

(22.7) (a) Calculate the Pourbaix-line for Np(IV)/Np(V) in Figure 22.5. (b) What value must the Eh value of water exceed at pH 6 for Np(V) to dominate? Neglect hydrolysis.

$$R := 8.31451 \cdot \frac{\text{joule}}{\text{mole} \cdot \text{K}} \quad q_e := 1.6021773 \cdot 10^{-19} \cdot \text{coul} \quad N_A := 6.022137 \cdot 10^{23} \cdot \text{mole}^{-1}$$

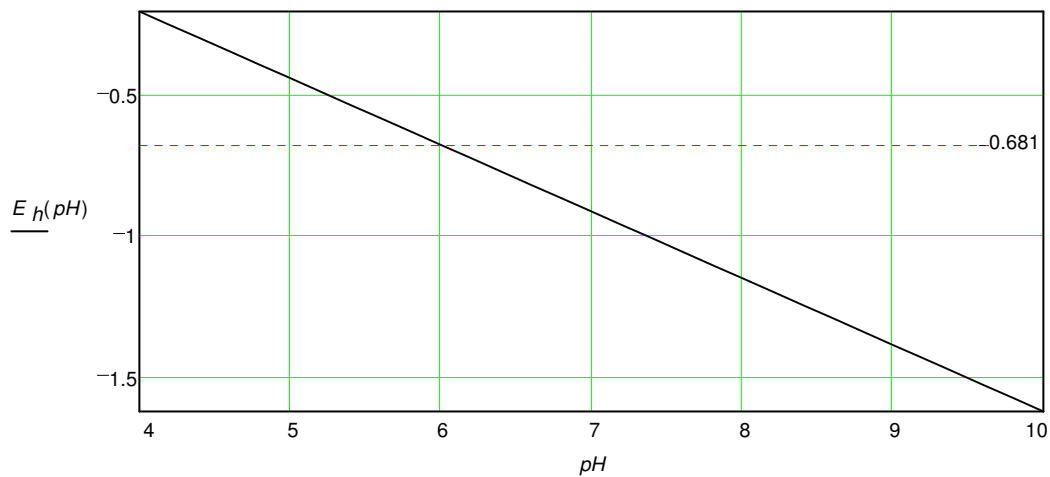
$$F := q_e \cdot N_A$$

$$T := (273.15 + 25) \cdot \text{K} \quad n := 1$$

At the pourbaix line concentrations of ox and red are equal. Hence, their ratio is 1.0

$$\text{pH} := 4, 4.2 \dots 10 \quad H(\text{pH}) := 10^{-\text{pH}} \quad E0(\text{pH}) := 0.739 \cdot \text{volt} + \frac{R \cdot T}{n \cdot F} \cdot \ln(H(\text{pH})^4)$$

$$E_h(\text{pH}) := E0(\text{pH}) + \frac{R \cdot T}{n \cdot F} \cdot \ln(1.0)$$



$$E_h(6) = -0.681 \cdot \text{volt} \quad \text{Hence, the } E_h \text{ must exceed } -0.681 \text{ volts}$$