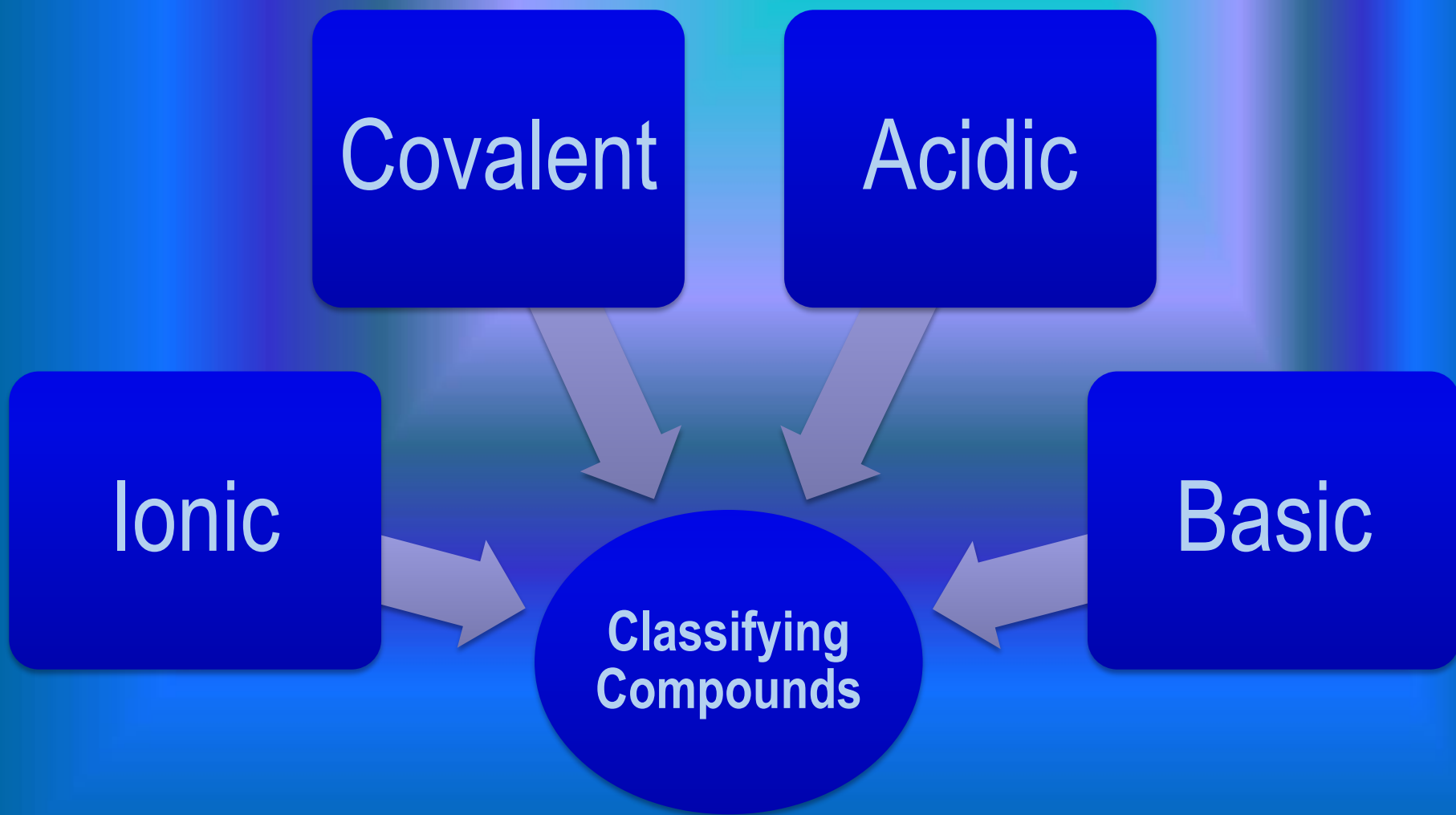


Acids and Bases

Classifying Compounds

What are two ways in which we can classify compounds?

Classifying compounds



Properties of Acids/Bases



Acids and Bases

- Many familiar compounds are acids or bases.
 - ♦ Classification as acids or bases is based on chemical composition.
- Acids and bases can be very dangerous.
 - ♦ Both can be very corrosive.
 - NEVER try to identify an acid or base by taste or touch!



See pages 220 - 222

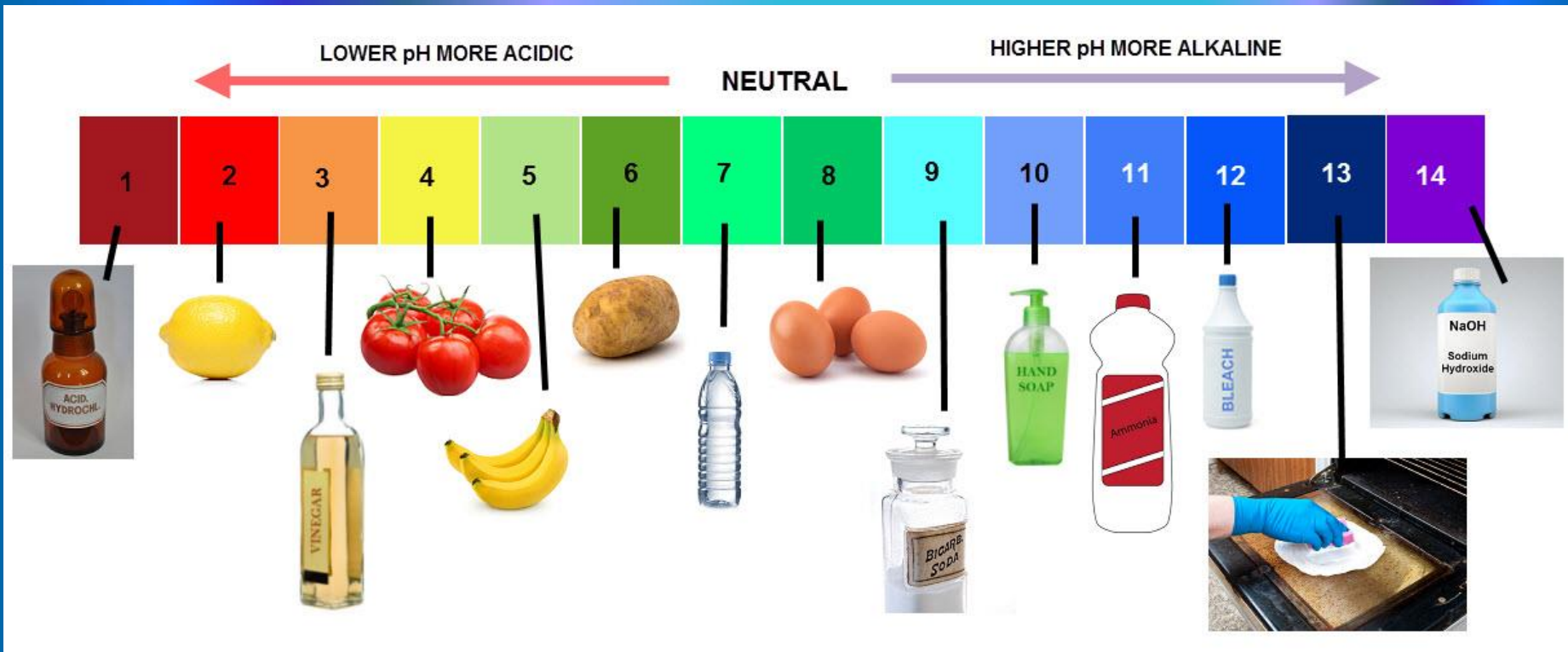
(c) McGraw Hill Ryerson 2007

pH Scale

- The strength of acids and bases is measured on the pH scale.
 - ♦ Power of hydrogen
 - ♦ Number scale for measuring how acidic or basic a solution is
 - ♦ pH below 7 = acidic, pH above 7 = basic, pH 7 = neutral
 - ♦ 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
- Acids Neutral Bases*
- ♦ Each decrease of 1 on the pH scale indicates 10× more acidic
 - For example, pH 4 is **10** times more acidic than pH 5.
 - pH 3 is **1000** times more acidic than pH 6.



pH Scale



pH Indicators

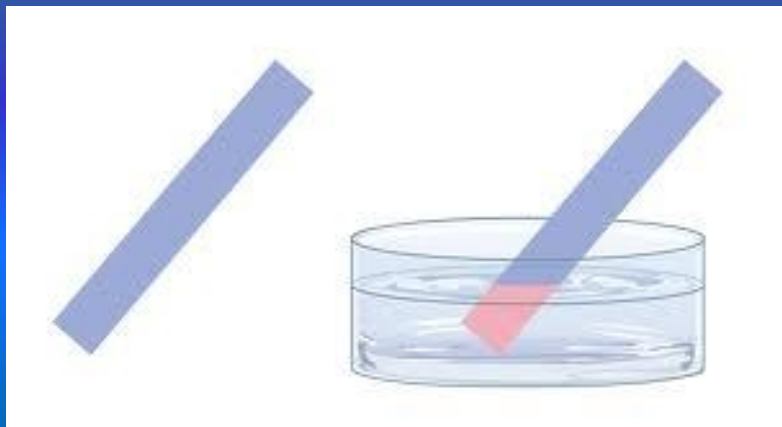
- The pH of acids and bases cannot be determined by sight.
 - ♦ Instead, pH is measured by other chemicals called indicators or by a pH meter that measures the electrical conductivity of the solution.



See pages 223 - 224

Indicators

- Many acidic and basic solutions are colourless therefore there needs to be a way to identify what type of compound you have
- pH indicators change colour based on the solution they are placed in.
 - ♦ Litmus is the most common indicator, and is used on litmus paper.
 - Extracted from lichens (algae/fungus)
 - Two colours of litmus paper: Blue and Red
 - Blue litmus turns red in an acidic solution
 - Red litmus turns blue in a basic solution
 - BAR → Blue Acidic Red

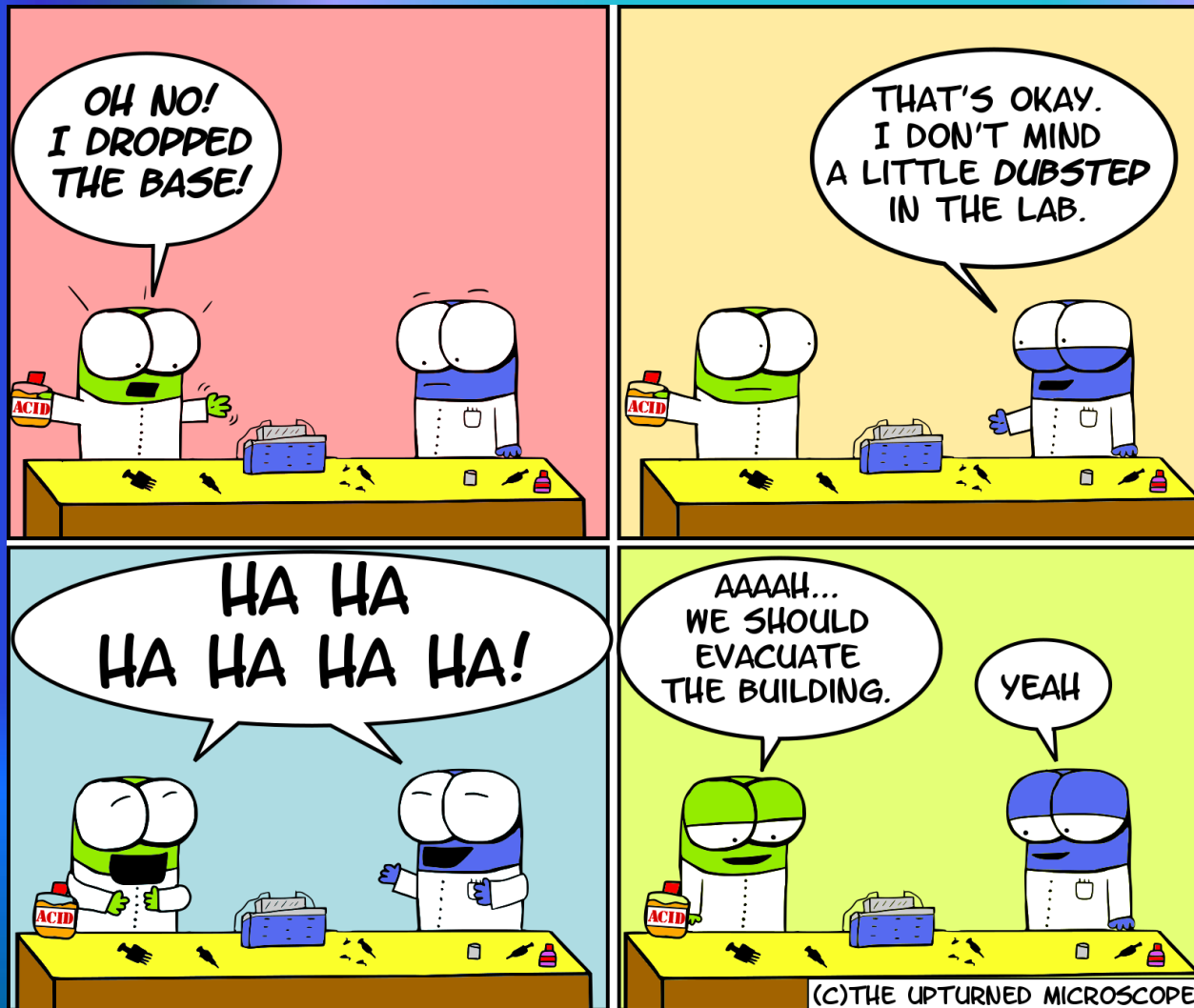


- Universal indicator contains many indicators that turn different colours at different pH values (can be in liquid form, or on paper strips like litmus).
 - ♦ A pH meter uses electrical probes to measure how solutions conduct electricity.
 - ♦ Indicators change colour at different pH values, so different indicators are used to identify different pH values.
 - Bromothymol blue for pH 6 – 7.6, phenolphthalein for pH 8.2 – 10.
 - Many natural sources, such as beets and cabbage, are also indicators.



Time OUT

- Page 84-85 in workbook



Acids

- If you know a compound's chemical formula, you may be able to identify whether it as an acid.
 - ♦ Acids often behave like acids only when dissolved in water
 - ♦ Therefore, acids often are written with symbol (aq) = aqueous = water.
 - Aqueous means dissolved in water

Sulfuric acid is used in batteries.



See pages 225 - 226

Naming Acids

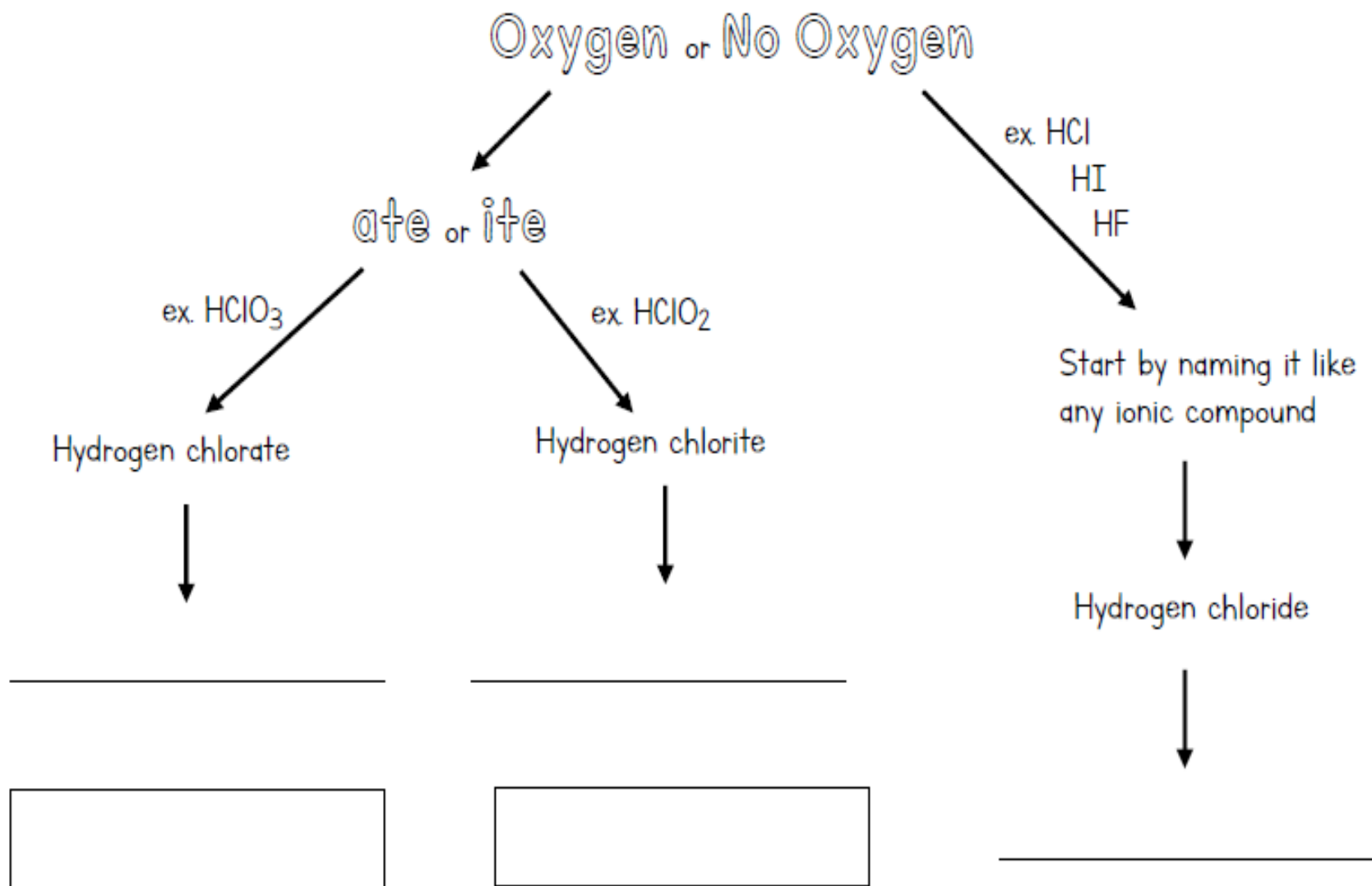
- The chemical formula of an acid **usually** starts with hydrogen (H).
 - ♦ Example:
 - HCl = hydrogen chloride
 - $\text{HCl}_{(\text{aq})}$ = hydrochloric acid
 - ♦ Exception:
 - Acids with a carbon usually have the C written first with the H on the end of the compound
 - $\text{CH}_3\text{COOH}_{(\text{aq})}$ = acetic acid (vinegar)

- Naming acids
 - ♦ If no state of matter is present then compound is named via ionic rules
 - Example: HF: Hydrogen fluoride
 - ♦ *If stated to be aqueous (aq)*
 - Write out the name in regular ionic form
 - Hydro minus “gen” + non metal minus-*ide*
 - Add “ic acid” suffix
 - Example
 - $\text{HF}_{(\text{aq})}$ = hydrogen fluoride = hydrofluoric acid

- In order to name an acid you must first recognize if oxygen is present or absent
 - ♦ If Oxygen is present
 - Write out name in regular ionic form
 - If it starts with hydrogen and ends with “ate”
 - Drop hydrogen and add “ic acid”
 - $\text{H}_2\text{CO}_{3(\text{aq})}$ = hydrogen carbonate = carbonic acid
 - If it starts with hydrogen and ends with “ite”
 - Drop hydrogen and add “ous acid”
 - $\text{H}_2\text{SO}_{3(\text{aq})}$ = hydrogen sulphite = sulphurous acid
 -

Naming Acids:

- You can recognize an acid by the _____ on the _____ side of the formula (ex. HCl)



- **Time out**
- **Page 86 in workbook**

Bases

- If you know a compound's chemical formula, you may be able to identify it as a base.
 - ♦ Bases often behave like bases only when dissolved in water.
 - ♦ Therefore, bases are often written with the symbol (aq) = aqueous = water.
- The chemical formula of a base usually ends with hydroxide (OH).
- Bases can be gentle or very caustic.
- Examples of common bases:
 - ♦ $\text{NaOH}_{(\text{aq})}$
 - ♦ $\text{Mg}(\text{OH})_{2(\text{aq})}$
 - ♦ $\text{Ca}(\text{OH})_{2(\text{aq})}$
 - ♦ $\text{NH}_4\text{OH}_{(\text{aq})}$



See page 227

Naming Bases:

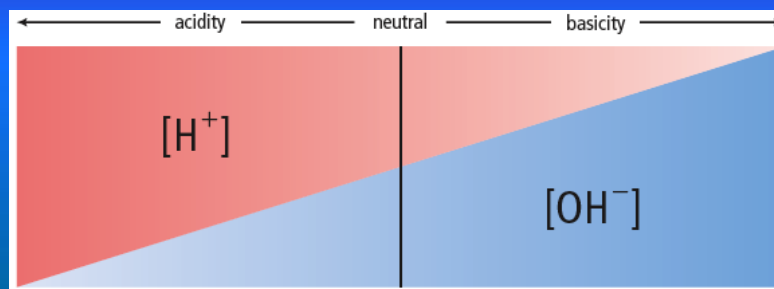
- You can recognize a base by the _____ on the _____ side of the formula (ex. NaOH)
- Naming bases follows the _____ we learned in Chapter 4

NaOH = _____

Mg(OH)₂ = _____

Production of Ions

- Acids and bases can conduct electricity because they release ions in solution.
 - ♦ Acids release hydrogen ions, H^+ .
 - ♦ Bases release hydroxide ions OH^- .
- The pH of a solution refers to the concentration of ions it has.
 - ♦ Square brackets are used to signify concentration, $[H^+]$, $[OH^-]$
 - High $[H^+]$ = low pH, very acidic
 - High $[OH^-]$ = high pH, very basic
 - ♦ A solution cannot have BOTH high $[H^+]$ and $[OH^-]$; they cancel each other out and form water. This process is called neutralization.
 - ♦ $H^+ + OH^- \rightarrow H_2O$



See page 228

Properties of Acids and Bases

Table 5.6 Properties of Acids and Bases

Property	Acid	Base
Taste CAUTION: Never taste chemicals in the laboratory.	<ul style="list-style-type: none">• Acids taste sour. Lemons, limes, and vinegar are common examples.	<ul style="list-style-type: none">• Bases taste bitter. The quinine in tonic water is one example.
Touch CAUTION: Never touch chemicals in the laboratory with your bare skin.	<ul style="list-style-type: none">• Many acids will burn your skin. Sulfuric acid (battery acid) is one example.	<ul style="list-style-type: none">• Bases feel slippery.• Many bases will burn your skin. Sodium hydroxide (lye) is one example.
Indicator tests	<ul style="list-style-type: none">• Acids turn blue litmus paper red.• Phenolphthalein is colourless in an acidic solution.	<ul style="list-style-type: none">• Bases turn red litmus blue.• Phenolphthalein is colourless in slightly basic solutions and pink in moderate to strongly basic solutions.
Reaction with some metals, such as magnesium or zinc	<ul style="list-style-type: none">• Acids corrode metals.	<ul style="list-style-type: none">• No reaction
Electrical conductivity	<ul style="list-style-type: none">• Conductive	<ul style="list-style-type: none">• Conductive
pH	<ul style="list-style-type: none">• Less than 7	<ul style="list-style-type: none">• More than 7
Production of ions	<ul style="list-style-type: none">• Acids form hydrogen (H^+) ions when dissolved in solution.	<ul style="list-style-type: none">• Bases form hydroxide (OH^-) ions when dissolved in solution.

Take the Section 5.1 Quiz

See page 229

- Properties of Acids and Bases (pg 83 workbook)
- Homework
- Pg 87-88 in workbook
- Bring in something to test for tomorrow
 - ♦ Suspected acid/base
 - ♦ BE CAREFUL and read safety warnings if bringing in cleaning products

