

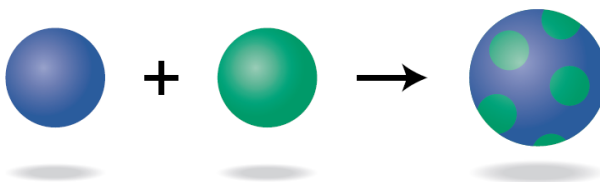
6.7

Types of Chemical Reactions: Synthesis and Decomposition

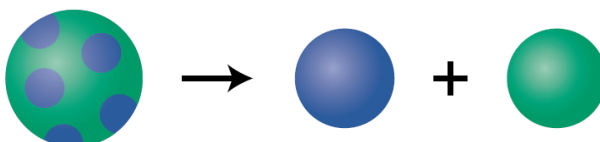
Chemists use these patterns to classify groups of chemical changes. Most chemical reactions can be grouped into four categories:

- synthesis
- decomposition
- single displacement
- double displacement

synthesis reaction

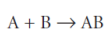


decomposition reaction

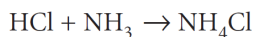


Synthesis Reactions

Synthesis reactions involve the combination of smaller atoms and/or molecules into larger molecules. These reactions are also called **combination reactions**. Often the reactants are elements that combine chemically to form compounds. Synthesis reactions have the following general formula:

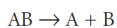


hydrogen chloride + ammonia \rightarrow ammonium chloride

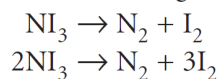


Decomposition Reactions

Decomposition reactions involve the splitting of a large molecule into elements or smaller molecules. Decomposition reactions have the following general formula:



nitrogen triiodide \rightarrow nitrogen + iodine



ammonium nitrate \rightarrow nitrous oxide + water

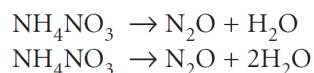


Table 1 Elements That Occur as Diatomic Molecules

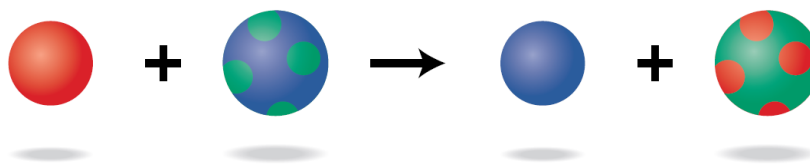
Element	Diatomic molecule
hydrogen	H ₂
oxygen	O ₂
nitrogen	N ₂
fluorine	F ₂
chlorine	Cl ₂
bromine	Br ₂
iodine	I ₂

If any of these elements appear alone in a chemical reaction they must come as a pair (you will be given this table for the exam).

6.10

Types of Chemical Reactions: Single and Double Displacement

single displacement reaction



double displacement reaction

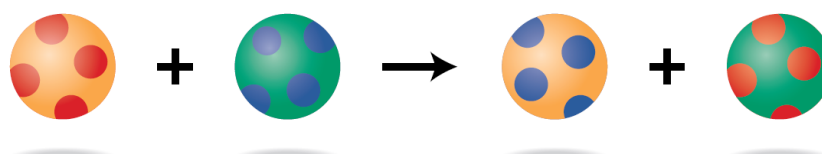
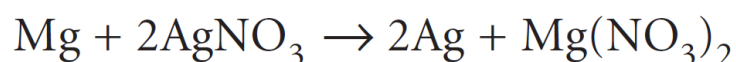
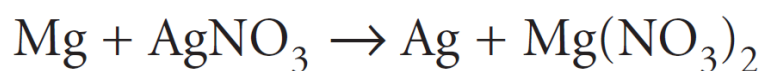
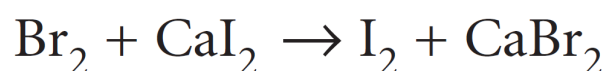


Figure 1

In single displacement reactions, an element takes the place of another element in a compound. In double displacement reactions, elements in two compounds "change partners."

Single Displacement

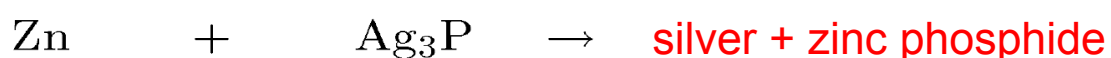
- Involve an element and a compound as reactants.
- If the element is a metal it takes the place of the metal in the compound.
- If the element is a non-metal it takes the place of the non-metal in the compound.

Metal (cation) Replacementmagnesium + silver nitrate \rightarrow silver + magnesium nitrate**Non-Metal (anion) Replacement**bromine + calcium iodide \rightarrow iodine + calcium bromide

Ex. 1 Complete and balance the following single displacement reaction:



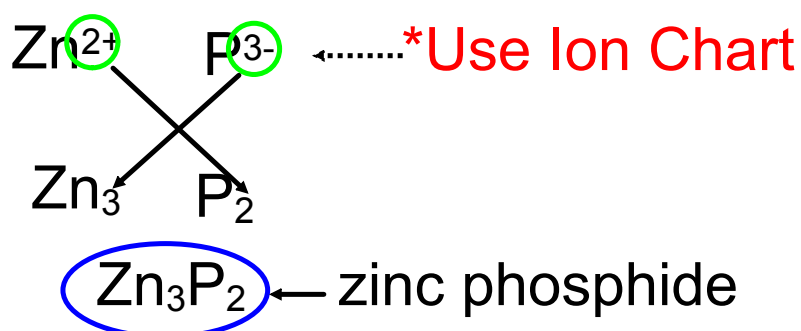
Step 1 - Write the products as a word equation.



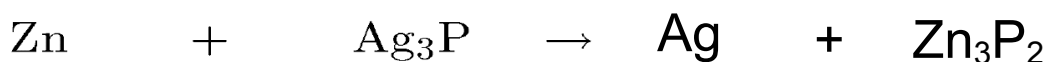
Step 2 - Write the formulas of the products to create the skeleton equation.

silver: Ag

zinc phosphide



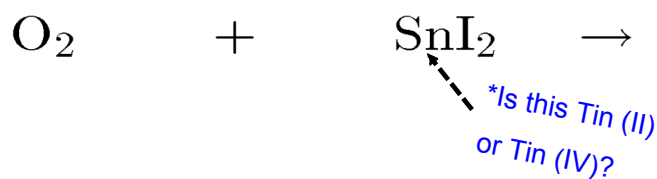
skeleton equation:



Step 3: Balanced equation.



Ex.2 Complete and balance the following single displacement reaction:

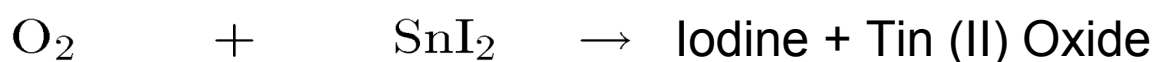


Since Iodine is I^- , this must be Tin (II).

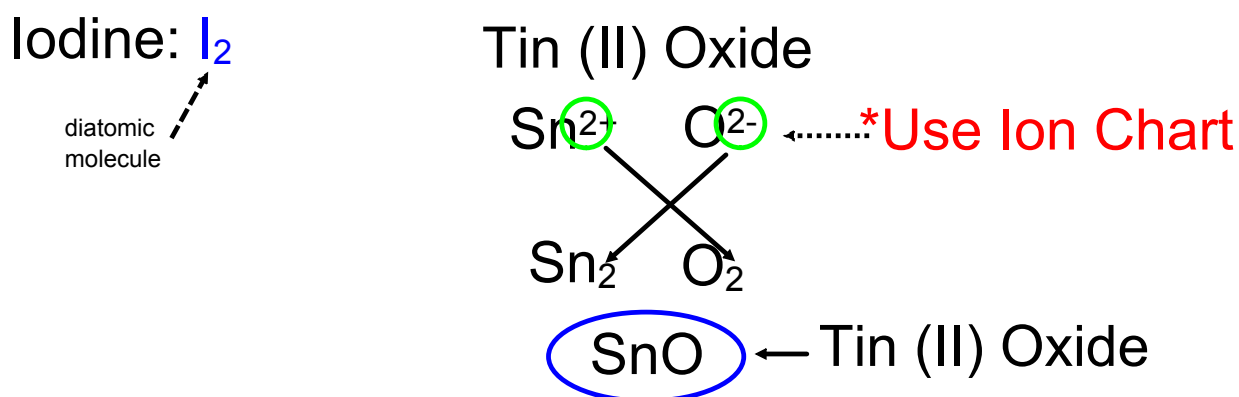
Table 1 Elements That Occur as Diatomic Molecules

Element	Diatomic molecule
hydrogen	H_2
oxygen	O_2
nitrogen	N_2
fluorine	F_2
chlorine	Cl_2
bromine	Br_2
iodine	I_2

Step 1: Products as word equation.



Step 2: Formulas and skeleton equation.



skeleton equation:



Step 3: Balanced Equation



Work on the handout: Single Displacement Reactions

Attachments

Balancing Chemical Equations.jar

Build Atom.jar

Build Molecule.jar