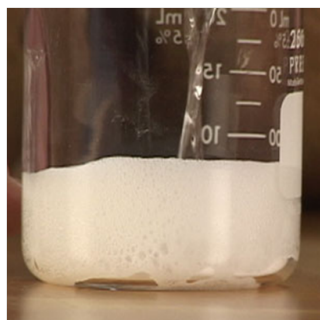


Chem Unit 12.5 Notes - Neutralization

12.5 - Neutralization

Warning! Neutralization Lab Next Class!



1. Lab Quiz

What do you neutralize an acid spill with?
Baking soda!

Acid Base Reactions

In a neutralization reaction, an acid and a base will react and produce an ionic compound and water.

Ionic compound (called a 'salt') made of a cation from the base and an anion from the acid.

In the process, the pH of the reaction mixture will approach 7.0 (neutral).

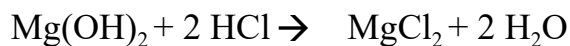
2. Neutralization Example

Balance the neutralization reaction of magnesium hydroxide and hydrochloric acid.

Correct chemical formulas are essential:

magnesium hydroxide = $\text{Mg}(\text{OH})_2$

hydrochloric acid = HCl



Titration

Titration: Method of determining concentration.

React a known volume of an unknown concentration with an amount of a known solution (called a titrant).

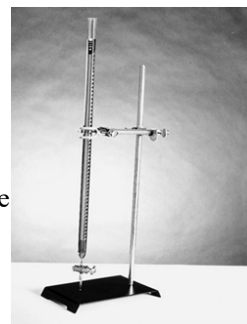
Ex: to determine the concentration of an unknown acid, use a measured amount of a base of known concentration.

Procedure

1. Put a measured volume of unknown concentration of acid or base in a beaker.

2. Fill a buret with a titrant of known concentration.

3. Add measured volumes of titrant (called aliquots) until the reaction reaches the equivalence point (end point).



A Buret

Chem Unit 12.5 Notes - Neutralization

Equivalence Point (End Point)

Def: The point in a neutralization when moles of H^+ and OH^- equal each other.

How is this point determined?

1. **pH meter** (if available): stop reaction at desired pH.
2. **Indicators** change color at a specific pH:
 - **Phenolphthalein**: clear to pink above pH = 8.2,
 - **Bromothymol Blue**: yellow to blue above pH = 6.8.

(Demo with indicators in test tubes)

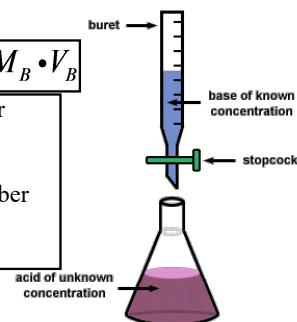
Not useful if necessary pH level is different than indicator's changing pH, or if solution is colored.

Calculating Concentration

1. Write a balanced acid-base reaction.
2. Determine hydrogen ions of acid, and hydroxide ions of base.
3. Use the equation:

$$\#H^+ \cdot M_A \cdot V_A = \#OH^- \cdot M_B \cdot V_B$$

$\#H^+$ = acid's hydrogen number
 M_A = Acid's molarity
 V_A = Acid's volume
 $\#OH^-$ = base's hydroxide number
 M_B = Base's molarity
 V_B = Base's volume



3. Titrating NaOH with HCl

Observe this procedure so the lab makes sense!

Data Chart	
NaOH Volume	25.0 mL
HCl Concentration	0.25 M
Beginning HCl Volume	0.0 mL
Ending HCl Volume	16.6 mL
Total HCl Volume	16.6 ml

Reaction: $NaOH + HCl \rightarrow NaCl + H_2O$
Calculate NaOH:

$$\#H^+ \cdot M_A \cdot V_A = \#OH^- \cdot M_B \cdot V_B$$

$$M_B = \frac{\#H^+ \cdot M_A \cdot V_A}{\#OH^- \cdot V_B} = \frac{1H^+ \cdot 0.25M \cdot 16.6 \text{ mL HCl}}{1OH^- \cdot 25.0 \text{ mL NaOH}} = 0.166 \text{ M}$$

Homework

12.5 Problems.
Due: Next Class.

Unit 12 Test Preparation Questions