**Answer on Question #76434, Chemistry / General Chemistry**

Question:

Ammonium nitrate, a common fertilizer, is used as an explosive in fireworks and by terrorists. It was the material used in the devastating and tragic explosion of the Oklahoma City federal building in 1995. How many liters of gas at 307 degrees C and 1 atm are formed by the explosive decomposition of 15.0 kg of ammonium nitrate to nitrogen gas, oxygen gas and water vapor?

Solution:

The reaction:

$$2 \text{ NH}_4\text{NO}_3 \rightarrow 2 \text{ N}_2 + \text{O}_2 + 4 \text{ H}_2\text{O}$$
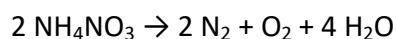
Amount of ammonium nitrate: 15000 / 80.04 = 187.4 mol

Each 2 moles of ammonium nitrate gives 7 moles of gaseous products, so:

Total amount of gases: n = 187.4 · (7/2) = 655.9 mol

Temperature: T = 307 + 273 = 600 K

Pressure: p = 1 atm = 101325 Pa

Ideal gas low: **pV = nRT**, where R - gas constant , = 8.314 $(\text{m}^3 \cdot \text{Pa}) / (\text{K} \cdot \text{mol})$

Volume: **V = nRT / p** = (655.9 · 8.314 · 600) / 101325 = 32.291 m^3 = 32291 L

Answer:

32291 L

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