Do Now ...April 18, 2017

Obj: Describe the properties of acids & bases.

Copy and Complete:

Place the following acids and bases on the continuum below: lemon juice, HCl, soap, NaOH, vinegar, distilled water

1← ---------- 7 ---------- →14

Tuesday, April 18, 2017

Today:

Warm-Up

Content: Acids & Bases

Demo: Cu(s) + HNO_3 (l)

Notes Quiz

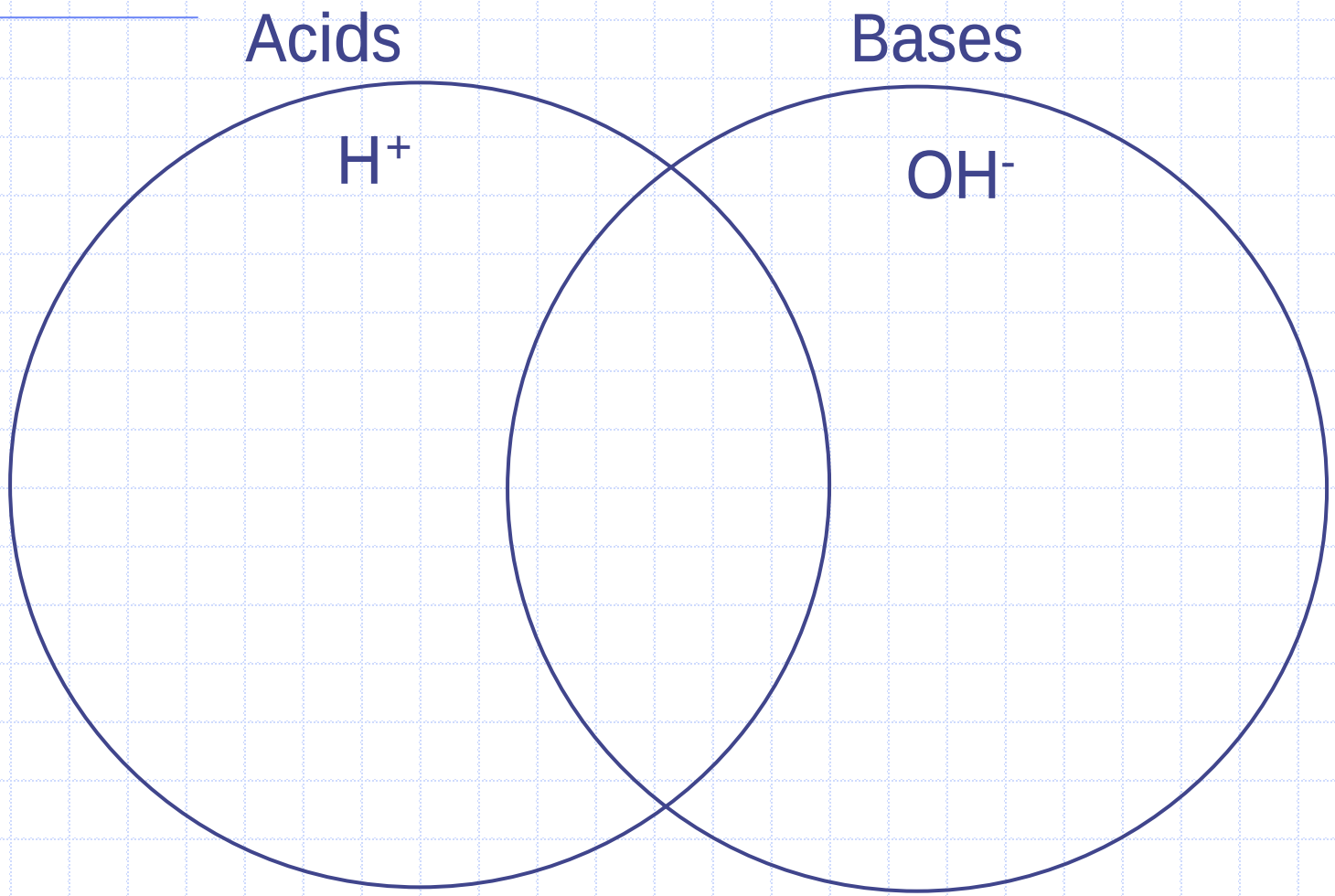
Homework: Google Form

Warm-Up: Acids & Bases

Which words relate to acids? Bases?

HCl	Sour	Bitter	NaOH
H_3O^+	OH^-	H_2SO_4	pH=7
pH>7	pH<7	Turns Red Litmus Blue	
Turns BTB Yellow	Conducts electricity.		
Hydronium Ion		Hydroxide Ion	

Warm-Up: Acids & Bases



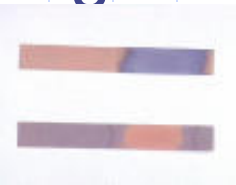
Properties of Acids

Taste sour.

Conduct electricity. (Some are strong, others are weak electrolytes.)

Often react with metals to form hydrogen gas.

Change indicators (blue litmus to red).



React with hydroxides (OH^-) to form H_20 and a salt.

Common Acids (know these!)

Strong Acids

H_2SO_4 -Sulfuric Acid

HCl - Hydrochloric Acid

HNO_3 - Nitric Acid

Weak

CH_3COOH – Ethanoic Acid

(also called Acetic Acid)

H_2CO_3 Carbonic Acid

Sulfuric Acid (H_2SO_4)

Principle uses include fertilizer manufacturing, ore processing, chemical synthesis, and oil refining.

Here's a clip of H_2SO_4 added to sugar.

If water is added to concentrated sulfuric acid, it can boil. Always ***add the acid to the water*** rather than the water to the acid. HI!!!

Nitric Acid (HNO_3)

Very strong acid! Dissociates completely in water.

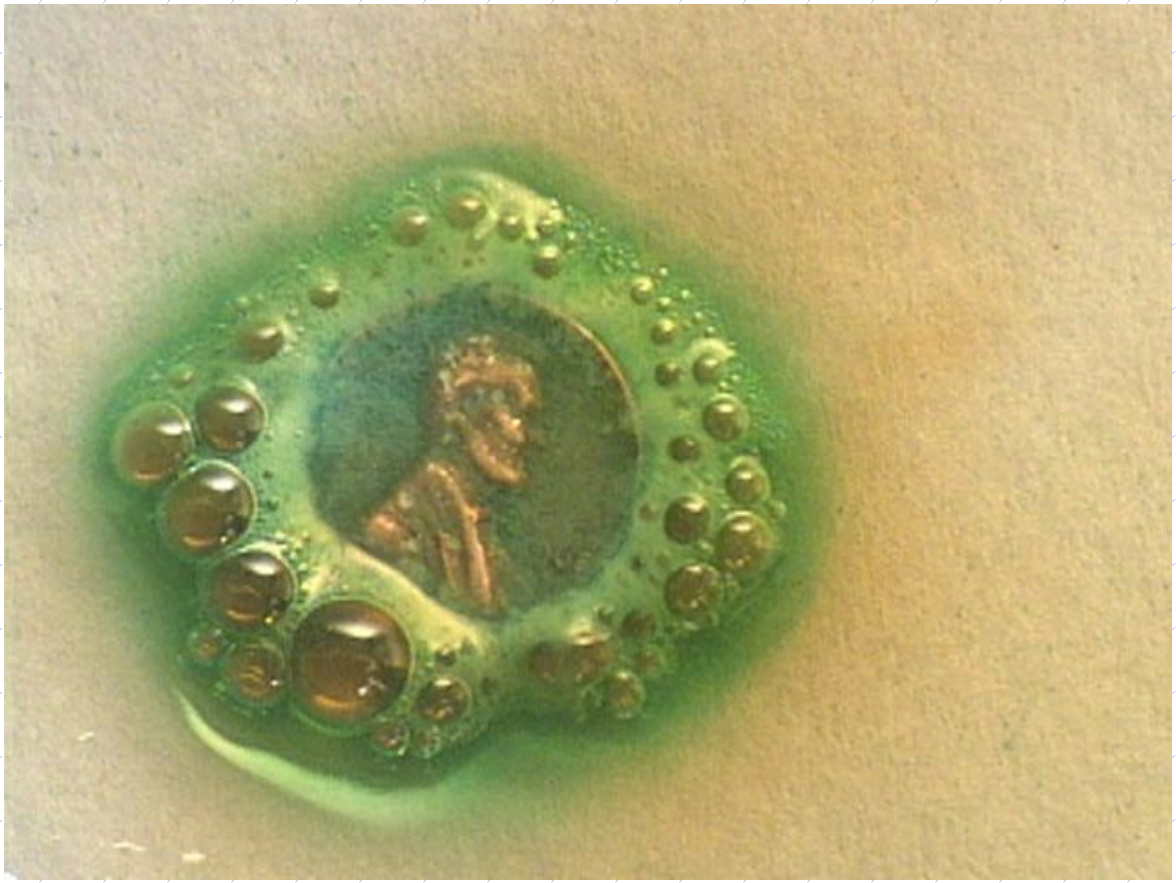


Image from http://jchemed.chem.wisc.edu/JCESoft/CCA/CCA3/STILLS/PENITRA/PENITRA/64JPG48/8.JPG

Important Safety Tip

Always add acid to water.

The reaction can be very **exothermic**!

Stir while adding acid to water.

Properties of Bases

Taste bitter.

Feel slippery.

Can be strong or weak electrolytes.

Change indicators (red litmus turns blue).

React with acids to form water and a salt.

Common Bases (know these

Strong

NaOH – Sodium Hydroxide

KOH – Potassium Hydroxide

Weak

NH_3 – Ammonia

NaCN – Sodium Cyanide

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)

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

Sodium Metal (Na)

Sodium metal is very reactive with water.

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

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

Sodium Hydroxide (NaOH)

Solid sodium also forms. This then immediately reacts with water to from NaOH and H_2 .

$$2Na + 2H_2O \rightarrow 2NaOH + H_2$$

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

Strengths of Acids and Bases

Strong acids completely ionize (form ions) in water.

For example: $HCl + H_2O \rightarrow H_3O^+ + Cl^-$

Weak acids slightly ionize in water.

$CH_3COOH + H_2O \rightleftharpoons H_3O^+ + CH_3COO^-$

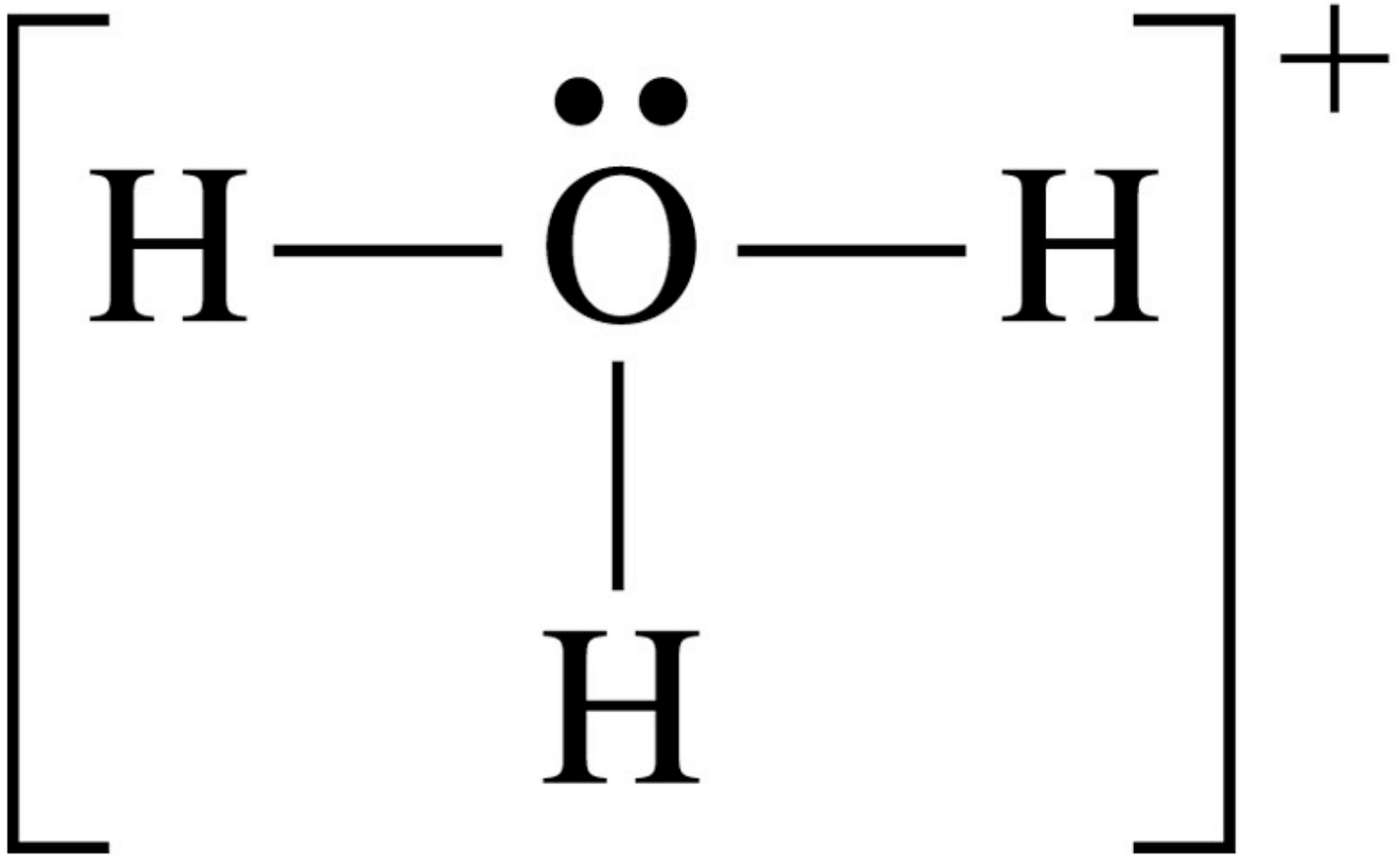
Hydronium Ion: H_3O^+

A water molecule that gains a hydrogen ion (H^+) becomes a hydronium ion.

$$H_3O^+$$

Draw the electron dot structure for the hydronium ion.

Hydronium Ion: H_3O^+



Hydroxide Ion: OH^-

A water molecule that **loses** a hydrogen ion (H^+) becomes a hydroxide ion.

OH^-

Draw the electron dot structure for the hydronium ion.

Quiz

1. Name two properties of acids that are not shared by bases.
2. Name one property that acids and bases have in common.
3. What safety precautions would you take when diluting concentrated sulfuric acid with water?
4. A substance has a pH of 13 and produces OH^- ions in water. How can you tell if it is an acid or base?
5. Place in order of increasing pH: HCl, NaOH, H_2O

Do Now ...April 19, 2017

Obj: Describe the properties of acids & bases.

Copy and Complete:

1. Name three acids in everyday experience.
2. Name two bases.

Wednesday, April 19, 2017

Today:

W-up, Lab: Household Acids and Bases

Homework: Finish Lab

Important

Goggles on.

Use small pieces of the Litmus paper!

Place used paper on a paper towel.

Do Now ... April 20, 2017

Obj: Describe the properties of acids & bases.

Copy and Complete:

Name the following:

H_2SO_4 _____

NaOH _____

HBr _____

KOH _____

Thursday, April 20, 2017

Today:

W-up, Notes & Practice: Naming Acids & Bases

Homework: Google Form

Acids

When dissolved (ionized or dissociated) in water

acids produce $\mathbf{H^+}$ ions.

HCl in water produces $H^+_{(aq)}$ and $Cl^-_{(aq)}$

Bases

When dissolved (ionized or dissociated) in water

bases produce **OH^-** ions.

NaOH in water produces $Na^+_{(aq)}$ and $OH^-_{(aq)}$

Salts

When dissolved (ionized or dissociated) in water

salts produce **positive and negative** ions.

NaCl in water produces $Na^{+}_{(aq)}$ and $Cl^{-}_{(aq)}$

Acid + Base → Salt and H_20

$$HCl + NaOH \rightarrow NaCl + H_2O$$

Neutralization

Why this reaction called *neutralization*?

In general ...

Acids start with H e.g. HCl, H_2SO_4

Bases end with OH e.g. NaOH, $Ca(OH)_2$

Salts are ionic compounds (Metal + NonMetal)

Naming Acids

Hydrogen ions (H^+) are also called **protons**.

This is because the hydrogen atom has one proton and one electron. When it loses the electron only the proton is left.

Naming Acids

1. When anion (non-metal) ends with -ide, the acid starts with hydro.
   The stem of the anion has the suffix -ic followed by the word *acid*

2. When anion ends with -ite, the anion has the suffix -ous, then add the word *acid*

3. When anion ends with -ate, the anion suffix is -ic and then *acid*

Naming Acids

Anion Ending	Example	Acid Name	Example
-ide	Cl^- chloride (HCl)	hydro-(stem)-ic acid	hydrochloric acid
-ite	SO_3^{2-} sulfite (H_2SO_3)	(stem)-ous acid	sulfurous acid
-ate	NO_3^- nitrate (HNO_3)	(stem)-ic acid	nitric acid

Naming Acids

Note:

HCl(*g*) -- named hydrogen chloride

HCl(*aq*) -- is named as an hydrochloric acid

Naming Acids

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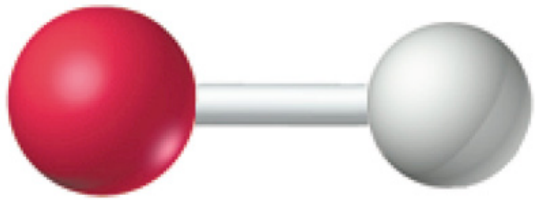
Naming Bases

A base produces hydroxide ions (OH^-) when dissolved in water.

Name as ionic compounds. For example:

NaOH sodium hydroxide

KOH potassium hydroxide



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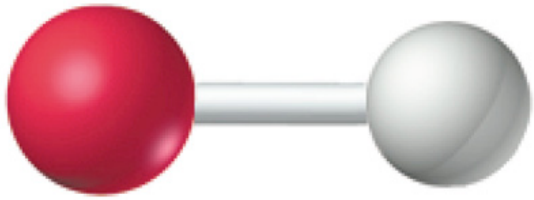

Name the following:

$Ca(OH)_2$ calcium hydroxide

LiOH lithium hydroxide

Do Now ... April 21, 2017

Obj: Describe the properties of acids & bases.

Copy:

Strong acids and bases ionize/dissociate/break apart **completely** in water.

Weak acids and bases **partially** dissociate.

Friday, April 21, 2017

Today:

W-Up, Notes: Strong & Weak Acids, Quiz

HW:

Acids

When dissolved (ionized or dissociated) in water

acids produce $\mathbf{H^+}$ ions.

HCl in water produces $H^+_{(aq)}$ and $Cl^-_{(aq)}$

Strong and Weak Acids

Video

1. What is the difference between a strong and weak acid?

Bases

When dissolved (ionized or dissociated) in water

bases produce **OH^-** ions.

NaOH in water produces $Na^+_{(aq)}$ and $OH^-_{(aq)}$

Salts

When dissolved (ionized or dissociated) in water

salts produce **positive and negative** ions.

NaCl in water produces $Na^{+}_{(aq)}$ and $Cl^{-}_{(aq)}$

Acid + Base → Salt and H_20

$$HCl + NaOH \rightarrow NaCl + H_2O$$

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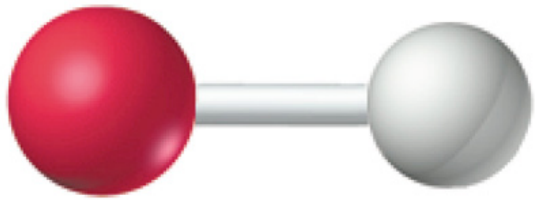
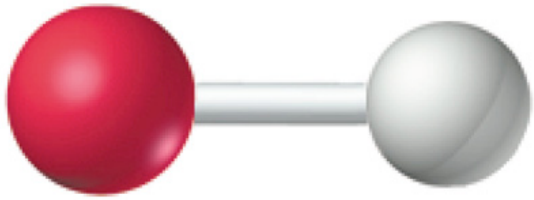


Naming Bases

A base produces hydroxide ions (OH^-) when dissolved in water.



Name the following:

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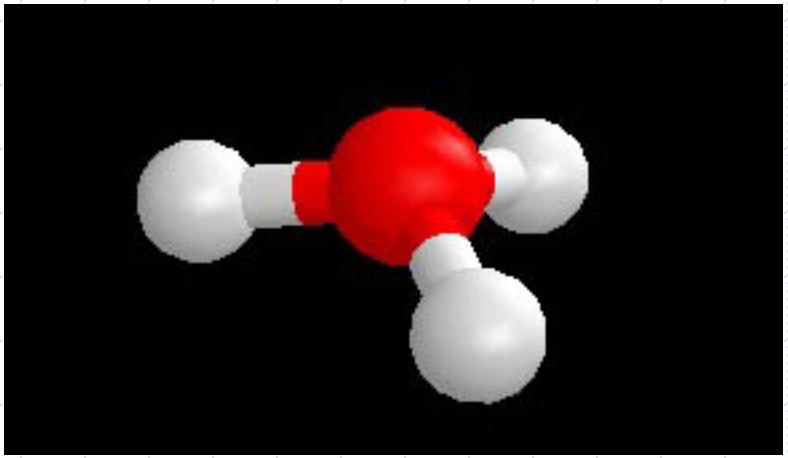
Naming Acids

A acid produces **hydrogen ions (H^+)** when dissolved in water.

Remember, H^+ is sometimes written as H_3O^+



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Naming Acids

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Older content below...

Warm-Up

1. Draw a diagram for the pH scale listing a strong acid, a weak acid, a strong base, a weak base, and water.

2. What is the use of an acid/base indicator in the lab? Which indicator did you use?