

Announcements

Wednesday, March 04, 2009

Ch 6 MC is due Monday, Mar 9.

Quiz 2 is on Monday, March 9, covering the last bit of chapter 5 (polyatomic name, formula, charge memorized!) and chapter 6 (6.1-6.7 assigned).

Exp 8 is next week.

Discussion assignment 1 is posted in D2L discussion boards - your main post is due before class Mon, March 9. Replies will be due a few weeks after that.

Note - it seems the insert image button isn't available anymore for students! Just add your image as an attachment and I'll fix them as I get time.

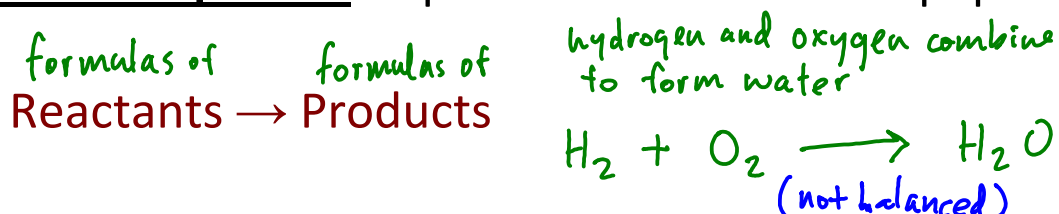
Chapter 7: Chemical Reactions

Chemical reaction: conversion of substances into different substances (by rearranging atoms)

Reactants: substances present before reaction

Products: substances present after reaction

Chemical equation: represents a reaction on paper



Phase labels: show the phase of reactants or products

(s): solid

(l): liquid : for pure liquids
ex. $\text{H}_2\text{O}(\text{l})$

ionic cpds can only be (s) or (aq)

(g): gas

(aq): aqueous : dissolved in water

NaCl ionic compound (s) when pure
(just like all ^vionic compounds)
pure

(aq) when it's saltwater


↳ anything dissolved in water

Balancing chemical equations

Law of conservation of mass: *neither created nor destroyed*

$\underline{2} \text{H}_2 + \underline{\quad} \text{O}_2 \rightarrow \underline{2} \text{H}_2\text{O}$

coefficient: how many of that formula



<u>reactants</u>	<u>products</u>
H: 2 4	H: 2 4
O: 2	O: 1 2

~~$\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$~~ *equation is now balanced*

Tips for balancing: *do not change subscripts!*

1. Leave elemental substances for last:

$\underline{\quad} \text{CH}_4 + \underline{2} \text{O}_2 \rightarrow \underline{\quad} \text{CO}_2 + \underline{2} \text{H}_2\text{O}$

C: 1	C: 1
H: 4	H: 2 4
O: 2 4	O: 3 4

2. In an even/odd issue, try doubling all other coefficients

$\underline{2} \text{C}_4\text{H}_{10} + \underline{13} \text{O}_2 \rightarrow \underline{8} \text{CO}_2 + \underline{10} \text{H}_2\text{O}$

C: 4 8	C: 1 8
H: 10 20	H: 2 20
O: 2 26	O: 3 26

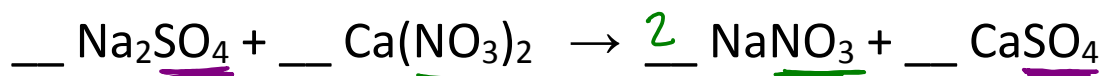
Always make sure all coefficients are reduced to the simplest whole numbers!

Balancing

3. If an element appears in one compound on each side, balance that element first, making the least common multiple on both sides (2b on prelab)



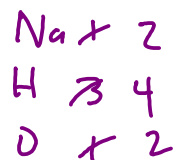
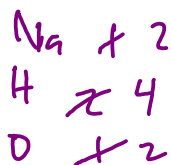
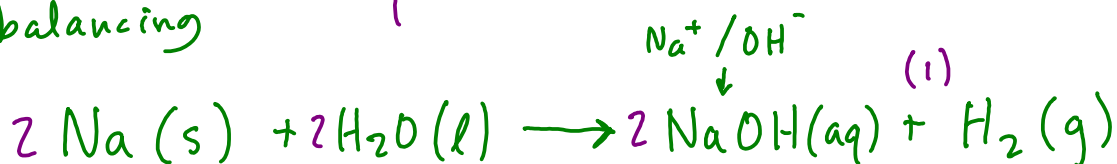
4. If polyatomic ions are identical on both sides, group them when counting



Use the chemical equations worksheet to practice writing and balancing chemical equations.

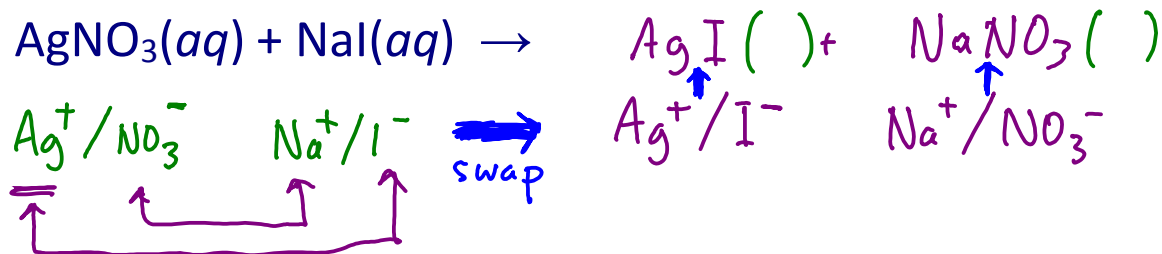
Solid sodium and liquid water combine to create sodium hydroxide solution and hydrogen gas.

- formulas of reactants/products
- phase labels
- balancing



Double displacement, solubility, and precipitation

Double displacement reaction: two ionic reactants swap their ions



1. Write ion pairs for reactants
2. Swap ions, make new +/- pairs, writing + ion first
3. Make formulas for possible products from new ion pairs
4. Balance if necessary
5. Predict phase labels of products

Solubility of ionic compounds

Some ionic compounds easily dissolve in water (**soluble**)

ex. NaCl (aq)

Some never dissolve in water (**insoluble**)

ex. CaCO_3 : chalk dust $\text{CaCO}_3 (s)$

Solubility Rules for Ionic Compounds

The following table will be given on the exam exactly as shown here.

<u>Compounds Containing the Following Ions Are Mostly Soluble</u>	<u>Exceptions</u>
$\text{Li}^+, \text{Na}^+, \text{K}^+, \text{NH}_4^+$ <i>ammonium</i>	None
nitrate, acetate	None
chloride, bromide, iodide $\text{Cl}^- \text{ Br}^- \text{ I}^-$	When any of these ions pairs with $\text{Ag}^+, \text{Hg}_2^{2+},$ or Pb^{2+} , the compound is insoluble $\rightarrow (s)$
sulfate SO_4^{2-}	When sulfate pairs with $\text{Sr}^{2+}, \text{Ba}^{2+}, \text{Pb}^{2+},$ or Ca^{2+} the compound is insoluble
<u>Compounds Containing the Following Ions Are Mostly Insoluble</u>	<u>Exceptions</u>
hydroxide, sulfide $\text{OH}^- \text{ S}^{2-}$	When either of these ions pairs with $\text{Li}^+, \text{Na}^+, \text{K}^+,$ or NH_4^+ , the compound is soluble (aq)
(s)	When sulfide pairs with $\text{Ca}^{2+}, \text{Sr}^{2+},$ or Ba^{2+} , the compound is soluble
	When hydroxide pairs with $\text{Ca}^{2+}, \text{Sr}^{2+},$ or Ba^{2+} , the compound is slightly soluble (for many purposes, these may be considered <u>insoluble</u>) (s)
carbonate, phosphate	When either of these ions pairs with $\text{Li}^+, \text{Na}^+, \text{K}^+,$ or NH_4^+ , the compound is soluble

Na_3PO_4 soluble (aq)

$\text{Ca}_3(\text{PO}_4)_2$ insol. (s)

CaI (aq)

PbI_2 (s)

$\text{Fe}(\text{OH})_3$

$\text{Ca}(\text{OH})_2$

K_2CO_3

CuCO_3