

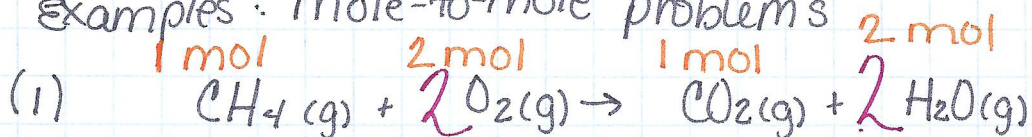
Stoichiometry

- study of the quantity relationships in a chemical reaction.
- uses a concept called the mole ratio

- converts from moles of given substance to moles of unknown substance
- comes from the balanced chemical equations

$$\frac{\text{moles unknown substance}}{\text{moles given substance}}$$

Examples: mole-to-mole problems



How many moles of water are produced from the reaction of 10.0 mol methane (CH₄) with excess oxygen?
GIVEN

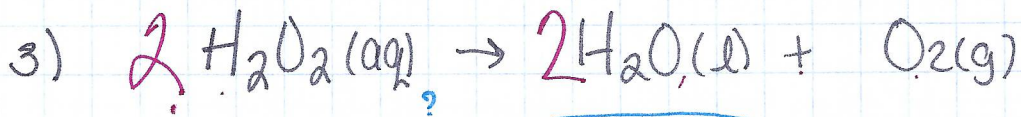
$$\frac{10.0 \text{ mol CH}_4}{1 \text{ mol CH}_4} \times \frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol CH}_4} = 20.0 \text{ mol H}_2\text{O}$$



How many moles of phosphorous are needed to completely react w/ 750 moles of sodium?

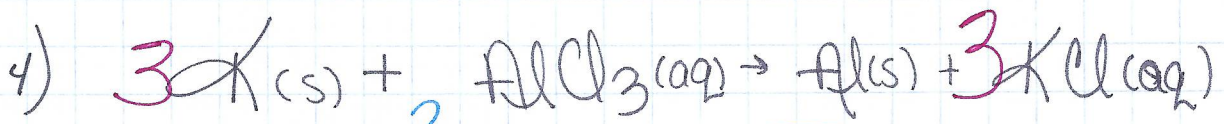
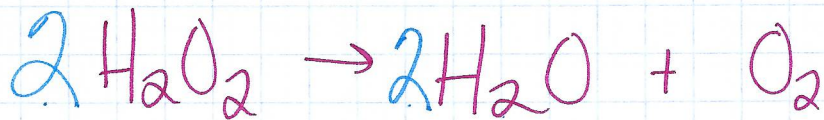
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$$\frac{750 \text{ mol Na}}{12 \text{ mol Na}} \times \frac{1 \text{ mol P}_4}{4 \text{ mol Na}} = 0.625 \text{ mol P}_4$$



How many moles of water are produced when 342.0 mol of hydrogen peroxide decompose? GIVEN

$$\frac{342.0 \text{ mol } \cancel{\text{H}_2\text{O}_2}}{2 \text{ mol } \cancel{\text{H}_2\text{O}_2}} \times \frac{2 \text{ mol } \text{H}_2\text{O}}{2 \text{ mol } \cancel{\text{H}_2\text{O}_2}} = 342.0 \text{ mol } \text{H}_2\text{O}$$



How many moles of potassium chloride are formed when .006 mol of aluminum chloride reacts w/ excess potassium? GIVEN

$$\frac{.006 \text{ mol } \cancel{\text{AlCl}_3}}{1 \text{ mol } \cancel{\text{AlCl}_3}} \times \frac{3 \text{ mol } \text{KCl}}{1 \text{ mol } \cancel{\text{AlCl}_3}} = .02 \text{ mol } \text{KCl}$$

.018