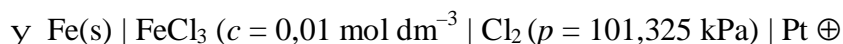


Určete střední aktivitní koeficient  $\text{FeCl}_3$  za teploty  $25^\circ\text{C}$ . Rovnovážné napětí článku



má hodnotu  $1,5515 \text{ V}$ . Předpokládejte, že chlor se chová jako ideální plyn (standardní stav  $p^{\text{st}} = 101,325 \text{ kPa}$ ). Standardní stav pro elektrolyt: nekonečné zředění,  $c^{\text{st}} = 1 \text{ mol dm}^{-3}$ . Hodnoty standardních redukčních elektrodových potenciálů:  $E^\gamma(\text{Fe}^{3+}|\text{Fe}) = -0,036 \text{ V}$ ,  $E^\gamma(\text{Cl}_2|\text{Cl}^-) = 1,36 \text{ V}$ .

$$[g_{\pm} = 0,4685]$$

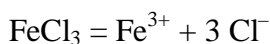
**Řešení:**

$$1. \gamma \text{ Fe (g)} = \text{Fe}^{3+} (\text{aq}) + 3 \text{ e} \quad E_1 = E^\gamma(\text{Fe}|\text{Fe}^{3+}) - \frac{RT}{3F} \ln a_{\text{Fe}^{3+}}$$

$$E^\gamma(\text{Fe}|\text{Fe}^{3+}) = -E^\gamma(\text{Fe}^{3+}|\text{Fe}) = -(-0,036) \text{ V}$$

$$2. \oplus \text{Cl}_2 (\text{g}) + 2 \text{ e} = 2 \text{Cl}^- (\text{aq}) \quad E_2 = E^\gamma(\text{Cl}_2|\text{Cl}^-) - \frac{RT}{2F} \ln \frac{a_{\text{Cl}^-}^2}{a_{\text{Cl}_2}}$$

$$E^\gamma(\text{Cl}_2|\text{Cl}^-) = 1,36 \text{ V} \quad , \quad a_{\text{Cl}_2} \approx \frac{p_{\text{Cl}_2}}{p^{\text{st}}} = \frac{101,325}{101,325} = 1$$



$$c_{\text{Fe}^{3+}} = c \quad , \quad c_{\text{Cl}^-} = 3c \quad , \quad z_K = 3 \quad , \quad z_A = 1$$

$$a_{\text{Fe}^{3+}} \cdot a_{\text{Cl}^-}^3 = g_{\text{Fe}^{3+}} \cdot c_{\text{Fe}^{3+}} \cdot g_{\text{Cl}^-}^3 \cdot c_{\text{Cl}^-}^3 = g_{\pm}^4 \cdot c \cdot (3c)^3 = g_{\pm}^4 \cdot 27 \cdot c^4 \quad , \quad c^{\text{st}} = 1 \text{ mol dm}^{-3}$$

$$E = E_1 + E_2 = -E^\gamma(\text{Fe}^{3+}|\text{Fe}) + E^\gamma(\text{Cl}_2|\text{Cl}^-) - \frac{RT}{3F} \ln a_{\text{Fe}^{3+}} - \frac{RT}{F} \ln a_{\text{Cl}^-}$$

$$= -E^\gamma(\text{Fe}^{3+}|\text{Fe}) + E^\gamma(\text{Cl}_2|\text{Cl}^-) - \underbrace{\frac{RT}{3F} (\ln a_{\text{Fe}^{3+}} + \ln a_{\text{Cl}^-}^3)}_{\frac{RT}{3F} \ln (a_{\text{Fe}^{3+}} \cdot a_{\text{Cl}^-}^3)}$$

$$E = -E^\gamma(\text{Fe}^{3+}|\text{Fe}) + E^\gamma(\text{Cl}_2|\text{Cl}^-) - \frac{RT}{3F} \cdot \underbrace{\ln (g_{\pm}^4 \cdot 27 \cdot c^4)}_{4 \ln (g_{\pm}) + \ln (27 \cdot c^4)}$$

$$1,5515 = -(-0,036) + 1,36 - \frac{8,314 \cdot 298,15}{3 \cdot 96485,3} \cdot [4 \ln (g_{\pm}) + \ln (27 \cdot c^4)]$$

$$4 \ln g_{\pm} = \frac{1,5515 - 0,036 - 1,36}{8,56372 \cdot 10^{-3}} + \ln (27 \cdot 0,01^4) = 18,157998 - 15,124844 = -3,0331542$$

$$\ln g_{\pm} = -0,75829$$

$$g_{\pm} = 0,46847$$