$FW_{NH_4NO_3} = 80.0434\ g/mol$

$$2\,NH_4NO_3(s) \longrightarrow 2\,N_2(g) + O_2(g) + 4\,H_2O(g)$$

At 300°C, ammonium nitrate violently decomposes to produce nitrogen gas, oxygen gas, and water vapor. What is the pressure inside a 30 mL vessel at 300C caused by the decomposition of 15.0 grams of ammonium nitrate?

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1 - Convert 15.0 grams of ammonium nitrate to moles using formula.
2 - Convert moles ammonium nitrate to total moles of gas using chemical equation
3 - Calculate pressure inside vessel using ideal gas equation.

$80.0434\ g\ NH_4NO_3 = mol\ NH_4NO_3$ | $2\ mol\ NH_4NO_3 = 7\ mol\ gas$

$$15.0\ g\ NH_4NO_3 \times \frac{mol\ NH_4NO_3}{80.0434\ g\ NH_4NO_3} \times \frac{7\ mol\ gas}{2\ mol\ NH_4NO_3} = 0.655894177\ 4\ mol\ gas$$

$PV = nRT$

$P = \dfrac{nRT}{V}$

$n = 0.655894177\ 4\ mol\ gas$ $\quad R = 0.08206\ \frac{L\cdot atm}{mol\cdot K}$

$T = 300.°C = 573K$ $\quad V = 30.0\ mL = 0.0300\ L$

$$P = \frac{(0.655894177\ 4\ mol\ gas)\left(0.08206\ \frac{L\cdot atm}{mol\cdot K}\right)(573K)}{(0.0300\ L)} = 1030\ atm$$