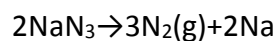


Answer on the question #54713 – Chemistry – General chemistry

Question:

Sodium azide (NaN_3) yields N_2 gas when heated to $300\text{ }^\circ\text{C}$, a reaction used in automobile air bags.

If 1.00 mol of N_2 has a volume of 47.0 L under the reaction conditions, how many liters of gas can be formed by heating 39.0 g of NaN_3 ? The reaction is:



Answer:

According to the reaction equation, the number of the moles of the sodium azide and nitrogen relates as:

$$\frac{n(\text{NaN}_3)}{2} = \frac{n(\text{N}_2)}{3}$$

The number of the moles of the sodium azide is:

$$n(\text{NaN}_3) = \frac{m(\text{NaN}_3)}{M(\text{NaN}_3)} = \frac{39.0}{65} = 0.6 \text{ mol}$$

Then, the number of the moles of nitrogen gas is:

$$n(\text{N}_2) = n(\text{NaN}_3) * \frac{3}{2} = 0.6 * \frac{3}{2} = 0.9 \text{ mol}$$

The volume of nitrogen is:

$$V(\text{N}_2) = n(\text{N}_2) * 47 = 42.3 \text{ L}$$