

# Stoichiometry

Mole to mole and mole to mass

- Stoichiometry – numerical relationships in chemical reactions
- Mole ratio – conversion factor that relates amount in moles of any two substances involved in the reaction (given has to be in mole before you can use mole ratio)

1. Ammonia is widely used in many household cleaners. How many moles of ammonia are produced when 6 mol of hydrogen gas react with an excess of nitrogen gas?



Giv: 6 mol  $\text{H}_2$

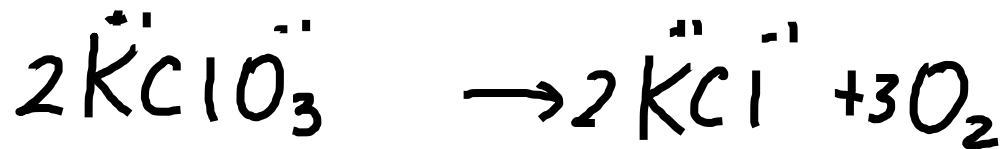
Unk: mol  $\text{NH}_3$

$$\cancel{6 \text{ mol H}_2} \times \frac{2 \text{ mol NH}_3}{3 \cancel{\text{ mol H}_2}} = \boxed{4 \text{ mol NH}_3}$$



mole ratio  
from  
balanced  
eqn

2. The decomposition of potassium chlorate is used as a source of oxygen in labs. How many moles of potassium chlorate are needed to produce 15 mol of oxygen?



Given: 15 mol  $\text{O}_2$

Unknown: mol  $\text{KClO}_3$

$$15 \cancel{\text{mol O}_2} \times \frac{2 \text{ mol KClO}_3}{3 \cancel{\text{mol O}_2}} =$$

$$\boxed{10 \text{ mol KClO}_3}$$

3. What mass of glucose,  $C_6H_{12}O_6$ , can be produced from a photosynthesis reaction that occurs using 10 mol of  $CO_2$ ?



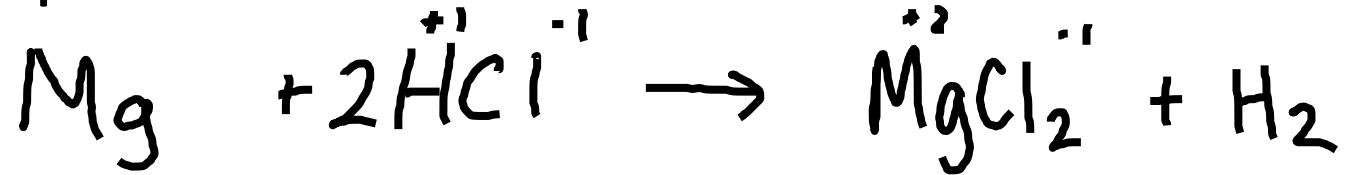
Given: 10 mol  $CO_2$

Unknown: g  $C_6H_{12}O_6$

$$10 \text{ mol } CO_2 \times \frac{1 \text{ mol } C_6H_{12}O_6}{6 \text{ mol } CO_2} \times \frac{180.18 \text{ g } C_6H_{12}O_6}{1 \text{ mol } C_6H_{12}O_6}$$

$$= 300.3 \text{ g } C_6H_{12}O_6$$

4. If you add 2.5 mol of magnesium to hydrochloric acid, how many grams of magnesium chloride will be produced?



Giv: 2.5 mol Mg

Unk: g MgCl<sub>2</sub>

$$2.5 \cancel{\text{mol Mg}} \times \frac{1 \cancel{\text{mol MgCl}_2}}{1 \cancel{\text{mol Mg}}} \times \frac{95.21 \text{ g MgCl}_2}{1 \cancel{\text{mol MgCl}_2}}$$

$$\boxed{238.01 \text{ g MgCl}_2}$$