

# Learning Objectives



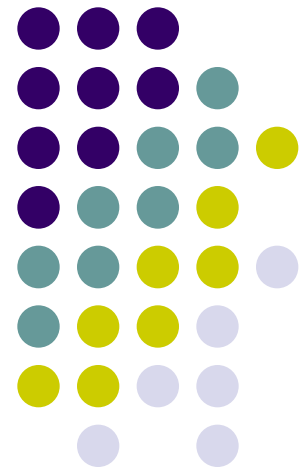
- To define acids and bases
- To recognize properties of acids and bases
- To name acids based on their formulas

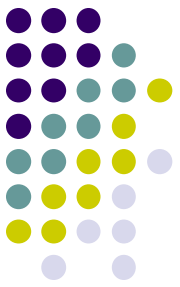
# Acids and Bases

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# What are they?

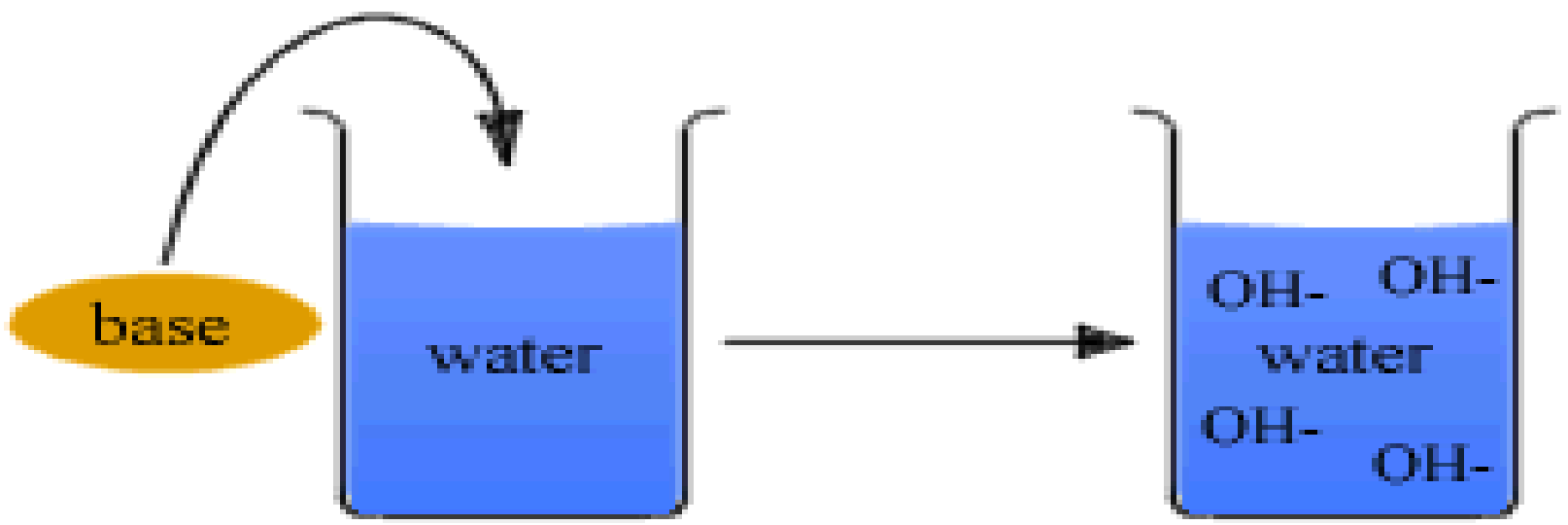
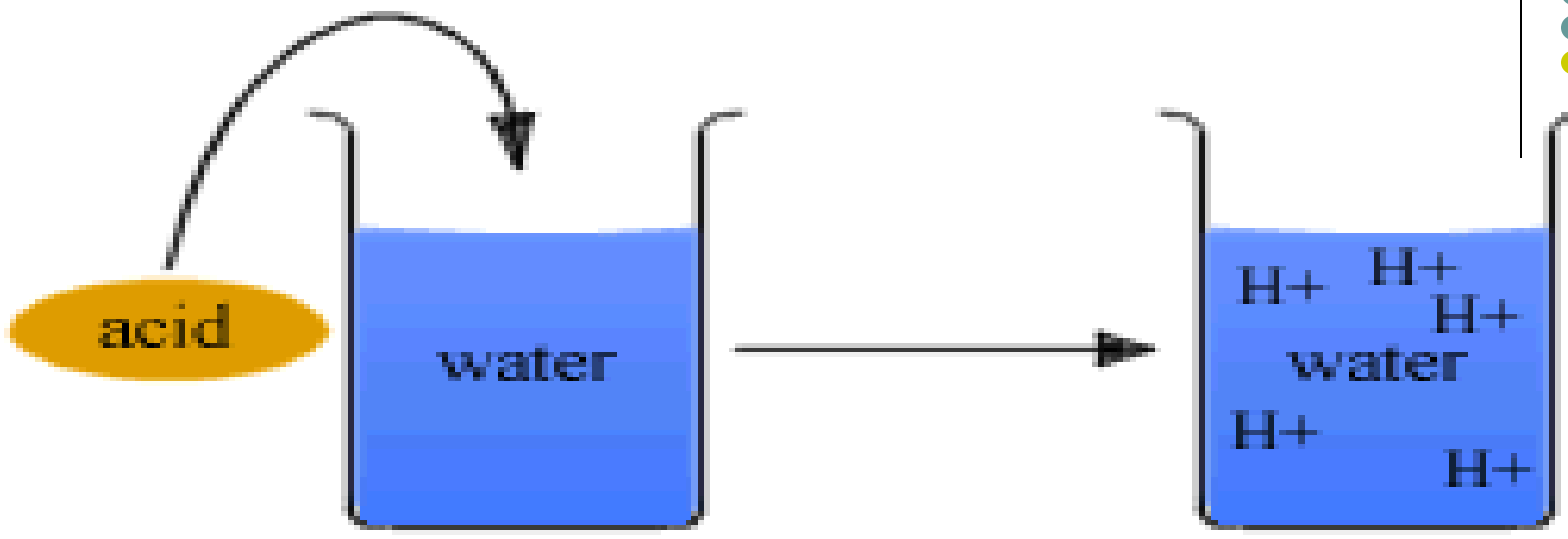


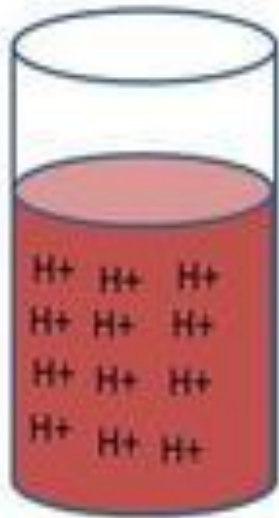
Substance	pH
Battery acid	0.5
Carbolic acid	1.0
Lemon juice	2.0
Vinegar	3.0
Orange juice	3.5
Apple cider vinegar	4.0
Beer	4.5
Acid rain	4.5-6.0
Coffee	5.0
Tomato ketchup	5.5
Milk	6.5
Pure water	7.0
Healthy human urine	7.5-8.0
Blood	7.35-7.45
Sea water	8.0
Ammonia	10.0-11.0
Household ammonia	11.0
bleach	12.0
Household lye	13.5

Courtesy of Wikipedia

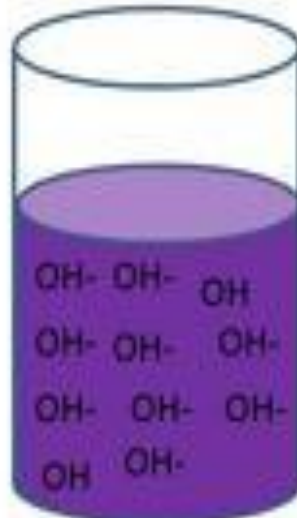


- **Acids** are compounds that produce **hydrogen ions** ( $H^+$ ) when **dissolved in water**
- **Bases** are compounds that produce **hydroxide ions** ( $OH^-$ ) when **dissolved in water**

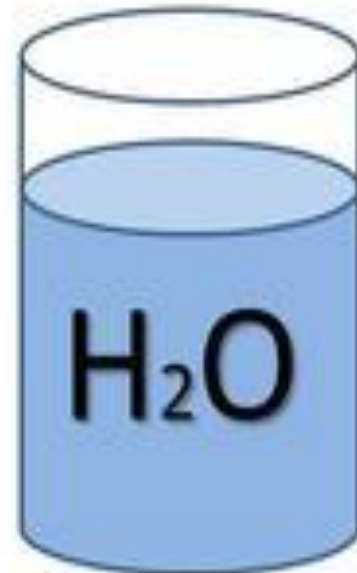




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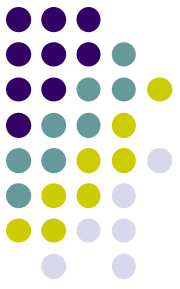


Acids contain  
Hydrogen ions  
also shown as H<sup>+</sup>.

Bases contain  
Hydroxides also  
shown as OH<sup>-</sup>.

Acids and Bases  
together cancel each  
other out and make  
water.

# A comparison...



## Acids

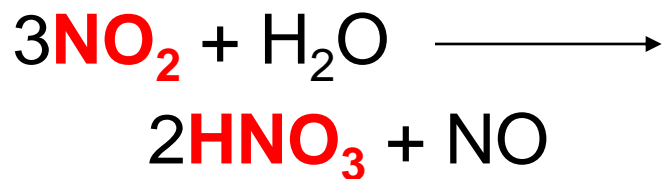
- Produce  $H^+$  ions
- Good conductors
- Taste sour
- Name ends with 'acid'
  
- Feel like water
  
- Chemical formula for an acid **begins with 'H'**
- Are **molecular** compounds, but may **behave like ionic** compounds in water

## Bases

- Produce  $OH^-$  ions
- Good conductors
- Taste bitter
- Name often end with 'hydroxide'
- Feel slippery
  
- Chemical formula usually **ends with 'OH'**
- Are **ionic** compounds

## Acids

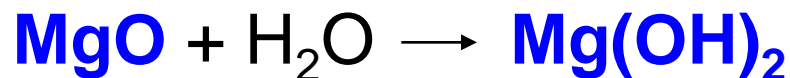
- Form from **non-metal oxides** and water



- **React with metals** to produce **hydrogen** gas
- Eg:  $\text{Mg} + 2\text{HCl}$  yields  $\text{MgCl}_2 + \text{H}_2$
- $2\text{K} + \text{H}_2\text{SO}_4$  yields  $\text{K}_2\text{SO}_4 + \text{H}_2$

## Bases

- Form from **metal oxides** and water



- **Do not** usually **react** with **metals**



## Acids

- Turn **blue** litmus paper **red**
- **Red** litmus paper remains **red** (red = acid)
- Useful in the **food industry** because many harmful bacteria cannot survive in acid

## Bases

- **Blue** litmus paper **remains blue** (blue = base)
- Turns **red** litmus paper **blue**
- Useful for **industrial and cleaning applications**, as well as heartburn medications







## Acids

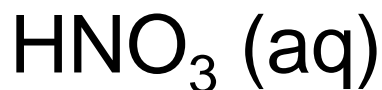
- **Binary acids** contain only 2 elements (HCl, HF, etc) and are named **hydro\_\_\_\_ic acid**
- Name these:  
HI  
H<sub>2</sub>S  
HBr  
HCl

## Bases

- Named the same way as any **ionic** compound:
- Name these:  
NaOH  
NH<sub>4</sub>OH  
Al(OH)<sub>3</sub>



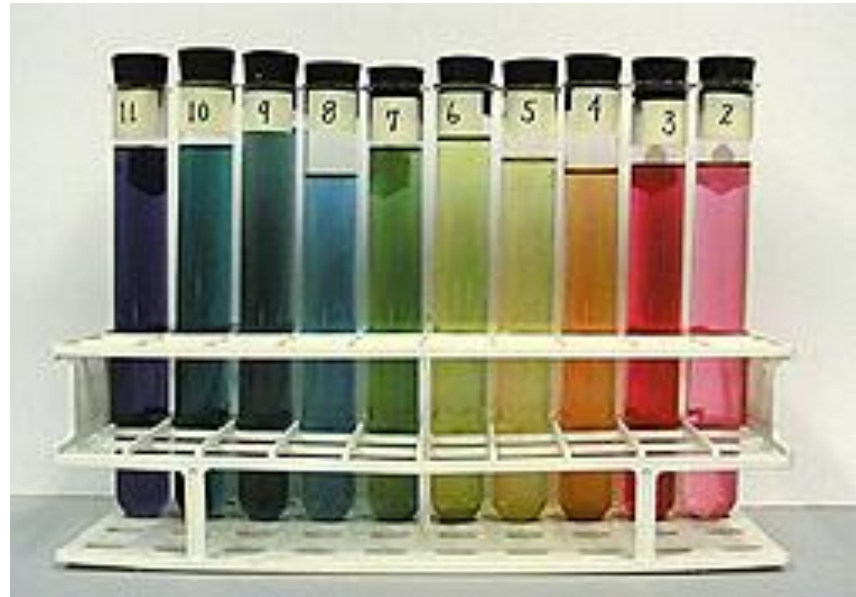
- **Oxyacids** contain **polyatomic ions**, with hydrogen ions added to make the compound neutral and are named according to the polyatomic ion present, **changing 'ate' to 'ic'**
- Name these:



# Acid-Base Indicators



- Many chemicals **change colour** when an acid or base is added
- These are called **indicators**
- The colour is determined by the **degree** of acidity or basicity





# Indicators to know:

Indicator	Colour in Acid	Colour in Base
Phenolphthalein	Colourless	Pink
Litmus paper	Red	Blue

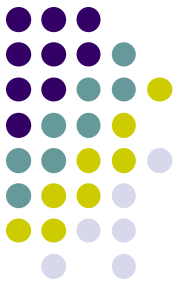
Red litmus paper with a drop of base here



Blue litmus paper with a drop of acid here



**So basically, all you have to do  
is....**



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