

Professor: Kelton Wadson				
1	2	3	4	5
D	E	C	E	B
6	7	8	9	10
E	D	B	D	A

- $(\% \text{ vol})_{\text{inicial}} \times V_{\text{inicial}} = (\% \text{ vol})_{\text{final}} \times V_{\text{final}}$   
 $96\% \times V_{\text{final}} = 70\% \times 12,0 \text{ m}^3$   
 $V_{\text{final}} = \frac{70\% \times 12,0 \text{ m}^3}{96\%} = 8,75 \text{ m}^3$   
 $1 \text{ m}^3 = 1.000 \text{ L} \Rightarrow V_{\text{final}} = 8,75 \times 1.000 \text{ L}$   
 $V_{\text{final}} = 8.750 \text{ L}$
- $\%(\text{v/v})_{\text{inicial}} = 96\%$   
 $\%(\text{v/v})_{\text{final}} = 70\%$   
 $V_{\text{inicial}} = 400 \text{ mL}$   
 $V_{\text{final}} = V_{\text{inicial}} + V_{\text{água}} = 400 + V_{\text{água}}$   
 $\%(\text{v/v})_{\text{inicial}} \times V_{\text{inicial}} = \%(\text{v/v})_{\text{final}} \times V_{\text{final}}$   
 $96\% \times 400 = 70\% \times (400 + V_{\text{água}})$   
 $V_{\text{água}} = \frac{96\% \times 400}{70\%} - 400 = 148,57 \text{ mL}$   
 $V_{\text{água}} = 148 \text{ mL}$
- $[\text{Concentração molar}] = \frac{n}{V} \Rightarrow n = [\text{Concentração molar}] \times V$   
 $[\text{HCl}] = 2 \times 10^{-2} \text{ mol} \cdot \text{L}^{-1}$   
 $V = 100 \text{ mL} = 0,1 \text{ L}$   
 $n_{\text{HCl}} = [\text{HCl}] \times V = 2 \times 10^{-2} \text{ mol} \cdot \text{L}^{-1} \times 0,1 \text{ L} = 0,002 \text{ mol}$   
 $[\text{NaOH}] = 6,25 \times 10^{-3} \text{ mol} \cdot \text{L}^{-1}$   
 $V' = 400 \text{ mL} = 0,4 \text{ L}$   
 $n_{\text{NaOH}} = [\text{NaOH}] \times V' = 6,25 \times 10^{-3} \text{ mol} \cdot \text{L}^{-1} \times 0,4 \text{ L} = 0,0025 \text{ mol}$   
 $1 \text{HCl} + 1 \text{NaOH} \rightarrow 1 \text{H}_2\text{O} + 1 \text{NaCl}$   
 $1 \text{ mol} \text{ — } 1 \text{ mol}$   
 $0,002 \text{ mol} \text{ — } 0,0025 \text{ mol}$   
Em excesso!  
 $n_{\text{Excesso NaOH}} = 0,0025 \text{ mol} - 0,0020 \text{ mol} = 0,0005 \text{ mol}$  (meio básico)  
 $V_{\text{total}} = 100 \text{ mL} + 400 \text{ mL} = 500 \text{ mL} = 0,5 \text{ L}$   
 $\text{NaOH} \rightarrow \text{Na}^+ + \text{OH}^-$   
 $[\text{OH}^-] = \frac{n_{\text{OH}^-}}{V_{\text{total}}}$   
 $[\text{OH}^-] = \frac{0,0005 \text{ mol}}{0,5 \text{ L}} = 0,001 \text{ mol} \cdot \text{L}^{-1} = 10^{-3} \text{ mol} \cdot \text{L}^{-1}$   
 $\text{pOH} = -\log[\text{OH}^-]$   
 $\text{pOH} = -\log 10^{-3} = 3$   
 $\text{pH} + \text{pOH} = 14$   
 $\text{pH} + 3 = 14$   
 $\text{pH} = 14 - 3 = 11$
- $d_{\text{CH}_3\text{CH}(\text{OH})\text{CH}_3} = 0,8 \text{ g} \cdot \text{mL}^{-1}$   
 $0,8 \text{ g} \text{ — } 1 \text{ mL}$   
 $m_{\text{CH}_3\text{CH}(\text{OH})\text{CH}_3} \text{ — } 2 \text{ mL}$   
 $m_{\text{CH}_3\text{CH}(\text{OH})\text{CH}_3} = \frac{0,8 \text{ g} \times 2 \text{ mL}}{1 \text{ mL}} = 1,6 \text{ g}$

- $1,6 \text{ g} \text{ — } 65 \text{ gotas}$   
 $m \text{ — } 1 \text{ gota}$   
 $m = \frac{1,6 \text{ g} \times 1 \text{ gota}}{65 \text{ gotas}} = \left(\frac{1,6}{65}\right) \text{ g}$   
 $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3 = 3 \times 12 + 8 \times 1 + 1 \times 16 = 60$   
 $M_{\text{CH}_3\text{CH}(\text{OH})\text{CH}_3} = 60 \text{ g} \cdot \text{mol}^{-1}$   
 $n_{\text{CH}_3\text{CH}(\text{OH})\text{CH}_3} = \frac{m_{\text{CH}_3\text{CH}(\text{OH})\text{CH}_3}}{M_{\text{CH}_3\text{CH}(\text{OH})\text{CH}_3}}$   
 $n_{\text{CH}_3\text{CH}(\text{OH})\text{CH}_3} = \frac{\left(\frac{1,6}{65}\right) \text{ g}}{60 \text{ g} \cdot \text{mol}^{-1}}$   
 $n_{\text{CH}_3\text{CH}(\text{OH})\text{CH}_3} = 0,0004 \text{ mol} = 4 \times 10^{-4} \text{ mol}$
- $C_B = 0,450 \text{ g mL}^{-1}$  (concentração máxima permitida de B)  
 $M_B = 150 \text{ g mol}^{-1}$   
 $C_B = [B] \times M_B$   
 $[B] = \frac{C_B}{M_B} = \frac{0,450 \text{ g mL}^{-1}}{150 \text{ g mol}^{-1}} = 0,003 \text{ mol} \cdot \text{mL}^{-1}$   
 Em  $1 \text{ mL} \Rightarrow 0,003 \text{ mol}$  de B  
 $2A \rightarrow 3B + C$   
 $2 \text{ mol} \text{ — } 3 \text{ mol}$   
 $0,002 \text{ mol} \text{ — } 0,003 \text{ mol}$   
 $n_A = 0,002 \text{ mol}$   
 $M_A = 250 \text{ g} \cdot \text{mol}^{-1}$   
 $n_A = \frac{m_A}{M_A} \Rightarrow m_A = n_A \times M_A$   
 $m_A = 0,002 \text{ mol} \times 250 \text{ g} \cdot \text{mol}^{-1}$   
 $m_A = 0,500 \text{ g}$   
 $C_A = 0,0200 \text{ g mL}^{-1}$   
 $0,0200 \text{ g} \text{ — } 1 \text{ mL}$   
 $0,500 \text{ g} \text{ — } V$   
 $V = \frac{0,500 \text{ g} \times 1 \text{ mL}}{0,0200 \text{ g}} = 25,0 \text{ mL}$
- $7,0 \text{ kcal} \text{ — } 1 \text{ g de etanol}$   
 $3000 \text{ kcal} \text{ — } m_{\text{etanol}}$   
 $m_{\text{etanol}} = \frac{3000 \text{ kcal} \times 1 \text{ g}}{7,0 \text{ kcal}} = 428,57 \text{ g}$   
 $d_{\text{etanol}} = 0,79 \text{ g} \cdot \text{mL}^{-1}$   
 $1 \text{ mL de etanol} \text{ — } 0,79 \text{ g}$   
 $V_{\text{etanol}} \text{ — } 428,57 \text{ g}$   
 $V_{\text{etanol}} = \frac{1 \text{ mL} \times 428,57 \text{ g}}{0,79 \text{ g}} = 542,49 \text{ mL}$   
 $542,49 \text{ mL} \text{ — } 40\%$   
 $V \text{ — } 100\%$   
 $V = \frac{542,49 \text{ mL} \times 100\%}{40\%} = 1356,2 \text{ mL}$   
 $V = 1356 \text{ mL}$
- $d_{\text{H}_2\text{O}} = 1 \text{ g/mL}$   
 $1 \text{ g} \text{ — } 1 \text{ mL (H}_2\text{O)}$   
 $400 \text{ g} \text{ — } 400 \text{ mL (H}_2\text{O)}$   
 $30^\circ\text{C} \Rightarrow 219 \text{ g de sacarose em } 100 \text{ g de H}_2\text{O}$   
 $219 \text{ g de sacarose} \text{ — } 100 \text{ g (H}_2\text{O)}$   
 $m_{\text{sacarose}} \text{ — } 400 \text{ g (H}_2\text{O)}$   
 $m_{\text{sacarose}} = \frac{219 \text{ g} \times 400 \text{ g}}{100 \text{ g}} = 876 \text{ g}$



8.  $C_4H_6O_6 = 4 \times 12 + 6 \times 1 + 6 \times 16 = 150$   
 $M_{C_4H_6O_6} = 150 \text{ g} \cdot \text{mol}^{-1}$  (massa molar)  
 $[C_4H_6O_6] = 0,12 \text{ mol} \cdot \text{L}^{-1}$   
 $V = 1.000 \text{ L}$   
 $[C_4H_6O_6] = \frac{n_{C_4H_6O_6}}{V} \Rightarrow [C_4H_6O_6] = \frac{m_{C_4H_6O_6}}{M_{C_4H_6O_6} \times V}$   
 $m_{C_4H_6O_6} = [C_4H_6O_6] \times M_{C_4H_6O_6} \times V$   
 $m_{C_4H_6O_6} = 0,12 \text{ mol} \cdot \text{L}^{-1} \times 150 \text{ g} \cdot \text{mol}^{-1} \times 1.000 \text{ L} = 18.000 \text{ g}$   
 $m_{C_4H_6O_6} = 18 \text{ kg}$
9.  $m_{(\text{Ampicilina})} = 500 \text{ mg}$   
 $V = 2 \text{ mL}$   
 $C_{(\text{Ampicilina})} = \frac{m_{(\text{Ampicilina})}}{V} = \frac{500 \text{ mg}}{2 \text{ mL}} = 250 \text{ g} \cdot \text{L}^{-1}$   
 $M_{(\text{Ampicilina})} = 349 \text{ g} \cdot \text{mol}^{-1}$   
 $C_{(\text{Ampicilina})} = [\text{Ampicilina}] \times M_{(\text{Ampicilina})}$   
 $250 \text{ g} \cdot \text{L}^{-1} = [\text{Ampicilina}] \times 349 \text{ g} \cdot \text{mol}^{-1}$   
 $[\text{Ampicilina}] = \frac{250 \text{ g} \cdot \text{L}^{-1}}{349 \text{ g} \cdot \text{mol}^{-1}} = 0,716 \text{ mol} \cdot \text{L}^{-1}$   
 $[\text{Ampicilina}] \approx 0,7 \text{ mol} \cdot \text{L}^{-1}$
10. A concentração de sais no Mar morto é muito elevada, por isso, conclui-se que os valores em 2 e 4 foram digitados em linhas trocadas.

Amostra de água	Origem	Concentração de sais dissolvidos
1	Oceano Atlântico (litoral nordestino brasileiro)	$3,6\% \text{ (m/V)} = \frac{3,6 \text{ g}}{100 \text{ mL}} = \frac{3,6 \text{ g}}{0,1 \text{ L}} = 36 \text{ g/L}$
2	Mar Morto (Israel/Jordânia)	$30\% \text{ (m/V)} = \frac{30 \text{ g}}{100 \text{ mL}} = \frac{30 \text{ g}}{0,1 \text{ L}} = 300 \text{ g/L}$
3	Água mineral de Campos do Jordão (interior do estado de São Paulo)	$120 \text{ mL} = 120 \times 10^{-3} \text{ g/L} = 0,12 \text{ g/L}$
4	Lago Titicaca (Bolívia/Peru)	1,2 g/L