

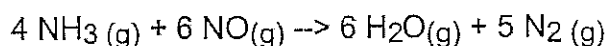
Example Calculations For Stoichiometry

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Example Calculations for Stoichiometry

The steps to calculate stoichiometry problems highlighted in [\[Stoichiometry Notes Handout\]](#) will be used in the following problem.

How many grams of nitrogen gas is produced if I react 32.5 grams of ammonia gas (NH₃) using the following equation?



Step 1: Balanced chemical rxn; get/see from problem

Step 2: grams NH₃ → mole NH₃; use molar mass

$$\text{molar mass NH}_3: 1(14\text{g}) + 3(1\text{g}) = \frac{17\text{g NH}_3}{1\text{mole NH}_3}$$

Step 3: mole NH₃ (known) → mole N₂ (unknown) use molar ratio

• For molar ^{ratio} ~~mass~~, use actual coefficient numbers from balanced chemical rxn. DO NOT REDUCE/SIMPLIFY these numbers

Step 4: mole N₂ → g N₂; use molar mass

$$\text{molar mass N}_2: 2(14\text{g}) = \frac{28\text{g N}_2}{1\text{mole N}_2}$$

Actual work (excluding molar mass calculation from above):

$$(32.5\text{g NH}_3) \left(\frac{1\text{mole NH}_3}{17\text{g NH}_3} \right) \left(\frac{5\text{mole N}_2}{4\text{mole NH}_3} \right) \left(\frac{28\text{g N}_2}{1\text{mole N}_2} \right) = 66.91\text{g N}_2$$

$$= \boxed{66.9\text{g N}_2}$$

Example Calculation for Stoichiometry By Equation

Step 1
Balanced
chem
rxn



32.5 g NH_3

? g N_2

$$\text{Step 2: } \# \text{ mol} = \frac{\# \text{ g}}{\left(\frac{\# \text{ g}}{\text{mol}} \right)}$$

$$\text{mm } \text{NH}_3: 1(14\text{g}) + 3(1\text{g}) =$$

$$\frac{17\text{g } \text{NH}_3}{1 \text{ mol } \text{NH}_3}$$

$$= \frac{32.5\text{g } \text{NH}_3}{\left(\frac{17\text{g } \text{NH}_3}{1 \text{ mol } \text{NH}_3} \right)} = 1.911 \text{ mol } \text{NH}_3$$

$$\text{Step 3: } (1.911 \text{ mol } \text{NH}_3) \left(\frac{5 \text{ mol } \text{N}_2}{4 \text{ mol } \text{NH}_3} \right) = 2.388 \text{ mol } \text{N}_2$$

$$\text{Step 4: } \# \text{ mol} = \frac{\# \text{ g}}{\left(\frac{\# \text{ g}}{\text{mol}} \right)} \Rightarrow \# \text{ g} = (\# \text{ mol}) \left(\frac{\# \text{ g}}{\text{mol}} \right)$$

$$\text{mm } \text{N}_2: 2(14\text{g}) = \frac{28\text{g } \text{N}_2}{1 \text{ mol } \text{N}_2}$$

$$= (2.388 \text{ mol } \text{N}_2) \left(\frac{28\text{g } \text{N}_2}{1 \text{ mol } \text{N}_2} \right)$$

$$= 66.86\text{g } \text{N}_2$$

$$= \boxed{66.9\text{g } \text{N}_2}$$