2 \text{ Torr}$$

### 18. ARIKETA

$$\text{1. ordena} \rightarrow T_{1/2} = \frac{\ln 2}{k} = 180 \rightarrow k = 0.00385 \text{ egun}^{-1}$$

$$T_{1/2} = 180 \text{ egun}$$

$$\ln [A] = \ln [A]_0 - kt$$

$$[A] = 0.6 [A]_0$$

$$0.00385 t = \ln \left( \frac{1}{0.6} \right) \rightarrow t = 133 \text{ egun}$$

### 15. ARIKETA

$$\text{1. ordena, } t = 60 \text{ min} \rightarrow [A] = 0.25 [A]_0$$

$$\ln [A] = \ln [A]_0 - kt$$

$$T_{1/2} = \frac{\ln 2}{k} = \frac{\ln 2}{0.023}$$

$$60k = \ln \left( \frac{[A]_0}{0.25 [A]_0} \right) \rightarrow k = 0.023 \text{ min}^{-1}$$

$$T_{1/2} = 30 \text{ min}$$

### 17. ARIKETA

$$[A]_0 = 94 \mu\text{mL}, k = 2.09 \cdot 10^{-5} \text{ h}^{-1} \rightarrow \text{1. ordena}$$

$$45 \mu\text{mL} \rightarrow \text{et eraginorra}$$

$$\ln [A] = \ln [A]_0 - kt$$

$$\ln 45 = \ln 94 - 2.09 \cdot 10^{-5} t \rightarrow t = 35245 \text{ h} \approx 4 \text{ urte}$$

$$T_{1/2} = \frac{\ln 2}{k} = \frac{\ln 2}{2.09 \cdot 10^{-5}} = 33164.93 \text{ h} = 3 \text{ urte } 9 \text{ hil. eta } 13 \text{ egun}$$

## 19. PRAKATA

$$2. \text{ordena} \rightarrow \frac{1}{[A]} = \frac{1}{[A]_0} + a \cdot kt \quad \frac{1}{0.008} = \frac{1}{0.01} + 40 \cdot k \rightarrow k = 6.25 \cdot 10^{-2} \text{ M}^{-1} \text{ min}^{-1}$$

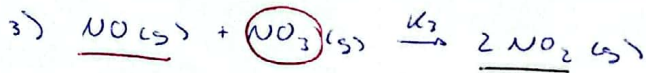
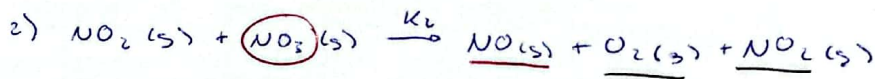
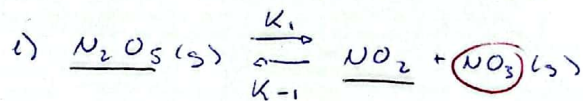
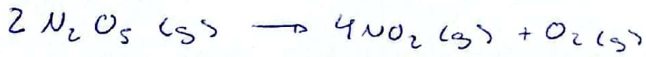
$$[A]_0 = 0.01 \text{ M}$$

$$t_{1/2} = \frac{1}{[A]_0 \cdot a \cdot k} = \frac{1}{0.01 \cdot 6.25 \cdot 10^{-2}} = 160 \text{ min}$$

$$\frac{1}{0.008} = \frac{1}{0.01} + 6.25 \cdot 10^{-2} \cdot t \rightarrow t = 400 \text{ min}$$

## ZINETIKA KOMPLEKSA

## 20. PRAKATA



$$a) v = k_3 [\text{NO}] [\text{NO}_3]$$

$$k_2 [\text{NO}_2] [\text{NO}_3] = k_3 [\text{NO}] [\text{NO}_3] \quad \left\{ \begin{array}{l} v = \frac{k_2 \cdot k_3}{k_3} [\text{NO}_2] [\text{NO}_3] \\ \end{array} \right.$$

$$k_1 [\text{N}_2 \text{ O}_5] = k_{-1} [\text{NO}_2] [\text{NO}_3] + k_2 [\text{NO}_2] [\text{NO}_3] + k_3 [\text{NO}] [\text{NO}_3]$$

$$k_1 [\text{N}_2 \text{ O}_5] = \left( k_{-1} [\text{NO}_2] + k_2 [\text{NO}_2] + k_3 \cdot \frac{k_2 [\text{NO}_2]}{k_3} \right) [\text{NO}_3]$$

$$v = \frac{k_2 [\text{NO}_2] k_1 [\text{N}_2 \text{ O}_5]}{[\text{NO}_2] (k_{-1} + k_2 + k_2)} = \frac{k_2 k_1 [\text{N}_2 \text{ O}_5]}{k_{-1} + 2k_2}$$

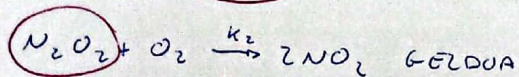
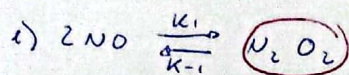
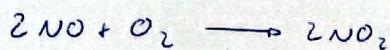
b) 2. vrata selo,  $\frac{k_1}{k_{-1}} = \frac{[\text{NO}_2] [\text{NO}_3]}{[\text{N}_2 \text{ O}_5]} \rightarrow [\text{NO}_2] [\text{NO}_3] = \frac{k_1}{k_{-1}} [\text{N}_2 \text{ O}_5]$

$$v = k_2 [\text{NO}_2] [\text{NO}_3]$$

$$v = k_2 \frac{k_1}{k_{-1}} [\text{N}_2 \text{ O}_5]$$

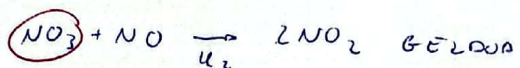
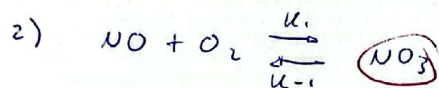
c)  $k_{-1} \gg 2k_2$  jenan (homela  $2k_2$  deskartaten de)

## 21. ΑΡΙΘΜΕΤΑ



$$\left\{ \begin{array}{l} \frac{k_1}{k_{-1}} = \frac{[\text{NO}]^2}{[\text{N}_2\text{O}_2]} \\ v = k_2 [\text{N}_2\text{O}_2] [\text{O}_2] \end{array} \right.$$

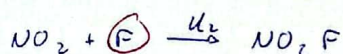
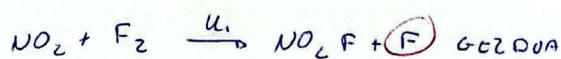
$$[\text{N}_2\text{O}_2] = [\text{NO}]^2 \frac{k_{-1}}{k_1} \quad v = k_2 \frac{k_{-1}}{k_1} [\text{NO}]^2 [\text{O}_2]$$



$$\left\{ \begin{array}{l} \frac{k_1}{k_{-1}} = \frac{[\text{NO}] [\text{O}_2]}{[\text{NO}_3]} \\ v = k_2 [\text{NO}_3] [\text{NO}] \end{array} \right.$$

$$[\text{NO}_3] = [\text{NO}] [\text{O}_2] \frac{k_{-1}}{k_1} \quad v = k_2 \cdot \frac{k_{-1}}{k_1} [\text{NO}]^2 [\text{O}_2]$$

## 22. ΑΡΙΘΜΕΤΑ



$$k_1 [\text{NO}_2] [\text{F}_2] = k_{-1} [\text{NO}_2\text{F}] [\text{F}]$$

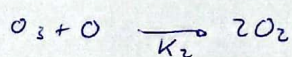
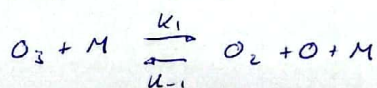
$$\frac{k_1}{k_2} [\text{F}_2] = [\text{F}]$$

$$v = k_1 [\text{NO}_2] [\text{F}_2]$$

$$v = k_2 [\text{NO}_2] [\text{F}]$$

$$v = k_2 [\text{NO}_2] \frac{k_1}{k_2} [\text{F}_2]$$

## 23. ΑΡΙΘΜΕΤΑ



$$v = k_2 [\text{O}] [\text{O}_3]$$

$$\frac{k_1}{k_{-1}} = \frac{[\text{O}_3] [\text{M}]}{[\text{O}_2] [\text{O}] [\text{M}]}$$

$$k_1 [\text{O}_3] [\text{M}] = k_{-1} [\text{O}_2] [\text{O}] [\text{M}] + k_2 [\text{O}] [\text{O}_3]$$

$$k_1 [\text{O}_3] [\text{M}] = (k_{-1} [\text{O}_2] [\text{M}] + k_2 [\text{O}_3]) [\text{O}]$$

$$\hookrightarrow [\text{O}] = \frac{k_1 [\text{O}_3] [\text{M}]}{k_{-1} [\text{O}_2] [\text{M}] + k_2 [\text{O}_3]}$$

$$v = k_2 \frac{k_1 [\text{O}_3] [\text{M}] [\text{O}_3]}{k_{-1} [\text{O}_2] [\text{M}] + k_2 [\text{O}_3]}$$

$$= \frac{k_1 k_2 [\text{O}_3]^2}{k_{-1} [\text{O}_2] + k_2 \frac{[\text{O}_3]}{[\text{M}]}}$$

ARRHENIUS ETA KATAKISIA

## 25. ΑΡΙΘΜΕΤΑ

$$T = 387^\circ\text{C} = 660\text{K}$$

$$k = 1.2 \cdot 10^{-3} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$$

$$E_a = 177 \text{ kJ/mol}$$

$$T = 720\text{K} \rightarrow k?$$

$$\ln \frac{k_1}{k_2} = -\frac{E_a}{R} \left( \frac{1}{T_1} - \frac{1}{T_2} \right)$$

$$\ln \frac{1.2 \cdot 10^{-3}}{k_2} = \frac{-177}{8.314 \cdot 10^{-3}} \left( \frac{1}{660} - \frac{1}{720} \right)$$

$$k_2 = 0.017 \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$$

### 27. PROBLEMA

$$k_1 = 1'44 \cdot 10^7 \quad T_1 = 300'15K$$

$$k_2 = 3'03 \cdot 10^7 \quad T_2 = 341'05K$$

$$k_3 = 6'9 \cdot 10^7 \quad T_3 = 392'05K$$

$\ln k$  vs  $\frac{1}{T}$  (incl. datos (regresión lineal))

$$r = 0'999, a = 23'14, b = -2005'17$$

$$b = -\frac{E_a}{R} \rightarrow E_a = 16'67 \text{ kJ/mol}$$

$$a = \ln A \rightarrow A = 1'42 \cdot 10^{10} \text{ mol}^{-1} \text{ dm}^3 \text{ s}^{-1}$$

### 28. PROBLEMA

$$\ln k \text{ vs } \frac{1}{T} \rightarrow a = 24'89, b = -19431'40, r = -0'99$$

$$a = \ln A \rightarrow A = 6'45 \cdot 10^{10} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$$

$$b = -\frac{E_a}{R} \rightarrow E_a = 161 \text{ kJ/mol}$$

### 29. PROBLEMA

$$\ln k \text{ vs } \frac{1}{T} \rightarrow a = 28'987, b = -10174'84,$$

$$a = \ln A \rightarrow A = 3'88 \cdot 10^{12} \text{ h}^{-1} \quad b = -\frac{E_a}{R} \rightarrow E_a = 84'59 \text{ kJ/mol}$$

$$\ln k = 28'98 - \frac{10174}{T} \rightarrow \ln k = 28'98 - \frac{10174}{298} \rightarrow k = 0'0057 \text{ h}^{-1}$$

$$[A] = 0'6 [A]_0 \quad \text{1. ordena} \rightarrow \ln [A] = \ln [A]_0 - kt$$

$$\ln \frac{[A]_0}{0'6[A]_0} = 0'0057t \rightarrow t = 87'6 \text{ h}$$

### 30. PROBLEMA

$$E_a = 104'5 \text{ kJ/mol}$$

$$\ln \frac{k_1}{k_2} = -\frac{E_a}{R} \left( \frac{1}{T_1} - \frac{1}{T_2} \right)$$

$$k_1 (25^\circ\text{C}) = 43'5 \cdot 10^{-6} \text{ h}^{-1}$$

$$\ln \frac{43'5 \cdot 10^{-6}}{2'4 \cdot 10^{-5}} = -\frac{104'5}{8'314 \cdot 10^{-3}} \left( \frac{1}{298} - \frac{1}{T_2} \right) \rightarrow T_2 = 278'83 \text{ K} = 5'83^\circ\text{C}$$

$$k_2 = 2'4 \cdot 10^{-5} \text{ h}^{-1}$$

### 31. PROBLEMA

$$\text{1. ordena} \rightarrow \ln [A] = \ln [A]_0 - kt$$

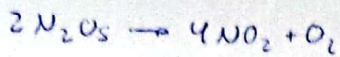
$$\ln (0'9 [A]_0) = \ln [A]_0 - k \cdot 45 \rightarrow 45k = \ln \left( \frac{[A]_0}{0'9 [A]_0} \right) \rightarrow k = 0'00234 \text{ h}^{-1}$$

$$\ln \frac{k_1}{k_2} = -\frac{E_a}{R} \left( \frac{1}{T_1} - \frac{1}{T_2} \right) \rightarrow \ln \left( \frac{0'00234}{k_2} \right) = \frac{-34'8}{8'314 \cdot 10^{-3}} \left( \frac{1}{277} - \frac{1}{288} \right) \rightarrow k_2 = 0'00678 \text{ h}^{-1}$$

$$6 \cdot 0'00678 = \ln \left( \frac{[A]_0}{x [A]_0} \right) \rightarrow x = 0'96 \rightarrow \% 96$$

$$\ln 0'9 = \ln 0'96 - 2'34 \cdot 10^{-3} t \rightarrow t = 27'6 \text{ h} \approx 2 \text{ h}$$

32. PROBLEMA ( $T_{1/2}(0^\circ\text{C})$  -  $k_0$  aditideca bakarririk)



$$A = 2'05 \cdot 10^{13} \text{ s}^{-1} \text{ (1. ordena)}$$

$$E_a = 103'14 \text{ kJ/mol}$$

$$\text{1. ordena} \rightarrow t_{1/2} = \frac{\ln 2}{a k}$$

$$\ln k = \ln A - \frac{E_a}{R} \frac{1}{T}$$

$$\ln k = \ln(2'05 \cdot 10^{13}) - \frac{103'14}{8'314 \cdot 10^{-3}} \cdot \frac{1}{273}$$

$$k = 3'78 \cdot 10^{-7} \text{ s}^{-1}$$

$$t_{1/2}(0^\circ\text{C}) = \frac{\ln 2}{2 \cdot 3'78 \cdot 10^{-7}} = 9'19 \cdot 10^5 \text{ s}$$

33. PROBLEMA

$$k_2 = 3k_1, T_1 = 300\text{K}, T_2 = 510\text{K}$$

$$\ln \frac{k_2}{k_1} = \frac{-E_a}{R} \left( \frac{1}{300} - \frac{1}{510} \right) \rightarrow E_a = 84'95 \text{ kJ/mol}$$

34. PROBLEMA

$$\ln k = -12400 \cdot \frac{1}{T} + 31'4$$

$E_a$ ?

$$T_{1/2} = 2\text{h} = 7200\text{s}$$

$$7200 = \frac{\ln 2}{k} \rightarrow k = 9'63 \cdot 10^{-5} \text{ s}^{-1}$$

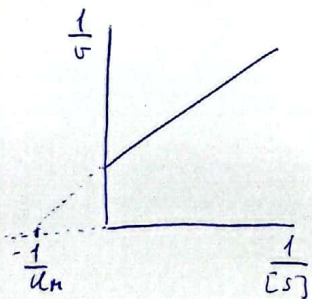
$$-12400 = \frac{-E_a}{R} \rightarrow E_a = 12400 \cdot 8'314 \cdot 10^{-3} = 103'09 \text{ kJ/mol}$$

$$31'4 = \ln A \rightarrow A = 4'33 \cdot 10^{13} \text{ s}^{-1}$$

$$\ln k = \ln A - \frac{E_a}{R} \frac{1}{T} \rightarrow \ln 9'63 \cdot 10^{-5} = \ln 4'33 \cdot 10^{13} - \frac{103'09}{8'314 \cdot 10^{-3}} \cdot \frac{1}{T}$$

$$T = 305\text{K}$$

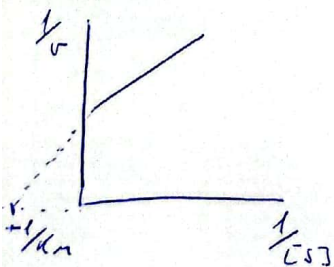
35. PROBLEMA



$$b = \frac{k_m}{v_{max}} = 1'19 \rightarrow k_m = 1'92 \cdot 10^{-5} \text{ M}$$

$$a = \frac{1}{v_{max}} = 0'62 \rightarrow v_{max} = 1'61 \cdot 10^{-6} \text{ min}^{-1}$$

36. PROBLEMA



$$b = \frac{k_m}{v_{max}} = 5 \cdot 10^{-4} \rightarrow k_m = 0'01 \text{ M}$$

$$a = \frac{1}{v_{max}} = 0'05 \rightarrow v_{max} = 20 \text{ mm}^2 \text{ min}^{-1}$$