

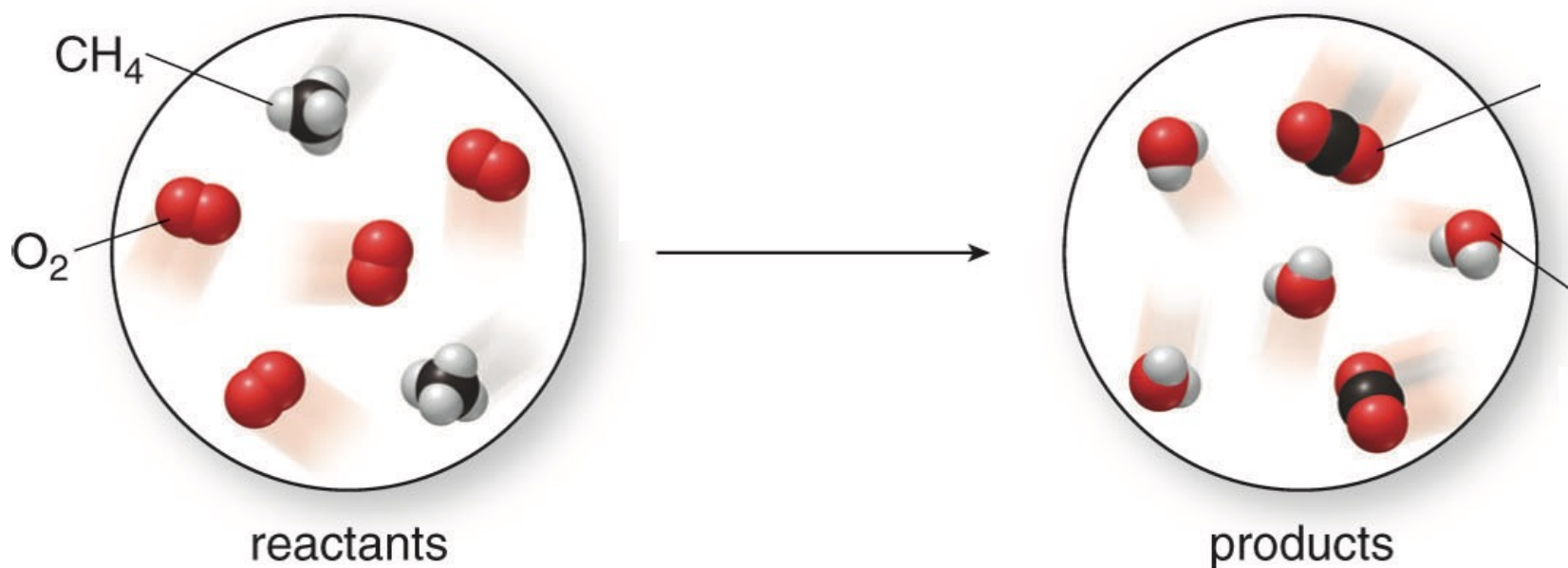


Module 7

Brad Ashburn, PhD
BIOC 141

The Law of Conservation of Matter (Section 5.1)

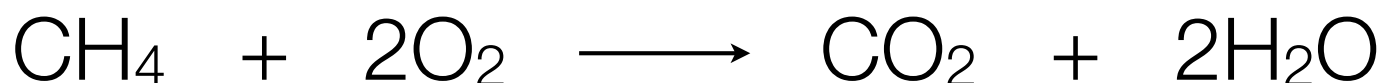
Matter is neither created nor destroyed



Chemical Equations (Section 5.2)

A **chemical equation** shows what goes in and what comes out.

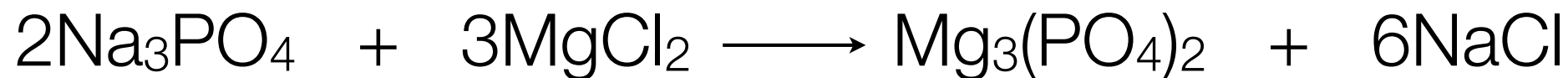
Coefficients indicate the number of molecules



Reactants
on the left
side

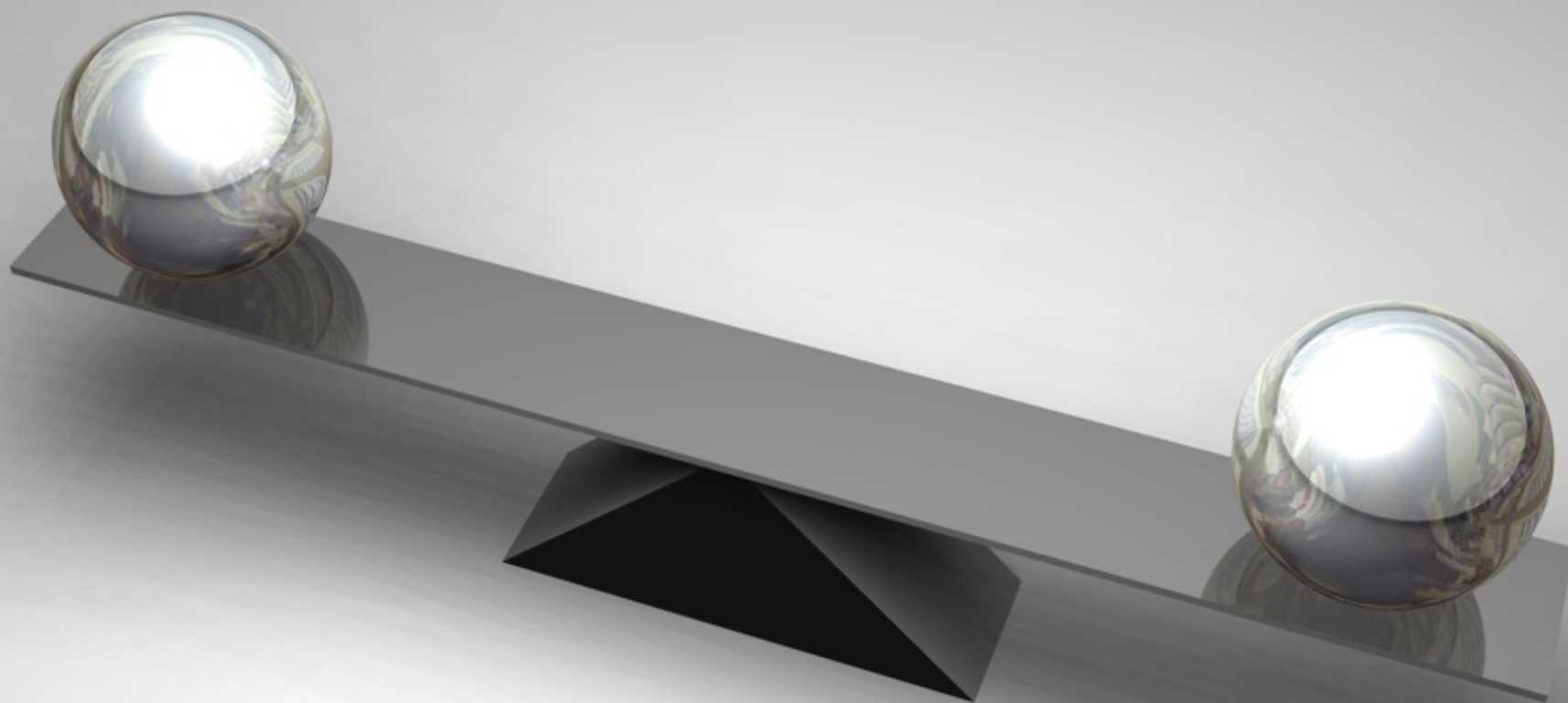
Products
on the right
side

Example



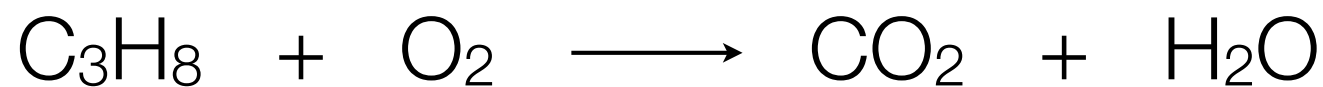
Indicate how many elements of each type are on the **reactants** side and **products** side.

Balancing Chemical Equations



A balanced chemical equation has the same number of atoms of each element on both sides of the equation.

Balancing Chemical Equations

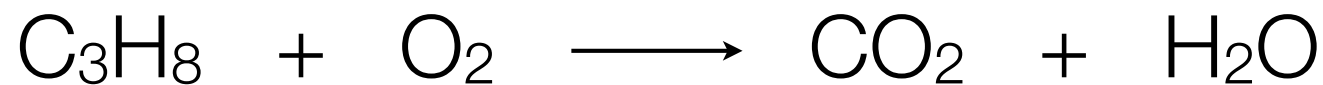


Step 1:

Balance the equation one element at a time
using coefficients

Never change subscripts!

Balancing Chemical Equations

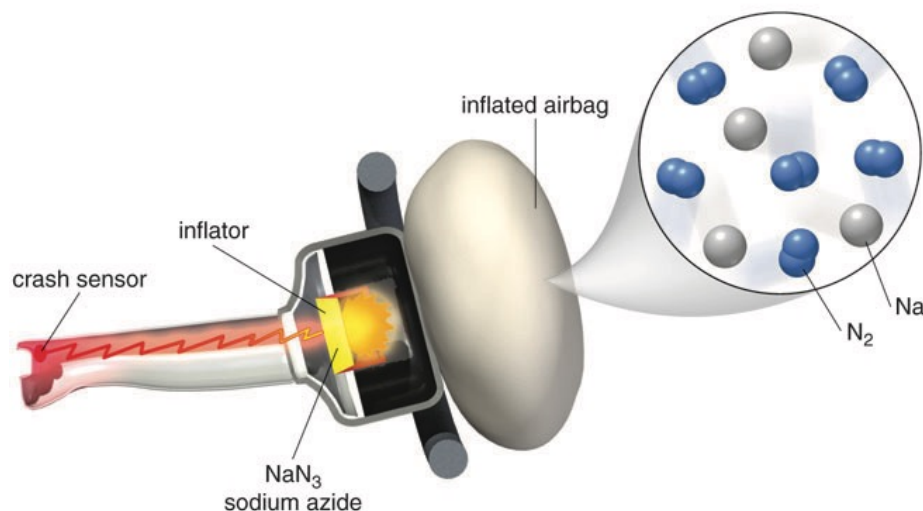
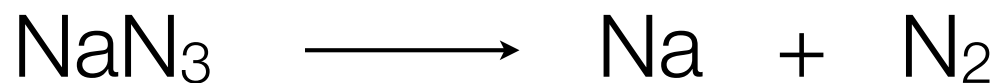


Step 2:

Use the lowest ratio of whole numbers
(no 1/2 molecules)

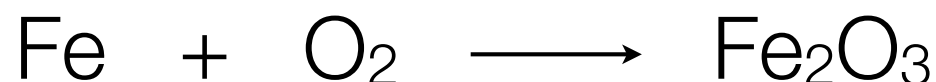
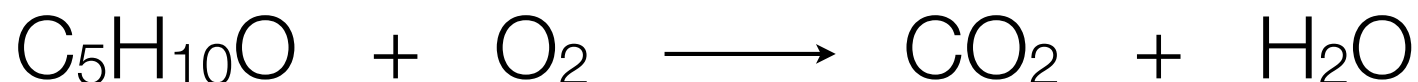
Car Airbag Example

Balance the equation



Concept Check

Balance the following chemical equations



Concept Review (Section 5.2)

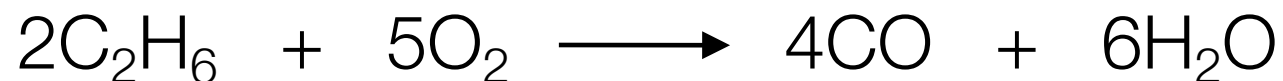
CONCEPT REVIEW EXERCISES

1. What are the parts of a chemical equation?
2. Explain why chemical equations need to be balanced.

Practice Problems: 1-16

Stoichiometry (Section 5.3)

What are the coefficients telling us?



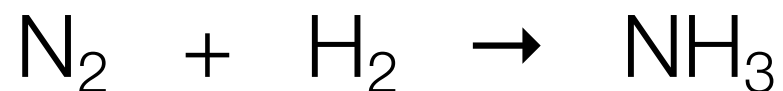
Mole-to-Mole Ratios

Balance this equation and write every stoichiometric ratio you can from it.

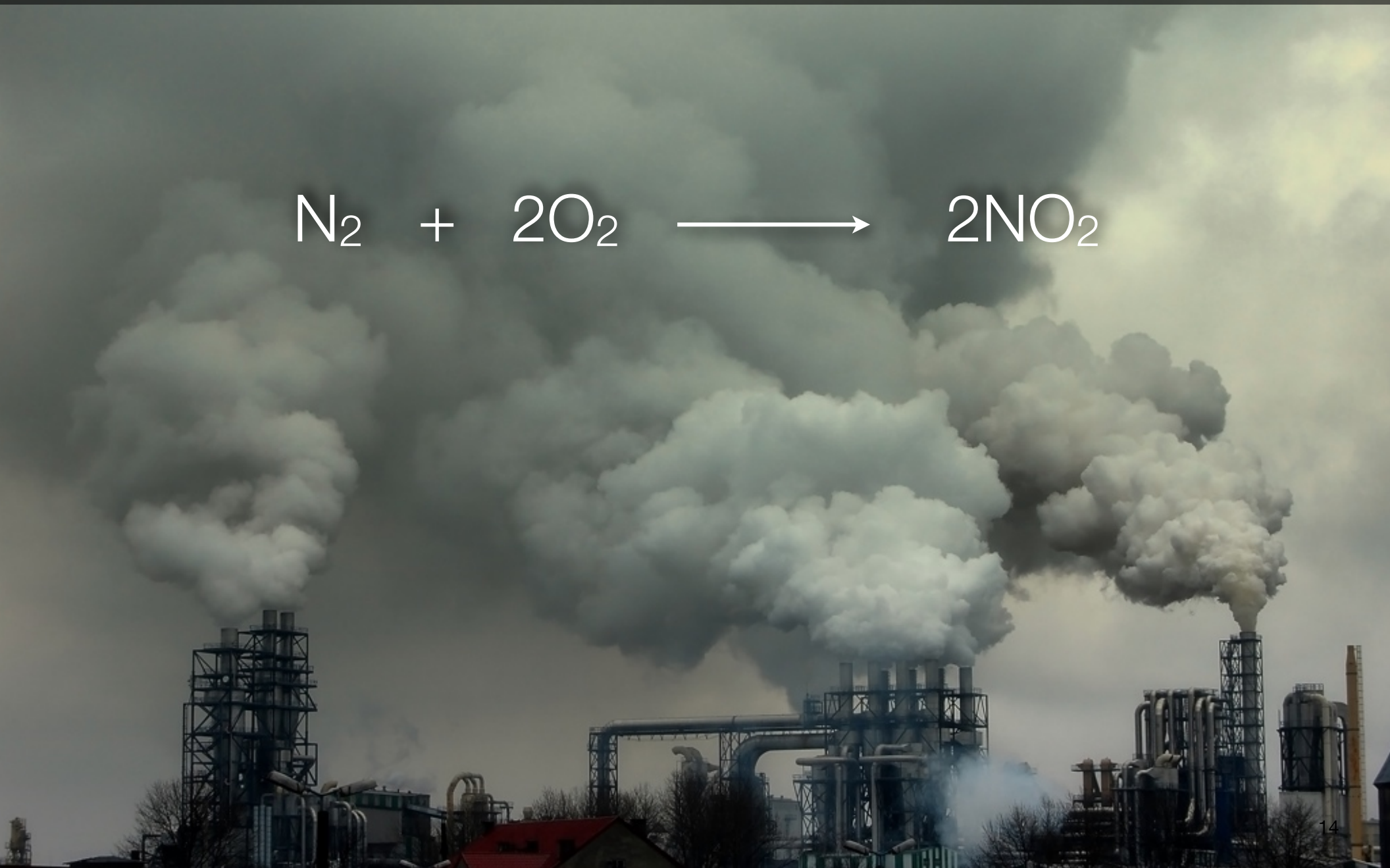
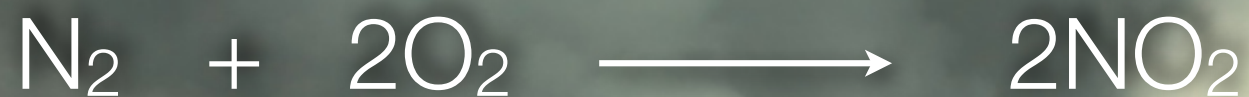


Concept Check

Balance this equation and write every stoichiometric ratio you can from it.



How many moles of NO_2 are formed from 3.3 moles of N_2 ?



Concept Review (Section 5.3)

CONCEPT REVIEW EXERCISES

1. Explain how stoichiometric ratios are constructed from a chemical equation.
2. Why is it necessary for a chemical equation to be balanced before it can be used to construct conversion factors?

Practice Problems: 1-10

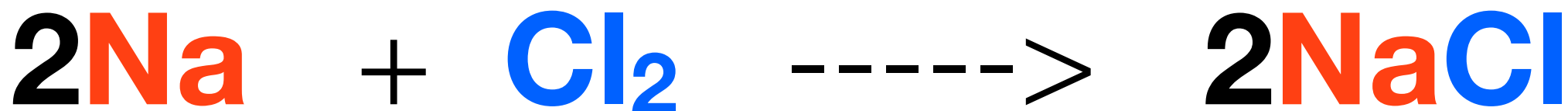


Five Classes of Chemical Reactions



Combination Reaction

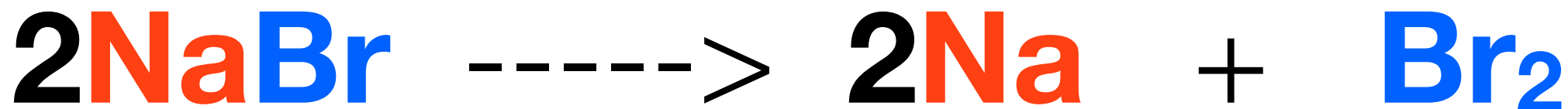
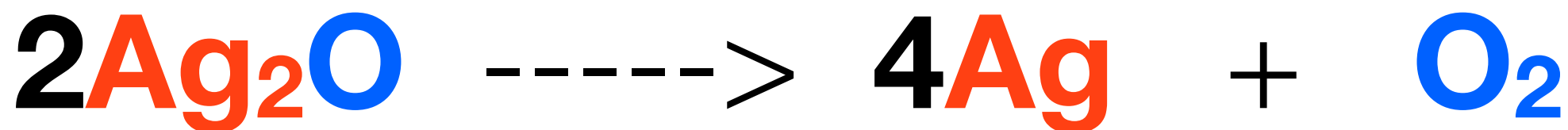
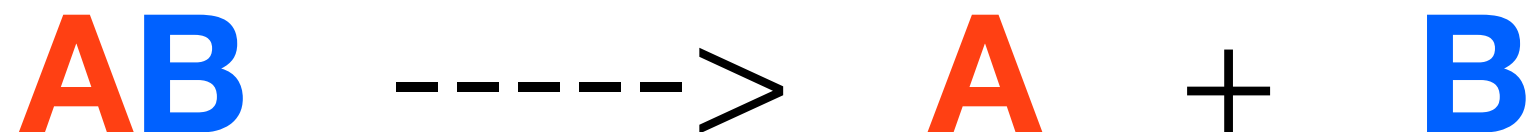
Combination Reaction

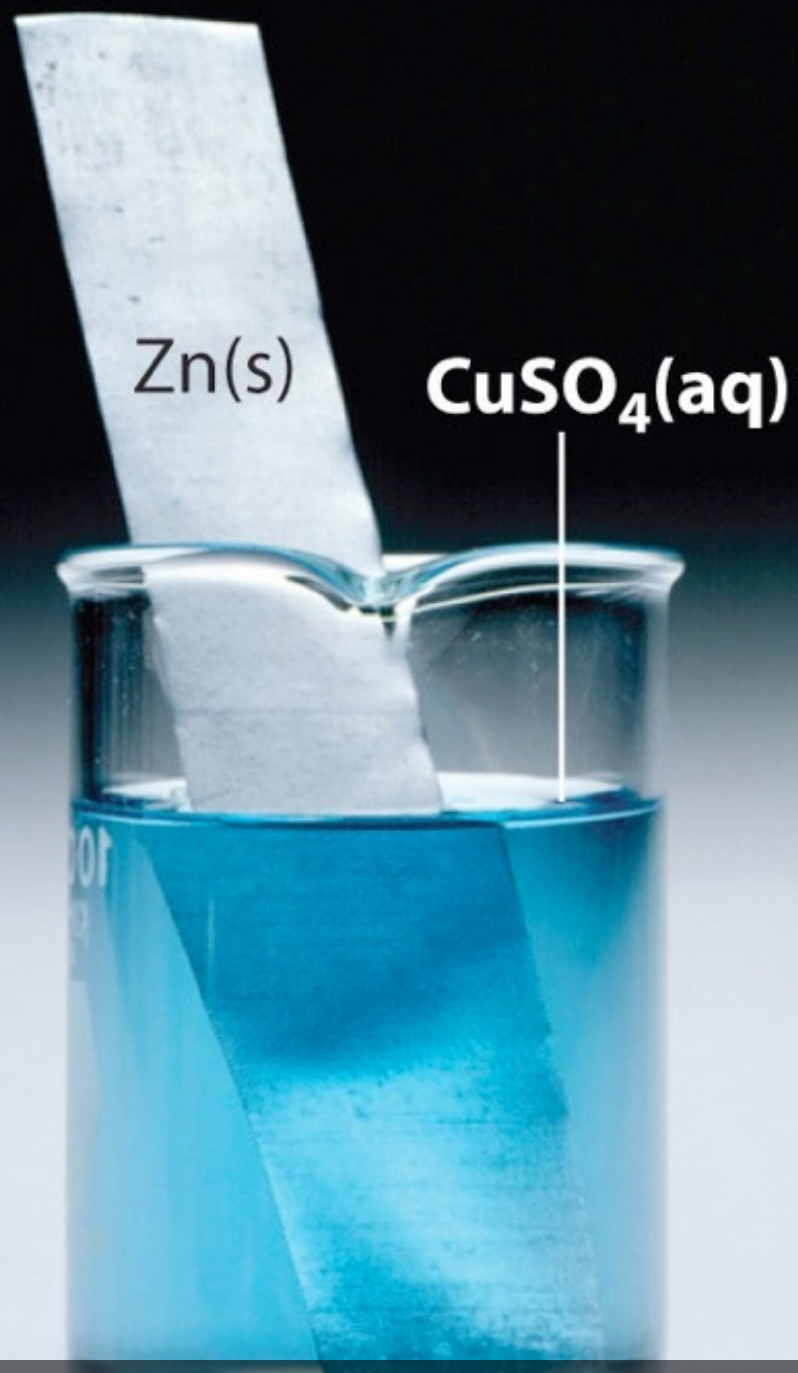




Decomposition Reaction

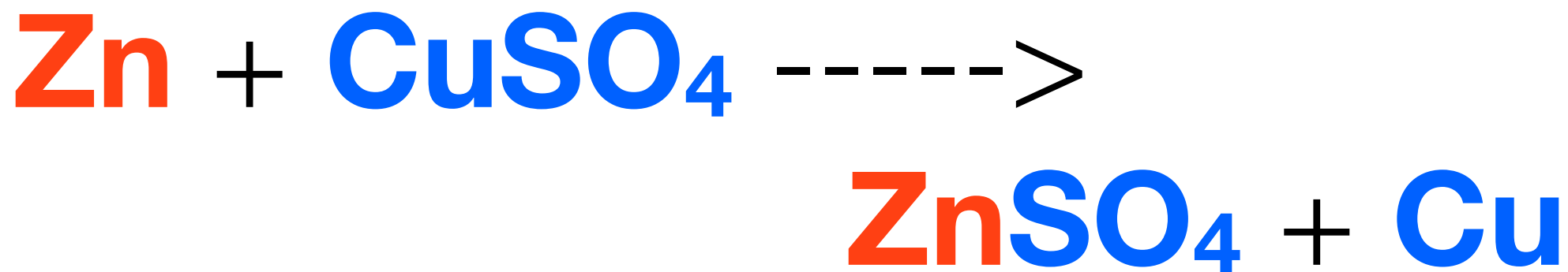
Decomposition

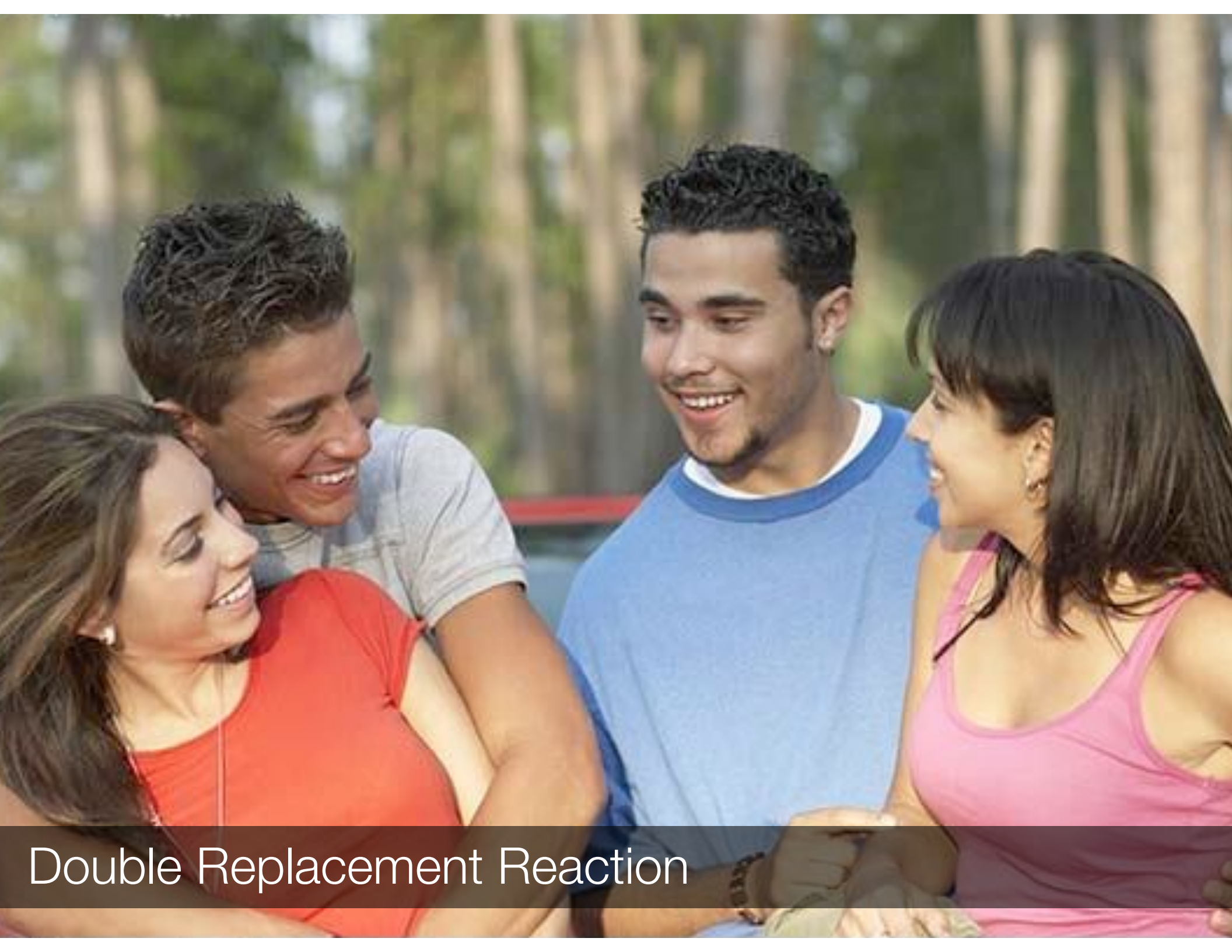




Single Replacement Reaction

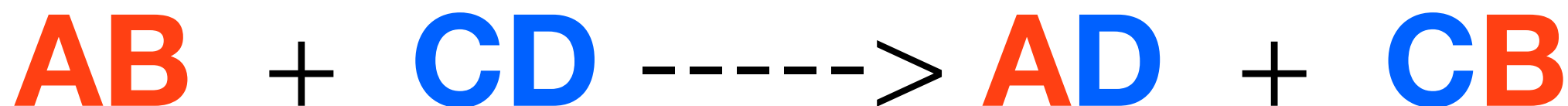
Single Replacement Reaction





Double Replacement Reaction

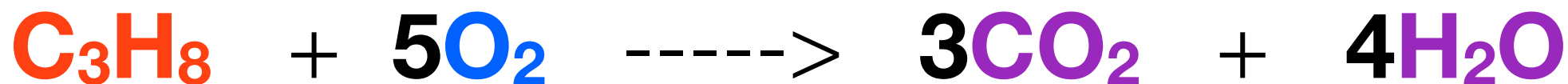
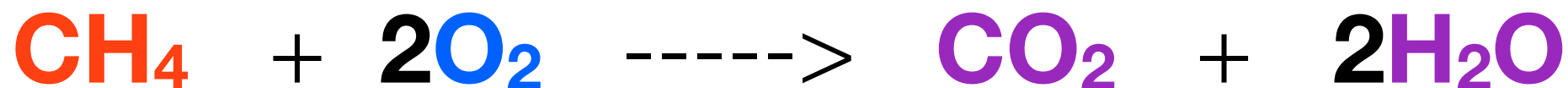
Double Replacement Reactions





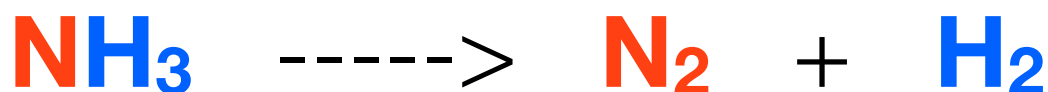
Combustion Reaction

Combustion Reaction



Concept Check

Balance & Classify the following reactions:



Concept Review (Section 5.4)

CONCEPT REVIEW EXERCISES

1. What is the difference between a combination reaction and a combustion reaction?
2. Give the distinguishing characteristic(s) of a decomposition reaction.
3. How do we recognize a combustion reaction?

Practice Problems: 1-3 + worksheet