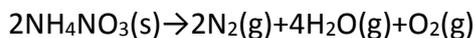


## Answer on Question #56154 - Chemistry - General Chemistry

### Question:

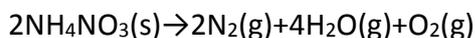
When heated to 350 °C at 0.950 atm, ammonium nitrate decomposes to produce nitrogen, water, and oxygen gases:



Question: How many liters of water vapor are produced when 23.6 g of  $\text{NH}_4\text{NO}_3$  decomposes?

Express your answer with the appropriate units.

### Solution:



$$n_{\text{NH}_4\text{NO}_3} = \frac{m(\text{NH}_4\text{NO}_3)}{M_{\text{NH}_4\text{NO}_3}} = \frac{23,6}{(18 + 14 + 48)\text{g/mol}} = 0.295 \text{ moles}$$

$$n_{\text{H}_2\text{O}} = 2n_{\text{NH}_4\text{NO}_3} = 0,59 \text{ moles}$$

According to the Mendeleev-Clapeyron law, value volume evolved during the reaction under the given conditions is:

$$V_{\text{O}_2} = \frac{n \cdot R \cdot T}{P} = \frac{0,59 \text{ mol} \cdot 0,082 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}} \cdot (350 + 273) \text{K}}{0,950 \text{ atm}} = 31,727 \text{L}$$

where R - the universal gas constant  $\frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}}$  ;

T - temperature in Kelvins;

P- pressure atm.

**Answer:** 31,727L  $\text{O}_2$