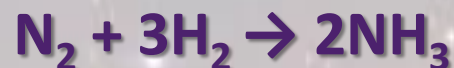


MASS-MASS RELATIONSHIPS

Stoichiometry

MOLE-MASS-MOLE-MASS?

- Write a balanced equation showing the formation of ammonia from hydrogen and nitrogen.



- What is the mole ratio in the balanced equation?

1:3:2

- What is the mass ratio based on the balanced equation?

28:6:34

- How many moles of ammonia will form from 2 moles of nitrogen?

4 mol

- How many grams of ammonia will form from 56 g of nitrogen?

68 g

THE ROAD MAP

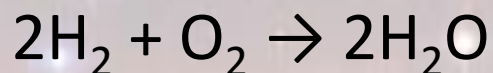
- Imagine we have two substances, substance 1 and substance 2, both of which are participants in a chemical reaction.
- Starting with a balanced equation,
 - it is possible to convert from mass to moles,
 - from moles of one substance to moles of another,
 - and from moles to mass.



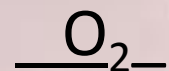
SAMPLE PROBLEM

How much oxygen is needed to produce 27.0 g of water by burning hydrogen?

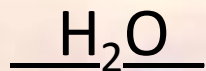
- **Step 1:** Write a balanced equation



- **Step 2:** Calculate the GFM of the known and unknown.



$$\text{O} = 16 \times 2 = 32 \text{ g}$$



$$\text{H} = 1 \times 2 = 2$$

$$\text{O} = 16 \times 1 = \underline{16}$$

$$18 \text{ g}$$

- **Step 3:** Apply the factor label method

$$27.0 \text{ g}_{\text{H}_2\text{O}} \times \frac{1 \text{ mol}_{\text{H}_2\text{O}}}{18 \text{ g}_{\text{H}_2\text{O}}} \times \frac{1 \text{ mol}_{\text{O}_2}}{2 \text{ mol}_{\text{H}_2\text{O}}} \times \frac{32 \text{ g}_{\text{O}_2}}{1 \text{ mol}_{\text{O}_2}} = 24 \text{ g}_{\text{O}_2}$$