· Ejercicio Nº 20.-

a) $2PH_3 \rightleftharpoons P_2 + 3H_2$ $\quad T = 300K$

inic.	P_0	—	—
reac.	$-2P$	P	$3P$
fnal	$P_0 - 2P$	P	$3P$

$P_T = \sum P_i = P_0 - 2P + P + 3P$

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

$P_f(PH_3) = P_0 - 2P = P_0 - (P_T - P_0) = 2P_0 - P_T$

t (min)	0	10	20	30	50
P_0 (atm)	0,0492	0,0492	0,0492	0,0492	0,0492
P_T (atm)	0,0492	0,0676	0,0760	0,0808	0,0861
P_f (atm)	0,0492	0,0308	0,0224	0,0176	0,0123

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

$C_f(PH_3)$	0,002	0,00125	0,00091	0,00072	0,0005

C | $y = -3 \cdot 10^{-5} x + 0,0017$ $\quad R^2 = 0,8816$

ln C | $y = -0,0269x - 6,36$ $\quad R^2 = 0,9544$

$\frac{1}{C}$ | $y = 30,001x + 498,91$ $\quad R^2 = 1$.

Orden = 0 t $\quad$ Orden = 1 t $\quad$ Orden = 2 t

Tenemos una cinética de orden 2.-

$$-\frac{d[A]}{dt} = k\cdot[A]^2 \Rightarrow -\frac{d[A]}{[A]^2} = k\,dt \Rightarrow$$

$$\Rightarrow -\int_0^t \frac{d[A]}{[A]^2} = k\cdot\int_0^t dt \Rightarrow \frac{1}{[A]_f} - \frac{1}{[A]_0} = k\cdot t$$

$$\left.\begin{array}{l} \frac{1}{[n]_f} = \frac{1}{[A]_0} + k\cdot t \\ y = 30{,}001\,x + 498{,}91 \end{array}\right\} \boxed{K = 30{,}001\ \frac{L}{mol\cdot min^{-1}}}$$

b) Ec. Arrhenius: $K = A\cdot e^{-Ea/RT}$

$$\ln K = \ln A - \frac{Ea}{RT}$$

$$\left.\begin{array}{l} \ln K_1 = \ln A - \frac{Ea}{RT_1} \\ \ln K_2 = \ln A - \frac{Ea}{RT_2} \end{array}\right\} \ln\frac{K_1}{K_2} = \frac{Ea}{R}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]$$

$$\ln\frac{30{,}001}{90} = \frac{Ea}{8{,}31}\cdot\left[\frac{1}{500} - \frac{1}{300}\right]$$

$$Ea = 6846{,}9\ \frac{J}{mol} = 6{,}85\ \frac{kJ}{mol}$$