

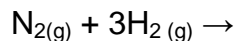
Types of Chemical Reactions

Synthesis (combination)

➤ Two or more reacting substances (elements or compounds) combine to form _____

General Equation:

Example:



For each of the following, complete and give the Balanced Chemical equation:

1. sodium + iodine →
2. carbon + → carbon dioxide
3. carbon dioxide + water →
4. calcium + oxygen →
5. dinitrogen pentoxide + → nitric acid
6. calcium oxide + water →
7. sodium oxide + → sodium sulfate

Decomposition

➤ **One reactant** breaks up and forms two or more products. Opposite of synthesis reaction.

➤ General Equation:

8. carbonic acid $\xrightarrow{2\text{NaCl}_{(s)}}$ + water
9. copper (II) carbonate $\xrightarrow{\text{heat}}$ + carbon dioxide
10. sodium bicarbonate $\xrightarrow{\text{heat}}$ sodium oxide + + water
11. magnesium chloride $\xrightarrow{\text{electrolysis}}$ +

Combustion

- Involves the burning of a chemical
- Oxygen is always a reactant

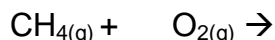
Complete Combustion – no limits for oxygen

- Metals will burn in oxygen to form metal oxides

- Non-metals will burn in oxygen to form its dioxide.

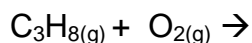
- Hydrocarbons are fuels made of hydrogen and carbon atoms (propane, butane, gasoline etc.) They burn in oxygen to produce carbon dioxide and water

General Equation:



Incomplete Combustion: insufficient oxygen

General Equation:



Displacement reactions occur only in solutions

- A solution is a homogenous mixture (uniform throughout)
- The _____ is the substance that is being dissolved. (smaller quantities)
- The _____ is doing the dissolving. (larger quantities)
- In an aqueous solution, the solvent is _____

Single Displacement

- An element will react with an aqueous compound to form a new element and a new aqueous compound
- Metals trade places with other metals

General Equation:



- Non-metals will trade places with other non-metals

General Equation:



Double Displacement

- Two compounds react in aqueous solution and switch partners to form two new compounds
- One of the product is soluble (aq) and the other product is insoluble and forms a precipitate (s).

General Equation:



Complete Q# 1-8 on Page 53

Balance the following reactions and state the type of reaction

S/D/C/SD/DD

- (a) $\text{Al}_{(\text{s})} + \text{Fe}_2\text{O}_{3(\text{s})} \rightarrow \text{Al}_2\text{O}_{3(\text{s})} + \text{Fe}_{(\text{s})}$
- (b) $\text{Ca}(\text{OH})_{2(\text{aq})} + \text{HNO}_{3(\text{aq})} \rightarrow \text{Ca}(\text{NO}_3)_{2(\text{aq})} + \text{H}_2\text{O}_{(\text{l})}$
- (c) $\text{Cr}_2(\text{SO}_4)_{3(\text{aq})} + \text{NaOH}_{(\text{aq})} \rightarrow \text{Cr}(\text{OH})_{3(\text{s})} + \text{Na}_2\text{SO}_{4(\text{aq})}$
- (d) $\text{Cu}_{(\text{s})} + \text{AgNO}_{3(\text{aq})} \rightarrow \text{Cu}(\text{NO}_3)_{2(\text{aq})} + \text{Ag}_{(\text{s})}$
- (e) $\text{CH}_4(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}_{(\text{g})}$
- (f) $\text{C}_2\text{H}_6(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}_{(\text{l})}$
- (g) $\text{SiO}_2(\text{s}) + \text{HF}_{(\text{g})} \rightarrow \text{SiF}_4(\text{g}) + \text{H}_2\text{O}_{(\text{l})}$
- (h) $\text{MgO}_{(\text{s})} + \text{H}_3\text{PO}_4(\text{aq}) \rightarrow \text{Mg}_3(\text{PO}_4)_{2(\text{s})} + \text{H}_2\text{O}_{(\text{l})}$
- (i) $\text{NaBr}_{(\text{aq})} + \text{Cl}_2(\text{g}) \rightarrow \text{Br}_{2(\text{l})} + \text{NaCl}_{(\text{aq})}$
- (j) $\text{Sb}_2\text{S}_3(\text{s}) + \text{HCl}_{(\text{aq})} \rightarrow \text{H}_3\text{SbCl}_6(\text{aq}) + \text{H}_2\text{S}_{(\text{g})}$
- (k) $\text{Fe}_3\text{O}_4(\text{s}) + \text{H}_2(\text{g}) \rightarrow \text{Fe}_{(\text{s})} + \text{H}_2\text{O}_{(\text{l})}$
- (l) $\text{HgO}_{(\text{s})} \rightarrow \text{Hg}_{(\text{l})} + \text{O}_2(\text{g})$
- (m) $\text{C}_3\text{H}_8(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}_{(\text{g})}$
- (n) $\text{Al}_2\text{O}_3(\text{s}) + \text{HCl}_{(\text{aq})} \rightarrow \text{AlCl}_3(\text{s}) + \text{H}_2\text{O}_{(\text{l})}$
- (o) $\text{F}_2(\text{g}) + \text{H}_2\text{O}_{(\text{l})} \rightarrow \text{HF}_{(\text{g})} + \text{O}_2(\text{g})$
- (p) $\text{Fe}_2\text{O}_3(\text{s}) + \text{CO}_{(\text{g})} \rightarrow \text{Fe}_3\text{O}_4(\text{s}) + \text{CO}_2(\text{g})$
- (q) $\text{PH}_3(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{P}_4\text{O}_{10(\text{g})} + \text{H}_2\text{O}_{(\text{l})}$
- (r) $\text{CO}_2(\text{g}) + \text{Al}_{(\text{s})} \rightarrow \text{Al}_2\text{O}_3(\text{s}) + \text{C}_{(\text{s})}$
- (s) $\text{F}_2(\text{g}) + \text{C}_3\text{H}_8\text{O}_{(\text{g})} \rightarrow \text{HF}_{(\text{g})} + \text{CF}_4(\text{g}) + \text{O}_2(\text{g})$
- (t) $\text{CaCN}_2(\text{s}) + \text{H}_2\text{O}_{(\text{l})} \rightarrow \text{NH}_3(\text{g}) + \text{CaCO}_3(\text{s})$
- (u) $\text{MnO}_2(\text{s}) + \text{HCl}_{(\text{aq})} \rightarrow \text{MnCl}_2(\text{s}) + \text{Cl}_2 + \text{H}_2\text{O}_{(\text{l})}$
- (v) $\text{NH}_3(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{NO}_{(\text{g})} + \text{H}_2\text{O}_{(\text{g})}$
- (w) $\text{FeS}_{(\text{s})} + \text{O}_2(\text{g}) \rightarrow \text{Fe}_2\text{O}_3(\text{s}) + \text{SO}_3(\text{g})$
- (x) $\text{Fe}_2\text{O}_3(\text{s}) + \text{H}_2\text{O}_{(\text{l})} \rightarrow \text{Fe}(\text{OH})_3$
- (y) $\text{H}_2\text{S}_{(\text{g})} + \text{SO}_2(\text{g}) \rightarrow \text{S}_{(\text{s})} + \text{H}_2\text{O}_{(\text{l})}$
- (z) $\text{CuFeS}_2(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{Cu}_{(\text{s})} + \text{FeO}_{(\text{s})} + \text{SO}_2(\text{g})$