Neutralization Reactions
Acid/Base Neutralization

- A **salt** is any compound that can be derived from the neutralization of _____.
- The word "**neutralization**" is used because the acid and base properties of H+ and OH- are destroyed or _____.
- In the reaction, H+ and OH- combine to form _____ or _____ (_____ molecules).
- A neutralization reaction is a type of _____ _____ reaction.

Writing neutralization equations

When acids and bases are mixed, a salt forms

$NaOH + HCl \rightarrow$

_____ + _____ → _____ + _____

The _____ and the _____ join to form the _____.

The _____and the _____ join to form _____ .

Writing neutralization equations

Example: Write the chemical reaction when lithium hydroxide is mixed with carbonic acid.

Step 1: write out the reactants

$LiOH + H_2CO_3 \rightarrow$

Step 2: determine products…(make sure the salt is written with correct subscripts! Refer to Oxidation Chart.)

Remember the "_____" method from Chapter 20

Step 3: balance the equation

Remember balancing equations… Chapter 21 (use _____ only)

$LiOH + H_2CO_3 \rightarrow Li_2CO_3 + H_2O$

Writing neutralization equations

Example: Complete the neutralization reaction…

$Ca(OH)_2 + H_2SO_4 \rightarrow$

Step 1: already completed for you

$Ca(OH)_2 + H_2SO_4 \rightarrow$

Step 2: determine products…(make sure the salt is written with correct _____! Refer to Oxidation Chart.)

Step 3: balance the equation

$Ca(OH)_2 + H_2SO_4 \rightarrow H_2O + CaSO_4$

Writing neutralization equations

Example: Complete the neutralization reaction…

iron(II) hydroxide + phosphoric acid

Step 1: write out the reactants …(make sure the acid and base are written with correct subscripts! Oxidation Chart.)

Step 2: determine products…(Is the salt written with correct subscripts? Oxidation Chart.)

Step 3: balance the equation

Practice

Write balanced chemical equations for these neutralization reactions.

1) $Ba(OH)_2 + HCl$
2) calcium hydroxide + nitric acid
3) $Al(OH)_3 + H_2SO_4$
4) $KOH + HClO_2$

Titration

Titration-process of determining the _____ of an acid or a base

Titration Animation

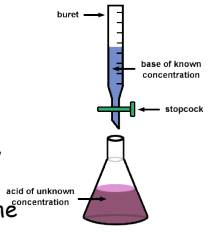
Titration

An _____is added to the solution being titrated. The indicator is a substance that changes color when the reaction is complete. Phenolphthalein, which is a commonly used acid-base indicator, is added to the acid solution in a flask.

Phenolphthalein has two chemical forms. In acidic conditions it is _____ In basic conditions it turns _____

Titration

Slowly and carefully, the _____ is added to the acid/phenolphthalein mix. When the mix turns from _____, the acid has been neutralized by the base. At that point you know exactly how much of the base solution it took to neutralize the acid.



Natural Indicator

Hydrangeas are natural indicators. When the pH of the soil is _____, they produce blue blossoms. When the pH of the soil is _____, pink blossoms.

Cabbage is another natural indicator. When _____, deep red color; when _____, lavender; when _____, yellow-green.

Applying Science

You have learned that neutralization reactions change acids and bases into salts. Antacids typically contain small amounts of $Ca(OH)_2$, $Al(OH)_3$, or $NaHCO_3$, which are bases. The base in the antacid is meant to neutralize the excess acid in your stomach causing your tummy ache.

1) What compounds are produced from a reactions of HCl and $Mg(OH)_2$?

2) Why is it important to have some acid in your stomach?

Applying Science

3) How could you compare how well antacid products neutralize acid? (Hint: Titrations?!) What procedure could you use?