

01

$V = 100 \text{ mL H}_2\text{SO}_4 \text{ } 0,025 \text{ mol/L}$

$V_{\text{TFSA}} = 5 \text{ cm}^3 = 5 \times 10^{-3} \text{ dm}^3$

$[\text{Ca}^{2+}] = \frac{m}{V} =$

$[\text{Ca}^{2+}] = 2 \text{ mg/L} = \frac{m}{0,1 \text{ L}}$

$m_{\text{Ca}^{2+}} = 0,2 \text{ mg em } 5 \times 10^{-3} \text{ dm}^3$

$\text{Teor Ca}^{2+} = \frac{0,2 \text{ mg}}{5 \times 10^{-3} \text{ dm}^3} = 40 \text{ mg/dm}^3$

1 mmol Ca^{2+} — 2 mmol e

40 mg Ca^{2+} — 2 mmol e / dm^3

$[\text{Mg}^{2+}] = \frac{m_{\text{Mg}^{2+}}}{V}$

1 mg/L = $\frac{m_{\text{Mg}^{2+}}}{0,1}$

$m_{\text{Mg}^{2+}} = 0,1 \text{ mg}$

$\text{Teor Mg}^{2+} = \frac{0,1 \text{ mg}}{5 \times 10^{-3} \text{ dm}^3} = 20 \text{ mg/dm}^3$

1 mmol Mg^{2+} — 2 mmol e

24 mg Mg^{2+} — 2 mmol e

(1 dm³) 20 mg Mg^{2+} — x

$x = 1,667 \text{ mmol e/dm}^3$

$m_{\text{K}^+} = [\text{K}^+] \cdot V = 0,1 \text{ mg}$

$\text{Teor} = \frac{0,1 \text{ mg}}{5 \times 10^{-3} \text{ dm}^3} = 20 \text{ mg/dm}^3$

39 mg K^+ — 1 mmol e

20 mg K^+ — y

$y = 0,513 \text{ mmol e}$

$m_{\text{Al}^{3+}} = 0,2 \text{ mg}$

$\text{Teor} = 40 \text{ mg/dm}^3$

27 mg Al^{3+} — 3 mmol e

40 mg — z

$z = 4,44 \text{ mmol e}$

02

$m_A = 0,50 \text{ g}$

$V = 125 \text{ mL ou } 0,125 \text{ L}$

$m_{\text{K}^+} = [\text{K}^+] \cdot V = 0,625 \text{ mg}$

100% — 0,5 g = 500 mg

x — 0,625 mg

$x = 0,125\% \text{ K}^+ \text{ (m/m)}$

$M_{\text{K}_2\text{O}} = 94 \text{ g/mol}$

94 g K_2O — 78 g K

x_2 — 0,125% K⁺

$x_2 = 0,1306\% \text{ K}_2\text{O (m/m)}$

$m_P = 0,625 \text{ mg}$

100% — 500 mg

y — 0,625 mg

$y = 0,125\% \text{ P (m/m)}$

$M_{\text{P}_2\text{O}_5} = 142 \text{ g/mol}$

142 g P_2O_5 — 62 g P

y_2 — 0,125% P

$y_2 = 0,2863\% \text{ P}_2\text{O}_5 \text{ (m/m)}$

03

$$m_r = 0,5g = 500mg$$

$$V_f = 250ml$$

$$m = C \cdot V$$

$$m_{Ca^{2+}} = 1,25mg$$

$$500mg - 100\%$$

$$1,25mg - x$$

$$x = 0,25\% \cdot Ca^{2+} (m/m)$$

$$M_{CaO} = 56g/mol$$

$$56g CaO - 40g Ca$$

$$x_2 - 0,25\%$$

$$x_2 = 0,35\% \cdot CaO (m/m)$$

$$m_{Mg^{2+}} = 1,25mg$$

$$500mg - 100\%$$

$$1,25mg - y$$

$$y = 0,25\% \cdot Mg^{2+} (m/m)$$

$$M_{MgO} = 40g/mol$$

$$40g MgO - 24g Mg$$

$$y_2 - 0,25\%$$

$$y_2 = 0,4167\% \cdot MgO (m/m)$$

04

$$m_A = 0,5g = 500mg$$

$$V_f = 50ml = 0,05l$$

$$m = [C] \cdot V_f$$

$$m_N = 5 \cdot 0,05l = 0,25mg$$

$$500mg - 100\%$$

$$0,25mg - x$$

$$x = 0,05\% \cdot N (m/m)$$

$$9,05g N - 100g \text{ solu.}$$

$$x_2 - 10^6g$$

$$x_2 = 50ppm$$

$$m_B = 0,5 \cdot 0,05 = 2,5 \times 10^{-2} mg$$

$$500mg - 100\%$$

$$2,5 \times 10^{-2} mg - y$$

$$y = 0,005\% \cdot B (m/m)$$

$$0,005g B - 100g \text{ solu.}$$

$$y - 10^6g \text{ solu.}$$

$$y_2 = 50ppm B$$