



Do Now ... May 1, 2017

Obj: Observe and describe neutralization reactions.

Copy: Balance the neutralization reaction.



If I had 100 mL of a 0.01 M HCl solution, what is the pH of 100 mL of KOH needed to neutralize the HCl?

Hint: find moles of KOH, then pOH, then pH.

Practice

Write the balanced chemical equation for the neutralization of CH_3COOH with KOH .



Note: For CH_3COOH , the green H is the hydrogen ion (H^+) that dissociates.

Monday, May 1, 2017

Today:

W-Up, Notes & Practice, Practice Quiz

HW: Review Notes

QUIZ Tuesday!

Sodium Hydroxide (NaOH)

Strong base used in production of paper, textiles, and detergents.

Manufactured by electrolysis of an aqueous solution of sodium chloride.

Sodium Hydroxide (NaOH)



Image from http://www.mysvarela.nom.es/fotos_sustancias/naoh_re.jpg

Sodium Hydroxide (NaOH)

Raw Material:
Rock Salt



Image from <http://sitara.com.pk/chemical/gidtur.htm>

Sodium Hydroxide (NaOH)

Electrolysis



Image from <http://sitara.com.pk/chemical/gidtur.htm>

Sodium Hydroxide (NaOH)

Collecting
Chlorine
Gas (Cl_2)



Sodium Metal (Na)

Sodium metal is very reactive with water.

<http://www.youtube.com/watch?v=fLJ4FH7q0EQ>

Sodium Hydroxide (NaOH)

Solid sodium also forms. This then immediately reacts with water to form NaOH and H₂.



Activity (to be collected)

You've found a spill in chemistry lab and don't know if it is dangerous. Using pH paper determine if it is an acid or a base. Then decide how you will neutralize the solution using household chemicals (baking soda or vinegar).

On your own paper (this is the BCR):

- Describe how you determined if the spill was dangerous.
- You plan for neutralizing the spill.
- How you know it is now safe.



Do Now ... May 2, 2017

Obj: Calculate pH and pOH based on hydrogen ion concentration.

Copy and Solve: What will the pH be when you add 2.3 grams of HCl to 500mL of water?

Steps:

1. Convert grams HCl to moles.
2. Find the molarity. $M = \text{mol/L}$
3. Use $\text{pH} = -\log[\text{H}^+]$ to find pH.

Tuesday, May 2, 2017

Today:

W-up, Notes & Practice, Quiz

HW: Google Form

Scientific Theory

→ What is a theory?

→ How do we use theories?

→ Are theories "true"?

Acid/Base Theories

There are three main theories used to explain the chemistry of acids and bases.

- Arrhenius
- Bronsted-Lowery
- Lewis

pH

pH

H is for H^+ ions

Arrhenius Acids and Bases

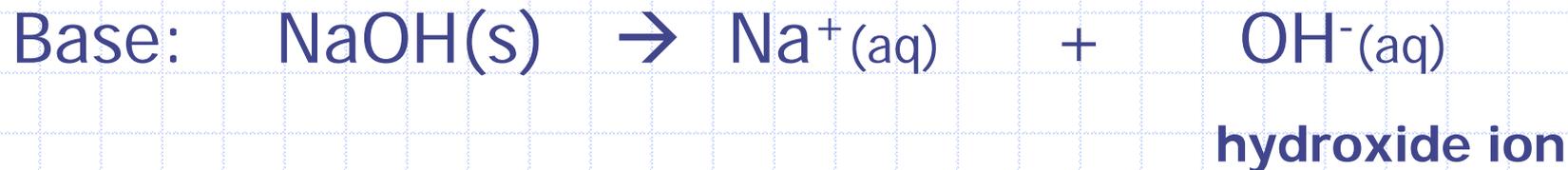
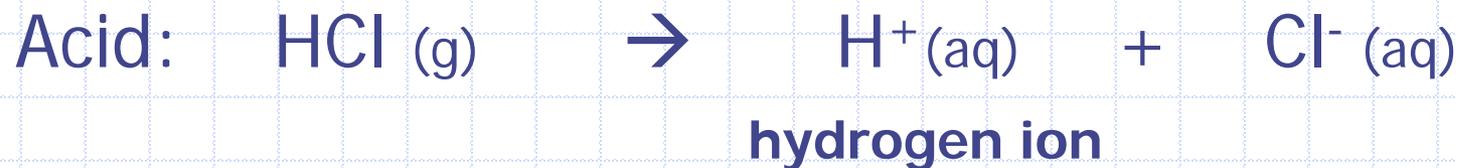
Acids produce hydrogen ions (H^+) in aqueous solution.

Bases produce hydroxide ions (OH^-) when dissolved in water.

Limited to aqueous solutions.

Only one kind of base (hydroxides).

Example: Arrhenius Acids and Bases



Bronsted-Lowery Acids and Bases

An acid is hydrogen-ion donor (H^+ or proton).

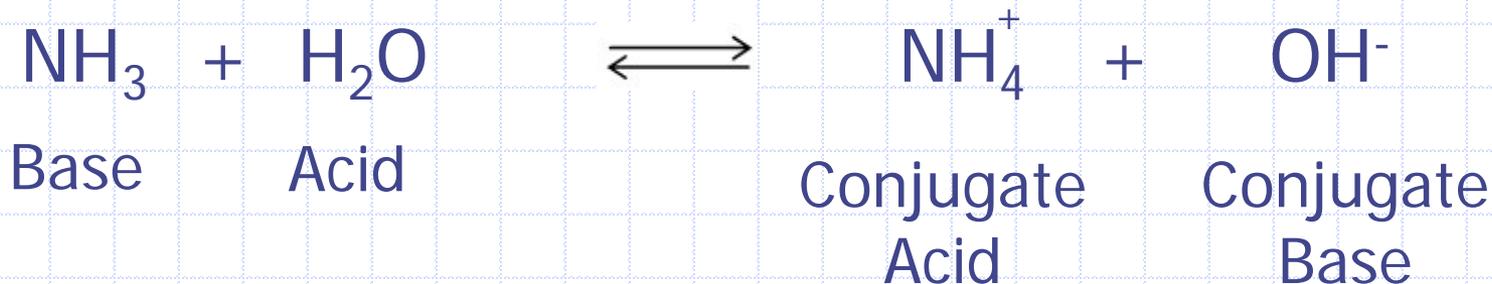
A base is hydrogen-ion acceptor.

Acids and bases always come in pairs.

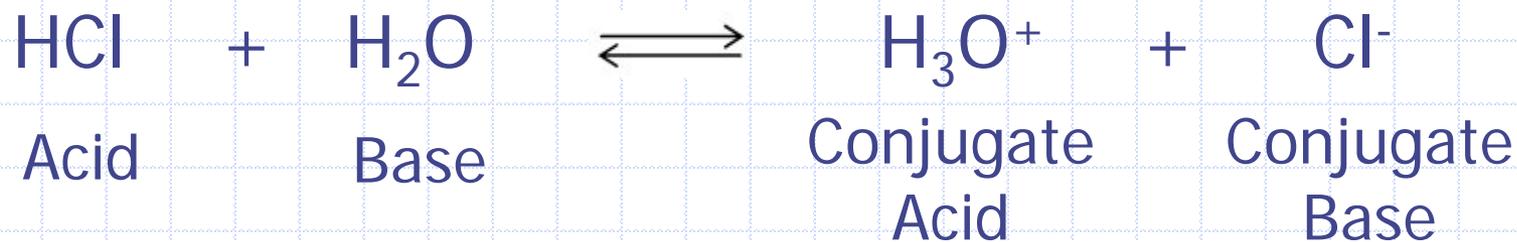
This theory has broader applications than Arrhenius.

Bronsted-Lowery Acids and Bases

For example:



and



Bronsted-Lowery Acids and Bases

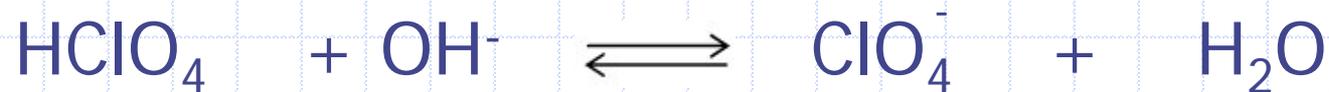
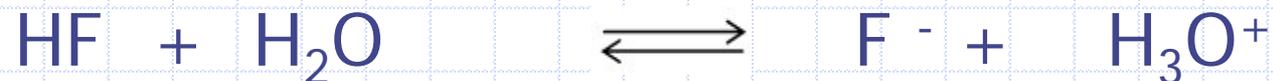
Water can act as an acid **or** base.

As an acid it **donates** protons (H^+)
when in a base.

As a base it **accepts** protons when in
an acid.

Bronsted-Lowery Practice

Identify the Bronsted acid and base.



Lewis Acids and Bases

ACID: Substance that can accept a pair of electrons from another atom to form a new bond.

BASE: Substance that can donate a pair of electrons to another atom to form a new bond.

More than one theory?

How can we have more than one theory for acids/bases?

Which one is right?

Which Theories?



So how can there be three theories to explain one concept?

Arrhenius

Bronsted-Lowery

Lewis

Quick Practice –Add to Notes

1. Label the Brønsted acid, base, conjugate acid, and base in the equation below.



2. What happens to pH when the concentration of H_3O^+ *decreases*?
3. An Arrhenius acid is made of _____ ions.
An Arrhenius base consists of _____ ions.
4. A Brønsted acid _____ protons.
A Brønsted base _____ protons.

Wednesday, May 3, 2017

Today:

Warm-Up, Notes and Practice

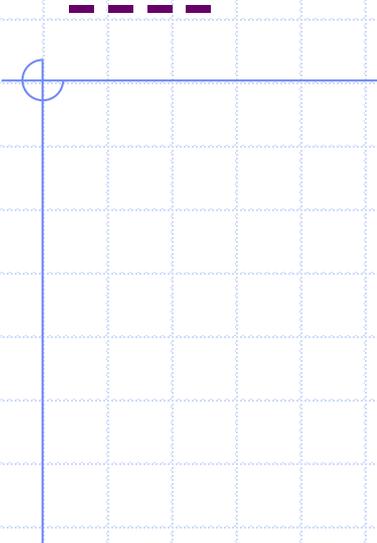
Homework:

pH

pH is a measure of the acidity of a solution.



A pH meter can be used to measure acidity.





Do Now ... May 4, 2017

Obj: Calculate pH based on the amount of H_3O^+ (hydronium ions) present in solution.

Copy and Solve: Use $M_1V_1 = M_2V_2$ to find the molarity ...

when we add 100mL of 1.2 M HCl solution to 100mL of a solution (final volume will be $100\text{mL} + 100\text{mL} = 200\text{mL}$).

Thursday, May 4, 2017

Today

W-up, Notes & Practice: Titrations

HW: Study for Test Tomorrow

Titration

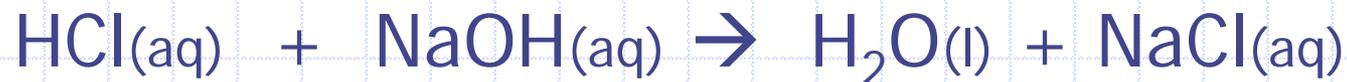
A technique used to determine the concentration of a solute in a solution.

With acid-base titrations we are trying to determine the molarity of an unknown acid or base solution.

$$M_1V_1 = M_2V_2$$

Neutralization Reactions

When a **strong** acid and **strong** base react the products are a salt and water.

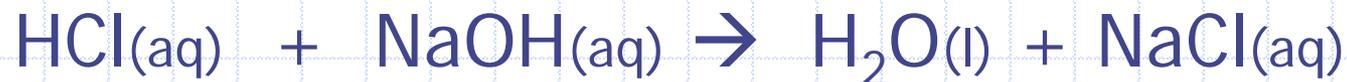


It takes 50mL of a 0.1 M HCl solution to neutralize a NaOH solution.

How many moles of NaOH are present?

Neutralization Reactions

When a **strong** acid and **strong** base react the products are a salt and water.



It takes 50mL a 0.1 M HCl solution to neutralize a 100mL NaOH solution.

What is the molarity of the NaOH solution?

Neutralization Reactions: Practice

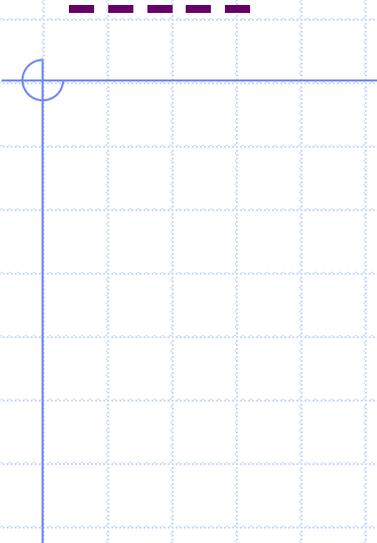
When 42.5mL of 1.03M NaOH is added to 50.0mL of vinegar (acetic acid), the indicator changes color.



What is the concentration of acetic acid in vinegar?

(Hint: find the moles NaOH added, use the balanced equation to find moles CH₃COOH, find molarity.)

Answer: 0.876 M



Titration

Key terms:

Burette

$$M_1V_1 = M_2V_2$$

Equivalence point

Indicator

Neutralization

Titration

Known and Unknown Solutions

Titration

As I perform the titration, write down each of the main steps in your notes.

Titration

Data Table

Trial #	0.1M HCl (mL)	NaOH (mL)
1		50.0 mL
2		50.0 mL
Average		50.0 mL

What is the molarity of the NaOH solution?

Neutralization Reactions: Practice

1. It takes 11.1 mL of 0.748M NaOH to neutralize a 10.0 mL sample of vinegar. What is the concentration of the vinegar?



Answer: 0.830 M

2. What is the concentration of NH_3 in household ammonia if 48.25mL of 0.5284M HCl is needed to neutralize 22.00mL of the ammonia?

Answer: 1.151 M



Warm-Up

1. What is the approximate pH of a $10^{-7.2}$ M solution of HCl? What is the actual pH?
2. What is the pH of a 0.0014 M solution of HNO_3 ?
3. Complete the reaction below (and balance):
 $\text{HCl} + \text{Ca}(\text{OH})_2 \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$

Friday, April 29, 2015

Today:
Unit Test

HW:

Neutralization

Alka-Seltzer -- What does it do?

Alkali (meaning an ionic salt of an alkali metal or alkaline earth metal element – e.g NaOH).

citric acid + baking soda \rightarrow H₂O + CO₂ + sodium citrate

Alka-Seltzer in water at zero-G.

