① $pK = 2.2 \rightarrow K = 6.3 \times 10^{-3}$

$\Delta n = 0$ denez, $K_c = K_p = 6.3 \times 10^{-3}$

Hasierako kontzentrazioa:

$Mm\ (HI) = 128\ g/mol$

$[HI]_0 = \frac{40\ g}{4\ L} \frac{1\ mol}{128\ g} = 0.078\ M$

ⓐ $K_{P_1} = \frac{P_{I_2} \times P_{H_2}}{P_{HI}^2} = 6.3 \times 10^{-3}$

$K_{P_2} = \frac{P_{HI}}{P_{H_2}^{1/2}\ P_{I_2}^{1/2}} = \sqrt{\frac{1}{K_{P_1}}} \rightarrow \boxed{K_{P_2} = 12.6}$

ⓑ

	$2\,HI \rightleftarrows$	H_2	+ I_2
Has	0.078	–	–
Ald.	-0.078α	$\frac{0.078\alpha}{2}$	$\frac{0.078\alpha}{2}$
Orek	$0.078(1-\alpha)$	0.039α	0.039α

$K_c = \frac{[H_2][I_2]}{[HI]^2} \rightarrow 6.3 \times 10^{-3} = \frac{(0.039\alpha)^2}{[0.078(1-\alpha)]^2} \rightarrow$

$\rightarrow 0.079 = \frac{0.039\alpha}{0.078(1-\alpha)} \rightarrow 6.16 \times 10^{-3} - 0.079\alpha = 0.039\alpha$

$\rightarrow 6.16 \times 10^{-3} = 0.118\alpha \rightarrow \boxed{\alpha = \%\ 5.22 = 0.0522}$

ⓒ $P_{HI} = \frac{n_{HI}}{n_{tot}} \times P_{Tot} = X_{HI} \times P_{Tot}$

$P_{Tot} = P_0 = C_0 RT \rightarrow P_{tot} = 0.078 \frac{mol}{L} \times 0.082 \frac{atm\,L}{K\,mol} \times 500K$

$P_{tot} = 3.2\ atm$

$X_{HI} = \frac{n_{HI}}{n_{tot}} = \frac{[HI] \times V}{C_{tot} \times V} = \frac{[HI]}{C_{tot}} \rightarrow X_{HI} = \frac{0.078(1-\alpha)}{0.078}$

$\rightarrow X_{HI} = 1-\alpha = 0.948$

$P_{HI} = 0.948 \times 3.2\ atm = 3.03\ atm \rightarrow \boxed{P_{HI} = 3.03\ atm}$

$P_{H_2} = X_{H_2} \cdot P_{Tot} = P_{I_2}$

$X_{H_2} = \frac{0.039\alpha}{0.078} \rightarrow X_{H_2} = X_{I_2} = 0.026$

$P_{H_2} = P_{I_2} = 0.026 \times 3.2\ atm \rightarrow \boxed{P_{H_2} = P_{I_2} = 0.08\ atm}$

ⓓ

Sistemari Kanpotik eragin:	Sistemaren erreakzioa:	Desplazamendua:
$P_T \uparrow$ $V \downarrow$	ez da desplazamendurik ematen: $\Delta n = 0$	
$P_T \uparrow$ $P_p =$		
$[H_2] \uparrow$	$[H_2] \downarrow$	←
$[HI] \downarrow$	$[HI] \uparrow$	←
$T \downarrow$ $Q \downarrow$	$Q \uparrow$	← alde exotermikoa

② ⓐ $HCl + MnO_2 \longrightarrow MnCl_2 + Cl_2 + H_2O$

$2\ Cl^- \longrightarrow Cl_2 + 2e^-$ oxidazioa

$MnO_2 + 4H^+ + 2e^- \longrightarrow Mn^{2+} + 2H_2O$ erredukzioa

$2Cl^- + 4H^+ + MnO_2 \longrightarrow Cl_2 + Mn^{2+} + 2H_2O$

$$\boxed{4HCl + MnO_2 \longrightarrow Cl_2 + MnCl_2 + 2H_2O}$$

ⓑ HCl-ren mol-kopurua:

$$n(HCl) = 0.15L \times \frac{1160\,g}{1L} \times \frac{35\,g\ HCl}{100\,g} \times \frac{1\,mol\ HCl}{36.5\,g\ HCl}$$

$n(HCl) = 1.69\,mol\ HCl$

Lortzen den kloroaren mol-kopurua:

$$n(Cl_2) = 1.69\,mol\ HCl \times \frac{1\,mol\ Cl_2}{4\,mol\ HCl} = 0.417\,mol\ Cl_2$$

Kloroaren bolumena:

$$V = \frac{nRT}{P} = \frac{(0.417\,mol) \times (0.082\ atm.L/K.mol) \times 303\,K}{(700/760\ atm)}$$

$$\boxed{V = 11.25\,L\ Cl_2}$$

ⓒ Erabili behar den MnO_2-ren mol-kopurua

$$n = 1.69\,mol\ HCl \times \frac{1\,mol\ MnO_2}{4\,mol\ HCl} = 0.417\,mol\ MnO_2$$

$$x = 0.417\,mol\ MnO_2 \times \frac{2\,mol\ e^-}{1\,mol\ MnO_2} = 0.834\,mol\ e^-$$

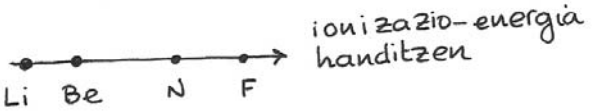
$$x = 0.834\,mol \times \frac{6.02 \times 10^{23}}{1\,mol} = 5.02 \times 10^{23}\ elektroi$$

$$x = 0.834\,mol\ e^- \times \frac{96500\,C}{1\,mol\ e^-} = 80481\,C$$

③ @ Atomoen n eta Z^*

	Be	Li	F	N
n	2	2	2	2
Z^*	2+	1+	7+	5+

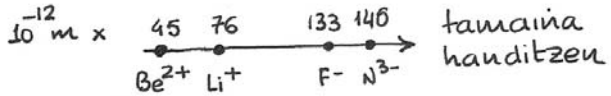
Ionizazio-energia handitzen da (energia gehiago behar da) karga nuklear eraginkorra (Z^*) handitzean.
Beraz:



ⓑ Ioien n eta Z^*

	Be^{2+}	Li^+	F^-	N^{3-}
n	1	1	2	2
Z^*	4+	3+	7+	5+

Erradioa handitzen da maila elektronikoen kopurua (n) handitzean eta karga nuklear eraginkorra (Z^*) txikitzean



ⓒ Sare-energia baxua izateko ioiek karga elektriko baxua eta tamaina handia behar dute.

④ Neutralizazio-erreakzioa

$$HCl + NaOH \longrightarrow NaCl + H_2O$$

$$n\,(HCl) = 0.05\,L \times \frac{1\,mol}{L} = 0.05\,mol\,HCl$$

$$n\,(NaOH) = 0.05\,L \times \frac{1\,mol}{L} = 0.05\,mol\,NaOH$$

Energia termikoa kalkulatzen da ΔT kontuan harturik:

$$Q = 0.1\,Kg \times 4180\,\frac{J}{Kg\,°C} \times (27.5°C - 21°C)$$

$$m = 0.1\,L \times \frac{1\,Kg}{L} = 0.1\,Kg$$

$Q = 2717\,J$ (prozesu exotermikoa)

$$\Delta H_n = -\frac{2717\,J}{0.05\,mol} \times \frac{1\,kJ}{1000\,J} \rightarrow \boxed{\Delta H_n = -54.34\,kJ/mol}$$

⑤ Disoluzio-prozesua:

$$CaSO_4(s) + H_2O \rightleftarrows \underset{x}{Ca^{2+}}(aq) + \underset{x}{SO_4^{=}}(aq)$$

non $x = [Ca^{2+}] = [SO_4^{=}] = [CaSO_4]$

ⓐ Disolbagarritasuna:

$$K_{ps} = 2.4 \times 10^{-5} = x^2 \rightarrow x = 4.9 \times 10^{-3} \frac{mol}{L}$$

Disolbatu nahi den mol-kopurua:

$$M_m (CaSO_4) = 40 + 32 + (4 \times 16) = 136 \ g/mol$$

$$n = 12.6 \ g \ CaSO_4 \times \frac{1 \ mol}{136 \ g} = 9.26 \times 10^{-2} \ mol$$

Bolumena

$$[CaSO_4] = \frac{n}{V} \rightarrow V = \frac{n}{[CaSO_4]} = \frac{9.26 \times 10^{-2} \ mol}{4.9 \times 10^{-3} \ mol/L}$$

$\boxed{V = 18.9 \ L}$ behar dira

ⓑ $[Ca^{2+}] = x = 4.9 \times 10^{-3} \ mol/L$

$$[Ca^{2+}] = 4.9 \times 10^{-3} \frac{mol}{L} \times \frac{40 \ g \ Ca}{1 \ mol} = 0.196 \frac{g \ Ca^{2+}}{L}$$