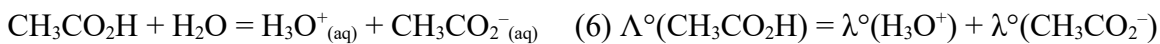
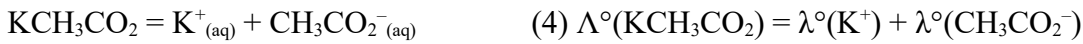
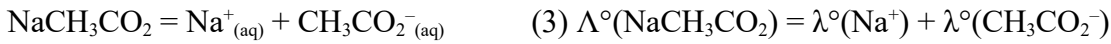


Correction activité S1.8 : Conductimétrie

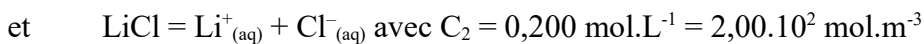
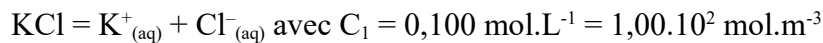
activité 8.1 Solution d'acide éthanique



$$(6) = (1) + (3) - (2) \Rightarrow \Lambda^\circ(\text{CH}_3\text{CO}_2\text{H}) = \Lambda^\circ(\text{NaCH}_3\text{CO}_2) + \Lambda^\circ(\text{HBr}) - \Lambda^\circ(\text{NaBr}) = 390,7 \cdot 10^{-4} \text{ S.m}^2.\text{mol}^{-1}$$

$$(6) = (1) + (4) - (5) \Rightarrow \Lambda^\circ(\text{CH}_3\text{CO}_2\text{H}) = \Lambda^\circ(\text{KCH}_3\text{CO}_2) + \Lambda^\circ(\text{HBr}) - \Lambda^\circ(\text{KBr}) = 390,7 \cdot 10^{-4} \text{ S.m}^2.\text{mol}^{-1}$$

activité 8.2 Conductivité équivalente limite de l'ion Li⁺



$$\text{Soit : } [\text{K}^+] = C_1 = 1,00 \cdot 10^2 \text{ mol.m}^{-3} ;$$

$$[\text{Li}^+] = C_2 = 2,00 \cdot 10^2 \text{ mol.m}^{-3} ;$$

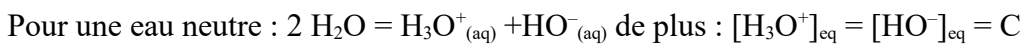
$$[\text{Cl}^-] = C_1 + C_2 = C_3 = 3,00 \cdot 10^2 \text{ mol.m}^{-3} ;$$

$$\sigma = \lambda^\circ(\text{Cl}^-) C_3 + \lambda^\circ(\text{K}^+) C_1 + \lambda^\circ(\text{Li}^+) C_2 = 38,0 \text{ mS.cm}^{-1} = 3,80 \text{ S.m}^{-1}$$

$$\lambda^\circ(\text{Li}^+) = \frac{\sigma - \lambda^\circ(\text{Cl}^-) \times C_3 - \lambda^\circ(\text{K}^+) \times C_1}{C_2} = \frac{3,80 - 76,3 \cdot 10^{-4} \times 3,00 \cdot 10^2 - 73,5 \cdot 10^{-4} \times 1,00 \cdot 10^2}{2,00 \cdot 10^2}$$

$$\Rightarrow \lambda^\circ(\text{Li}^+) = 38,8 \cdot 10^{-4} \text{ S.m}^2.\text{mol}^{-1}$$

activité 8.3 Ionisation de l'eau pure



$$\rho = 1/\sigma \Rightarrow \sigma = 5,71 \cdot 10^{-6} \text{ S.m}^{-1} \text{ et } \sigma = \lambda^\circ(\text{H}_3\text{O}^+) [\text{H}_3\text{O}^+] + \lambda^\circ(\text{HO}^-) [\text{HO}^-] = (\lambda^\circ(\text{H}_3\text{O}^+) + \lambda^\circ(\text{HO}^-)) C$$

$$\Rightarrow C = \frac{\sigma}{\lambda^\circ(\text{H}_3\text{O}^+) + \lambda^\circ(\text{HO}^-)} = \frac{5,71 \cdot 10^{-6}}{(349,8 + 198,9) 10^{-4}} = 1,04 \cdot 10^{-4} \text{ mol.m}^{-3} = 1,04 \cdot 10^{-7} \text{ mol.L}^{-1}$$

$$K_e = \frac{a(\text{H}_3\text{O}^+)_{\text{eq}} a(\text{HO}^-)_{\text{eq}}}{a(\text{H}_2\text{O})_{\text{eq}}^2} \text{ avec } a(\text{H}_2\text{O}) = 1 \text{ et } C^\circ = 1 \text{ mol.L}^{-1} \Rightarrow K_e = \left(\frac{C}{C^\circ} \right)^2 = 1,08 \cdot 10^{-14}$$

N.B. : $\text{p}K_e = -\log K_e = 13,96$; cela correspond à la valeur attendue de 14,0 à 25 °C.