Answer on Question #54499 – Chemistry – Physical Chemistry

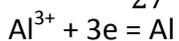**Task:**

A quantity of electric charge brings about the decomposition of 4.5 g Al from Al^{+3} at the cathode. How much volume (STP) of $H_2(g)$ from H_2O at the cathode will be produced using the same quantity of electric charge?
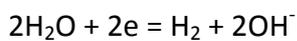
Answer:

$$n = \frac{m}{M}$$

M(Al)=27 g/mol

$$n(Al) = \frac{4.5}{27} = 0.17 \; mol$$

Al^{3+} + 3e = Al

E°=-1.663 V/mol

E=-1.663·0.17=-0.283 V

$2H_2O$ + 2e = H_2 + $2OH^-$

E°=-0.828 V/mol

M(H_2)=2 g/mol

$$E = \frac{-0.283}{-0.828} = 0.342 \; mol$$

$$n = \frac{V}{22.4}$$

$$V(H_2) = 22.4 \cdot 0.342 = 7.7 \; l$$