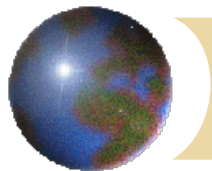


# *Chapter 21*

## Types of Reactions

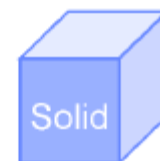


# Symbols

⊕ The symbols shown in parenthesis in equations tell you about the type of substances.

symbol	meaning
(s)	substance is a solid
(l)	substance is a liquid
(g)	substance is a gas
(aq)	substance is dissolved in solution (aqueous)

(s)



(l)

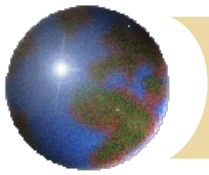


(g)

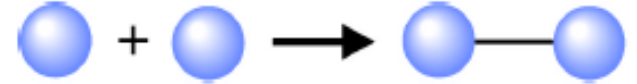


(aq)

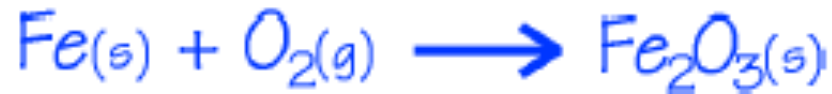




# *Synthesis Reaction*

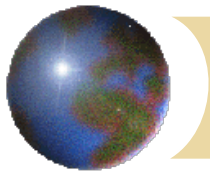


- ✚ In a synthesis reaction two or more substances combine to form a new compound.



- ✚ The general equation is:





# *Decomposition Reaction*

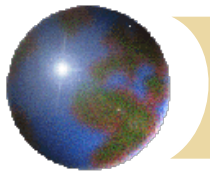


- ✚ In a decomposition reaction a single compound is broken down to produce two or more smaller compounds.



- ✚ The general equation is:





# Single-Displacement Reaction



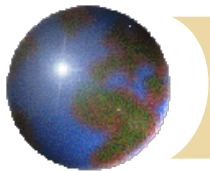
- ✚ In a single-displacement reaction, one element replaces a similar element in a compound.



- ✚ The general equation is:



- Where AX is a compound, B is an element, BX is a compound and A is an element



# *Double-Displacement Reaction*

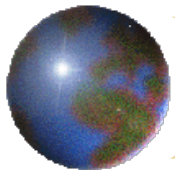
- ⊕ In a double-displacement reaction, ions from two compounds exchange places to produce two new compounds.



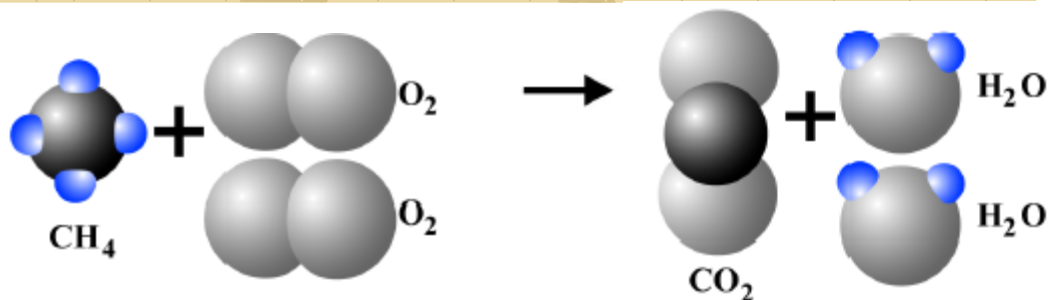
- ⊕ The general equation is:



– Where AB and CD are compounds



## Combustion

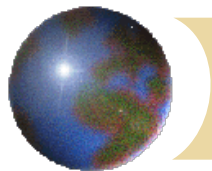


- ✚ In a combustion reaction, a substance combines with oxygen to release energy.



- ✚ The general equation is:

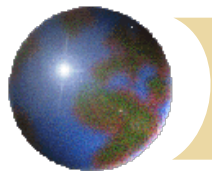




# The Types of Reactions

Type	General equation	Example
addition	$A + B \rightarrow AB$	$2H_2 + O_2 \rightarrow 2H_2O$
decomposition	$AB \rightarrow A + B$	$2NaHCO_3 \rightarrow H_2 + 2NaCO_3$
single-displacement	$AX + B \rightarrow BX + A$	$Fe + CuCl_2 \rightarrow FeCl_2 + Cu$
double-displacement	$AB + CD \rightarrow AD + CB$	$Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$
combustion	carbon compound + $O_2 \rightarrow CO_2 + H_2O$	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

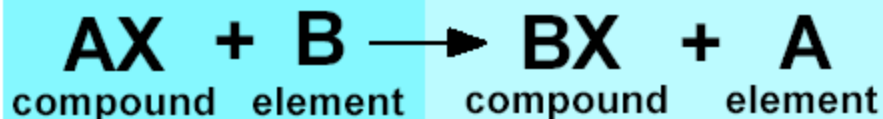
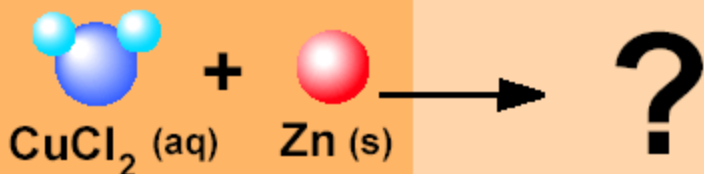




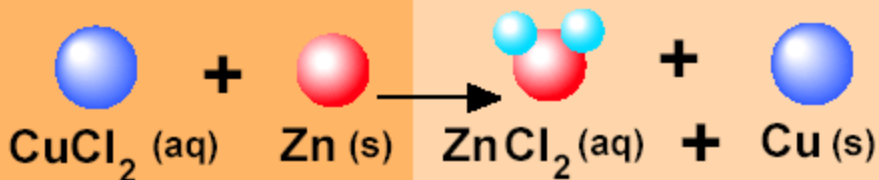
# Predicting the Products of a Reaction

Copper chloride solution reacts with zinc metal to produce what?

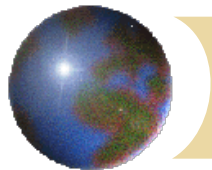
oxidation numbers



single displacement

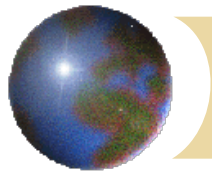


1. Look up oxidation numbers of elements in compound.
2. Write the chemical formulas for the reactants.
3. Identify the type of reaction.
4. Predict the products. Write chemical formulas for products.
5. Balance equation.



## *Energy in Reactions*

- ⊕ In order for a chemical reaction to take place chemical bonds must be broken and new chemical bonds formed.
- ⊕ The breaking and production of chemical bonds requires energy.
- ⊕ Some reactions produce energy, others use energy.



# *Exothermic and Endothermic Reactions*

- ✚ In an *exothermic reaction* energy more energy is produced than used. As a result, the container gets hot and the temperature increases.
- ✚ In an *endothermic reaction* more energy is used than is produced. As a result, the container gets cold and the temperature drops.