

(22.7) (a) Calculate the Pourbaix-line for Np(IV)/Np(V) in Figure 22.4. (b) What value must the Eh value of water exceed at pH 6 for Np(V) to dominate? Neglect hydrolysis.

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

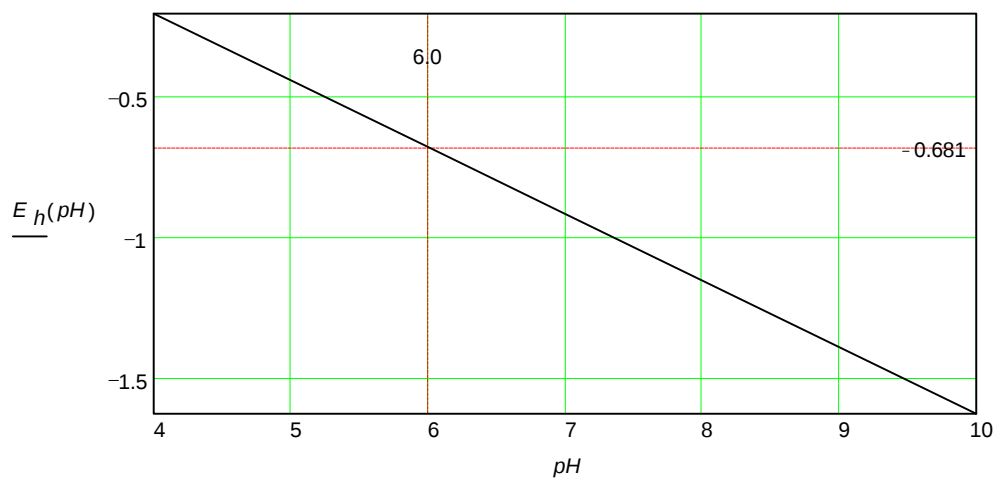
$$F := q_e \cdot N_A$$

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

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

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

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



$$E_h(6) = -0.681 \cdot \text{volt}$$

Hence, the E_h must exceed -0.681 volts