

$$21. \quad v_i = 1 \text{ L} \quad v_e = 1 + 0,001 = 1,001 \text{ L}$$

$$1 \text{ mL} = 0,001 \text{ L}$$

$$n = c \cdot v \rightarrow 0,001$$

$$\downarrow 1 \text{ M}$$

$$\Rightarrow \text{ donc } n = 1 \cdot 0,001 = 0,001 \text{ mol}$$

concentration hydroxyde :

$$c[\text{OH}^-] = \frac{n}{v_e} \Rightarrow c[\text{OH}^-] = \frac{0,001}{1,001} = \frac{1}{1001} \text{ M}$$

$$\Rightarrow \text{ donc maintenant } [\text{H}_3\text{O}^+] \cdot [\text{OH}^-] = 10^{-14}$$

$$[\text{H}_3\text{O}^+] \cdot \frac{1}{1001} = 10^{-14}$$

$$c[\text{H}_3\text{O}^+] = \frac{10^{-14}}{\frac{1}{1001}} = 1,001 \cdot 10^{-11} \text{ mol/L}$$

$$\Rightarrow \text{ pH} = -\log [\text{H}_3\text{O}^+]$$

$$\text{ pH} = -\log [1,001 \cdot 10^{-11}]$$

$$\text{ pH} = 10,999$$