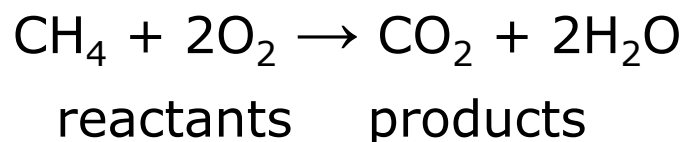


Outline

- Chemical Equations
- Precipitation Reactions
- Acid-Base and Gas Evolution Reactions
- Oxidation-Reduction Reactions
- Classification of Reactions

Chemical Equations

Chemical reactions are represented with chemical equations



Chemical equations give important information about reactants and products:

1. relative amounts
2. physical states (phases)

Phases are indicated in chemical equations:

solid	(s)	liquid	(l)
gas	(g)	aqueous	(aq)

Chemical equations must have mass and charge balance...

total number and type of atoms don't change

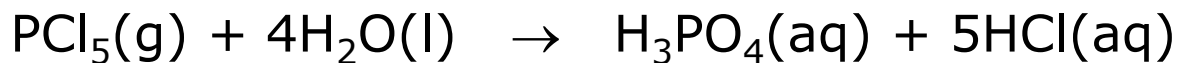
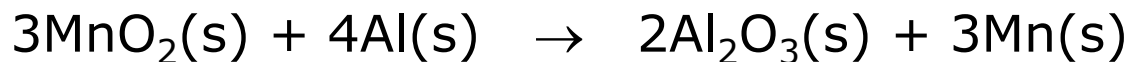
total charge of reactants same as products

Chemical equations are balanced by...

adjusting coefficients in front of reactants and products

“inspection”

1. start with most complicated formula
2. start with species that appears once on each side
3. use simplest whole number coefficients



Every 2 molecules of H_2O_2 produce...

2 molecules of H_2O and 1 molecule of O_2

Every 2 moles of H_2O_2 produce...

2 moles of H_2O and 1 mole of O_2

Precipitation Reactions

Some substances dissolve in water to produce homogeneous mixture: aqueous solution

Ionic compounds (salts) dissociate into ions when dissolved...

soluble salts: dissolve

insoluble salts: do not dissolve

Solubility of salts predicted from solubility rules...

$(\text{NH}_4)_2\text{CO}_3$ soluble

$\text{Zn}(\text{NO}_3)_2$ soluble

$\text{Al}(\text{OH})_3$ insoluble

BaSO_4 insoluble

NH_4^+ salts soluble!

NO_3^- salts soluble!

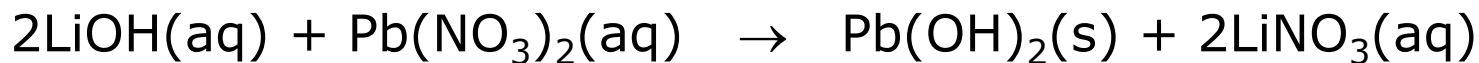
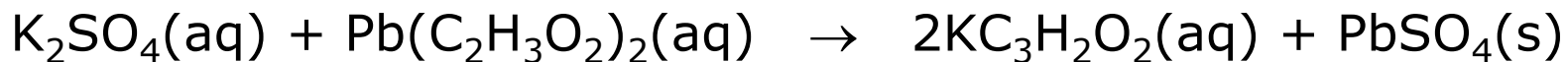
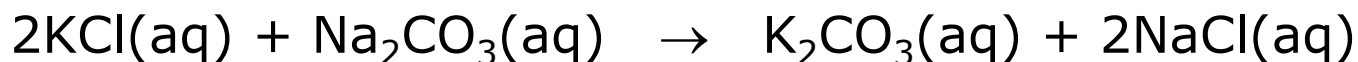
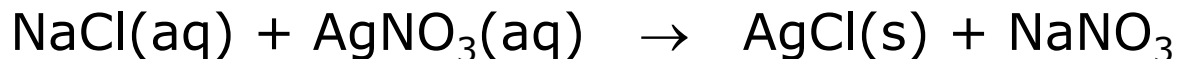
OH^- insoluble, except for...?

SO_4^{2-} soluble, except for...?

Ions in solution can react to form insoluble substance (precipitate)

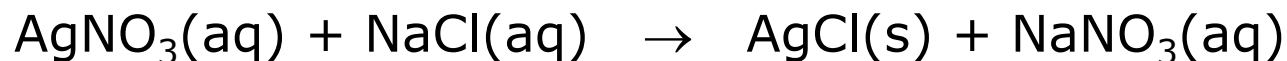
Reactions that form precipitates are precipitation reactions

Write equations for reactions between:

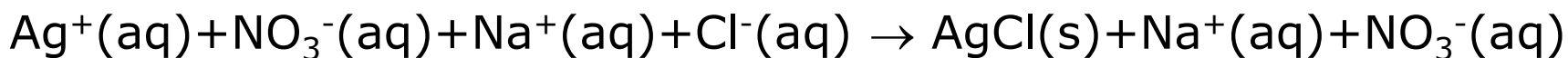


Description of chemical reaction with...

formula equation: all reactants and products, no individual ions



total ionic equation: all reactants and products are given as ions



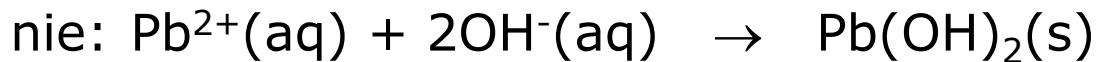
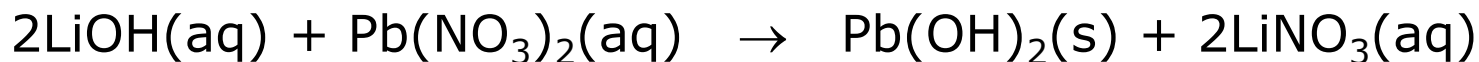
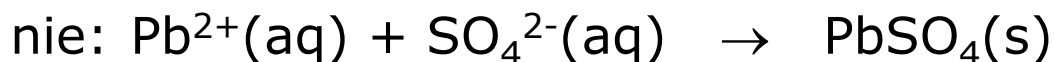
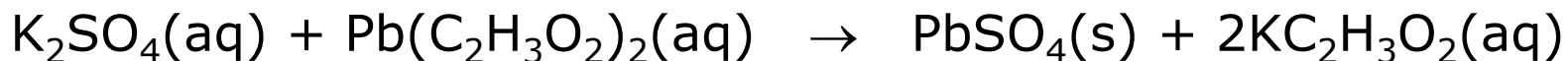
net ionic equation: includes only those species involved in reaction



Ions present that do not participate in reaction are spectator ions

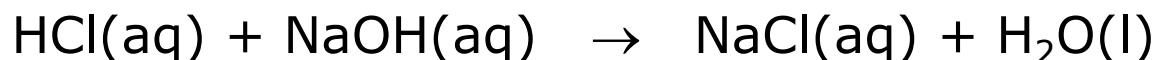


Write net-ionic equations for:



Acid-Base and Gas Evolution Reactions

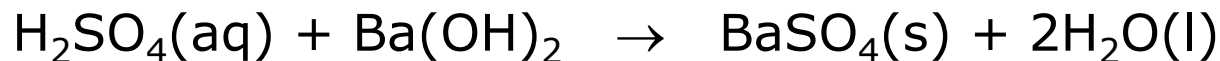
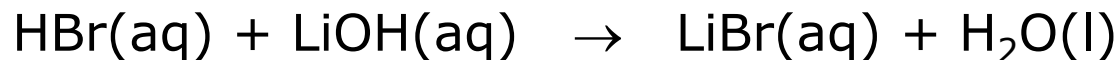
Acids react with bases by transferring hydrogen ions (H^+)



Acid-base reactions are termed neutralization reactions...

the reactions produce "hot salty water"!

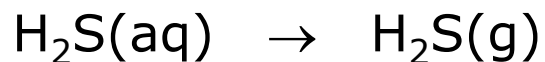
Predict the products...



The net-ionic equation for an acid-base reaction is...



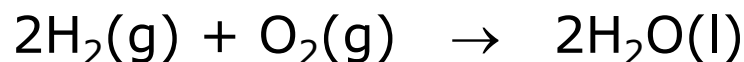
Some products in aqueous reactions are gaseous...



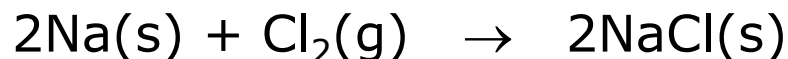
Oxidation-Reduction Reactions

Reactions involving the transfer of electrons are oxidation-reduction reactions (redox reactions)

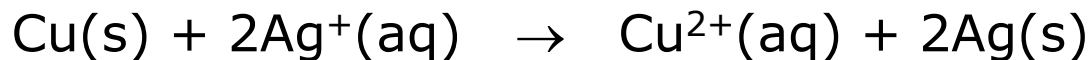
a substance reacts with oxygen (O₂)



a metal reacts with a nonmetal



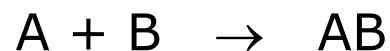
a substance transfers electrons to another



Classification of Reactions

Chemical reactions can be classified into different types...

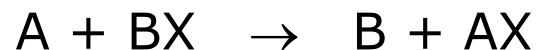
combination: simpler substances combine to form complex substance



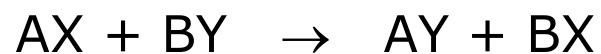
decomposition: complex substance decomposes to form simpler substances



single-displacement: one element displaces another in a compound



double-displacement: two elements (groups) displace one another



Classify the reaction type...

