

Chemical Reactions

SINGLE REPLACEMENT REACTIONS

Element + Compound

- If the single element is a metal --- use REACTIVITY SERIES of metals
- If the single element is a nonmetal --- use HALOGEN family
- The single element must be higher to replace an element in a compound
- ACIDS and WATER are special compounds
- water should be written as H OH (H⁺ OH⁻)

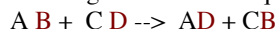


Is (the single metal) above (metal in the compound)? If yes continue reaction. If no write N.R. - no reaction.

DOUBLE REPLACEMENT REACTIONS

Compound + Compound (not H₂O)

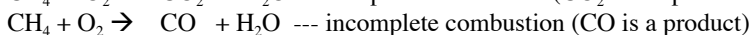
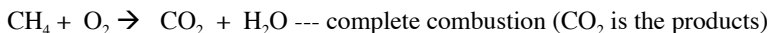
- acids(H⁺) and bases (hydroxides, OH⁻) are special D.R.'s --- they are Neutralization Rxn --> they form SALTS & Water
- If H₂CO₃, carbonic acid, is a product it will decompose into CO₂ & H₂O
- Predict products by switching B & D of the equation below



- For the products look at solubility chart for an "SS" or "I", if you see this, a chemical reaction will occur. (ppt. - gas - molecular compound)
- Write products using charges and criss-cross method.
- Label each reactant and product..... (g), (s), (l).....

COMBUSTION REACTIONS

Reactions that usually involve a hydrocarbon, (C_xH_y), that will react with oxygen, O₂, to produce carbon dioxide and water.



Diatomic Molecules

H₂, Hydrogen – N₂, Nitrogen – O₂, Oxygen – F₂, Fluorine – Cl₂, Chlorine – Br₂, Bromine – I₂, Iodine

DECOMPOSITION REACTIONS

More Products than Reactants

Metal / Nonmetal → Individual elements or (cation/anion)

Acids → nonmetal oxides + water

Bases (OH) → metal oxides + water

Carbonates → metal oxides + carbon dioxide

Chlorates → metal chlorides + oxygen

For some decomposition rxns to occur, heat or electricity is needed.

SYNTHESIS REACTIONS

More Reactants than Products

Metal + Nonmetal → Binary Ionic (Use Charges)

Metal Oxide + water → Hydroxides

MgO + H OH → Mg²⁺ OH⁻¹ → Mg(OH)₂

Nonmetal Oxide + water → Acids

SO₃ + H OH → H₂SO₄

Nonmetal + Nonmetal → Molecular compounds

Metals + Metals → N.R.

Double Replacement Reactions	acetate	bromide	carbonate	chlorate	chloride	chromate	hydroxide	iodide	nitrate	oxide	phosphate	sulfate	sulfide	silicate
aluminum	s	s	-	s	s	-	I	s	s	I	I	s	d	I
ammonium	s	s	s	s	s	s	s	s	s	-	s	s	s	-
barium	s	s	I	s	s	I	ss	I	s	s	I	ss	d	s
cadmium	s	s	I	s	s	-	I	s	s	I	I	s	I	ss
calcium	s	s	I	s	s	s	ss	s	s	I	I	ss	s	I
copper (I)	-	ss	I	-	I	I	I	I	-	I	-	d	-	-
copper (II)	s	s	d	s	s	I	I	-	s	I	I	s	I	I
hydrogen	s	s	s	s	s	s	HOH	s	s	s	s	s	s	-
iron (II)	s	s	I	-	s	n	I	s	s	I	I	s	I	-
iron (III)	-	s	-	-	s	I	I	-	s	I	I	ss	I	-
lead (II)	s	ss	I	s	ss	I	I	I	s	I	I	ss	I	I
lead (IV)	d	-	-	-	d	-	-	-	-	I	-	-	-	-
magnesium	s	s	ss	s	s	s	I	s	s	I	I	s	d	-
manganese (II)	s	s	I	-	s	-	I	s	s	I	-	s	I	I
mercury (I)	ss	I	I	ss	I	ss	-	ss	s/d	I	I/d	ss	I	-
mercury (II)	s	ss	I	s	s	ss	I	I	s	I	ss	d	I	-
nickel (II)	s	s	I	s	s	-	I	s	s	I	I	s	I	I
potassium	s	s	s	s	s	s	s	s	s	d	s	s	s	-
silver	s	I	I	s	I	ss	-	I	s	I	I	ss	I	-
sodium	ss	s	s	s	s	s	s	s	s	d	s	s	s	-
tin (II)	-	-	-	-	s	-	I	s	-	I	-	s	I	-
tin (IV)	-	s/d	-	-	s/d	-	-	s/d	-	I	I	s/d	I	-
zinc	s	s	I	s	s	s	I	s	d	I	I	s	I	I
strontium	s	s	ss	s	s	ss	ss	s	s	s	I	ss	I	I

s-soluble (use (aq))

I-insoluble (use (s))

ss-slightly soluble (use (s))

d-decomposes

"-" - does not exist

Single Replacement Reaction

ACTIVITY SERIES of METALS

lithium
rubidium
potassium
cesium
barium
strontium
calcium
sodium
magnesium
aluminum
manganese
zinc
chromium
iron
cadmium
cobalt
nickel
tin
lead
HYDROGEN
antimony
bismuth
arsenic
copper
mercury
silver
platinum
gold

Replaces "H" in acids and HOH

Replaces "H" only in Acids