

How much hydrogen in grams could be obtained from 4.5L of water?

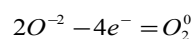
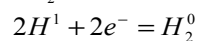
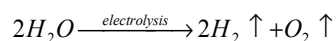
Solution

Water volume $V(H_2O) = 4.5 \text{ l}$

Water density $\rho(H_2O) = 1\text{kg} \bullet \text{l}^{-1}$

Water molar mass $Mr(H_2O) = 0.018\text{kg} \bullet \text{mol}^{-1}$

Hydrogen production



Based on the reaction equation $n(H_2O) = n(H_2)$

n – Number of moles

$$n(H_2O) = n(H_2) = m(H_2O) / Mr(H_2O) = V(H_2O) \bullet \rho(H_2O) / Mr(H_2O) = 4.5(\text{l}) \bullet 1(\text{kg} \bullet \text{l}^{-1}) / 0.018(\text{kg} \bullet \text{mol}^{-1}) = 250\text{mol}$$

Find hydrogen mass

$$m(H_2) = Mr(H_2) \bullet n(H_2) = 2(\text{g} \bullet \text{mol}^{-1}) \bullet 250\text{mol} = 500\text{g}$$

Answer: 500g of hydrogen could be obtained from 4.5 l of water