① Hona hemen disoziazio-taula:

$$HA + H_2O \rightleftarrows A^-(aq) + H_3O^+(aq)$$

| | | | |
|---|---|---|---|
| $C_0$ | 0,05 M | – | – |
| $\Delta C$ | $-0,05\alpha$ | $0,05\alpha$ | $0,05\alpha$ |
| $C_{eq}$ | $0,05(1-\alpha)$ | $0,05\alpha$ | $0,05\alpha$ |

Azidotasun-konstantea erabiliz:

$$K_a = \frac{[A^-][H_3O^+]}{[HA]} \rightarrow 2.10^{-6} = 0,05\,\frac{\alpha^2}{1-\alpha}$$

Hurbilketa hau frogatuko dugu: $1-\alpha \simeq 1$

$$\alpha = \sqrt{\frac{2.10^{-6}}{0,05}} = 6,32 \times 10^{-3}$$

Hurbilketa egokia da: errorea < %5 baino

pHa hauxe da:

$$[H_3O^+] = 0,05\,\alpha = 3,16.10^{-4} \rightarrow \boxed{pH = 3,5}$$

HCl guztiz disoziatzen denez

$$[H_3O^+] = [HCl] = 3,16 \times 10^{-4}\ M$$

| $HCl + H_2O \rightarrow$ | $Cl^-$ | $+ H_3O^+$ |
|---|---|---|
| c | – | – |
| $-c$ | c | c |
| 0 | c | c |

HCl-ren mol-kopurua:

$$[HCl] = 3,16 \times 10^{-4}\ M = \frac{n(HCl)}{0,025\,L}$$

$$n(HCl) = 3,16 \times 10^{-4}\ M \times 0,025\,L = \boxed{7,9 \times 10^{-6}\ mol\ HCl}$$

(2) Amoniakoaren disoziazio-taula:

| | $NH_3 + H_2O \rightleftarrows$ | $NH_4^+ +$ | $OH^-$ |
|---|---|---|---|
| $C_0$ | 0,2 M | – | – |
| $\Delta C$ | $-0,2\alpha$ | $0,2\alpha$ | $0,2\alpha$ |
| $C_{eq}$ | $0,2(1-\alpha)$ | $0,2\alpha$ | $0,2\alpha$ |

Basearen konstantea erabiliz:

$$K_b = \frac{[NH_4^+][OH^-]}{[NH_3]} \rightarrow 1,8\times10^{-5} = 0,2\,\frac{\alpha^2}{1-\alpha}$$

Hurbilketa hau frogatuko dugu: $1-\alpha \simeq 1$

$$\alpha = \sqrt{\frac{1,8\times10^{-5}}{0,2}} = 9,5\times10^{-3}$$ Hurbilketa egokia da

Disoziazio-gradua:

$$\alpha\,(\%) = 9,5\times10^{-3}\times100 = \boxed{\%\ 0,95}$$

pH-a:

$$[OH^-] = 0,2\,\alpha = 1,9\times10^{-3}\,M \rightarrow pOH = 2,72$$

$$pH = 14 - pOH = \boxed{11,28}$$

③ $HNO_3$ azido sendoa denez guztiz disoziatuko da

| | $HNO_3 + H_2O \longrightarrow$ | $NO_3^-(aq)$ | $+ \; H_3O^+(aq)$ |
|---|---|---|---|
| $c_0$ | c | – | – |
| $\Delta c$ | -c | c | c |
| $c_{eq}$ | 0 | c | c |

$$c = [H_3O^+] = 10^{-2,15} \longrightarrow \boxed{c = 7,08 \times 10^{-3}\ M}$$

④ Neutralizazioaren ekuazioa

$$2\ NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O$$

Baloratzeko erabili den azidoaren mol-kopurua:

$$n\,(H_2SO_4) = 0,024\ L \times 0,1\ \frac{mol\ H_2SO_4}{L} = 2,4 \times 10^{-3}\ mol\ H_2SO_4$$

Baloratutako basearen mol-kopurua:

$$n\,(NaOH) = 2,4 \times 10^{-3}\ mol\ H_2SO_4 \times \frac{2\ mol\ NaOH}{1\ mol\ H_2SO_4} = 4,8 \times 10^{-3}\ mol\ NaOH$$

Basearen molaritatea:

$$[NaOH] = \frac{4,8 \times 10^{-3}\ mol\ NaOH}{0,04\ L} = \boxed{0,12\ M}$$

⑤ Neutralizazioaren ekuazioa:

$$2\ KOH + H_2SO_4 \longrightarrow K_2SO_4 + 2\ H_2O$$

Erabili den azidoaren mol-kopurua:

$$n(H_2SO_4) = 0{,}245\ \frac{mol\ H_2SO_4}{L} \times 0{,}02\ L = 4{,}9 \times 10^{-3}\ mol\ H_2SO_4$$

Behar den basearen mol-kopurua:

$$n(KOH) = 4{,}9 \times 10^{-3}\ mol\ H_2SO_4 \times \frac{2\ mol\ KOH}{1\ mol\ H_2SO_4} = 9{,}8 \times 10^{-3}\ mol\ KOH$$

Behar den basearen bolumena:

$$V(KOH) = \frac{1\ L\ dis}{0{,}61\ mol\ KOH} \times 9{,}8 \times 10^{-3}\ mol\ KOH \times \frac{1000\ mL}{1\ L}$$

$$\boxed{V(KOH) = 16\ mL}$$