Name: KEY Official Class: _____ Date: _____

Teacher: _____ Period: _____ Class: _____

Neutralization Reactions

Types of Reaction Review

- What type of reaction is this?
  - $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ single replacement
  - $3MgCl_2 + 2AlBr_3 \rightarrow 2AlCl_3 + 3MgBr_2$ double replacement

Neutralization Reactions

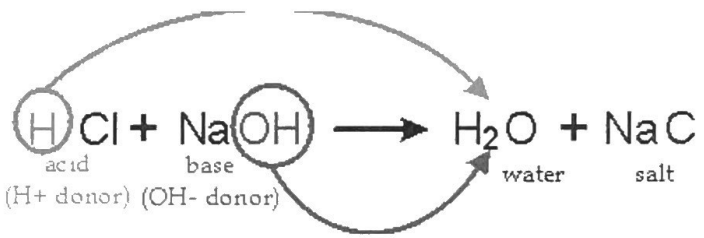
- When $Mg(OH)_2$ and HCl react, a neutralization reaction occurs.
- A neutralization reaction is a reaction in which an acid and a base in an aqueous solution react to produce a salt and water.
- A salt is an ionic compound made from the cation from a base, and an anion from an acid.
- Neutralization is a double replacement reaction.
- Neutralization occurs when:
  - an Arrhenius acid and an Arrhenius base react to form WATER and a SALT (both neutral)
  - # of H^+ ions = # of OH^- ions (equivalent or equal amounts)
- You don't always get a completely neutral solution!
  - Strong acid + strong base = pH 7 (neutral)
  - Weak acid + weak base = pH 7 (neutral)
  - Strong acid + weak base = pH < 7 (acidic)
  - Weak acid + strong base = pH > 7 (basic)
- Make sure your equations are balanced!

Copy Example Below

$Mg(OH)_2 + HCl \rightarrow MgCl_2 + HOH$ (H: acid, OH: base) → not balanced

Mg^{+2} Cl^{-1} → $MgCl_2$

$1\,Mg(OH)_2 + 2\,HCl \rightarrow 1\,MgCl_2 + 2\,HOH$



Practice

1. $1\,HCl + 1\,KOH \rightarrow 1\,KCl + 1\,HOH$ (Cl^{-1}, K^{+1})

$HCl + KOH \rightarrow KCl + H_2O$

2. $1\,HNO_3 + 1\,NaOH \rightarrow 1\,NaNO_3 + 1\,HOH$

CHECK TABLE FOR POLYATOMIC ION CHARGE!

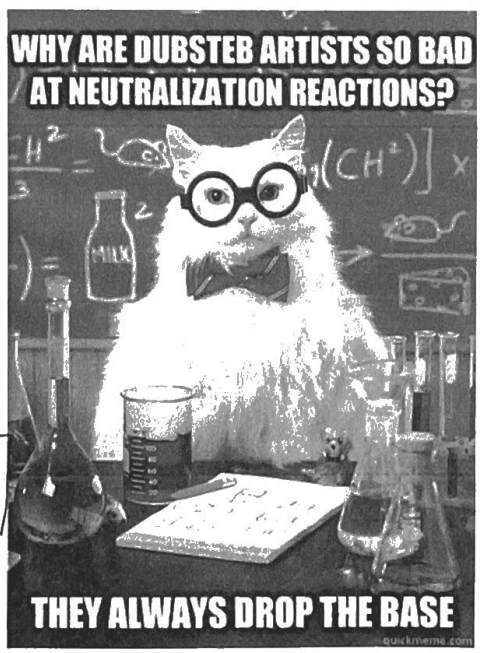
Na^{+1} NO_3^{-1}

$HNO_3 + NaOH \rightarrow NaNO_3 + H_2O$

3. $1\,H_2SO_4 + 2\,KOH \rightarrow 1\,K_2SO_4 + 2\,HOH$

K^{+1} SO_4^{-2} → K_2SO_4

$H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$



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4. $1\ H_2CO_3 + 1\ Ca(OH)_2 \rightarrow 1\ CaCO_3 + 2\ HOH$

$H_2CO_3 + Ca(OH)_2 \rightarrow CaCO_3 + 2H_2O$

Ca^{+2} CO_3^{-2} $Ca_2(CO_3)_2 \rightarrow CaCO_3$

5. $1\ H_3PO_4 + 3\ LiOH \rightarrow 1\ Li_3PO_4 + 3\ HOH$

$H_3PO_4 + 3LiOH \rightarrow Li_3PO_4 + 3H_2O$

Li^{+1} PO_4^{-3} Li_3PO_4

More Practice

1. $HCl + NaOH \rightarrow 1\ NaCl + 1\ HOH$

$HCl + NaOH \rightarrow NaCl + H_2O$

Na^{+1} Cl^{-1} $NaCl$

2. $2\ HBr + Ca(OH)_2 \rightarrow 1\ CaBr_2 + 2\ HOH$

$2HBr + Ca(OH)_2 \rightarrow CaBr_2 + 2H_2O$

Ca^{+2} Br^{-1} $CaBr_2$

3. $Ca(OH)_2 + H_2SO_4 \rightarrow CaSO_4 + 2\ HOH$

$Ca(OH)_2 + H_2SO_4 \rightarrow CaSO_4 + 2H_2O$

H^{+1} SO_4^{-2} H_2SO_4

Ca^{+2} OH^{-} $Ca(OH)_2$

4. $2\ HBr + Ba(OH)_2 \rightarrow BaBr_2 + 2\ HOH$

$2HBr + Ba(OH)_2 \rightarrow BaBr_2 + 2H_2O$

Ba^{+2} OH^{-1} $Ba(OH)_2$

H^{+1} Br^{-1} HBr