

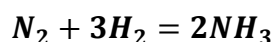
Answer on Question #62994 - Chemistry - General Chemistry

Ammonia is prepared industrially by the reaction of nitrogen and hydrogen according to the following equation. If 29.7 g of N₂ is added to 3.31 g of H₂, which reactant is the limiting reactant and how much ammonia (NH₃) is formed?

Solution

$$v(N_2) = \frac{29.7 \text{ g}}{28 \text{ g/mol}} = 1.06 \text{ mol}$$

$$v(H_2) = \frac{3.31 \text{ g}}{2 \text{ g/mol}} = 1.66 \text{ mol}$$



According to the reaction, we need 3 moles of H₂ for every mole of N₂. Therefore, we need 3.18 moles of H₂ to react with N₂ given. Therefore, H₂ is the limiting reagent.

$$v(NH_3) = 1.66 \text{ mol} \times \frac{2}{3} \approx 1.1 \text{ mol}$$

$$m(NH_3) = 1.1 \text{ mol} \times 17.03 \frac{\text{g}}{\text{mol}} = 18.78 \text{ g}$$

Answer: H₂ is the limiting reagent; 18.78g of ammonia is formed.