

Acids and Bases

PowerPoint 5.1

Classification of Elements

How many different ways are individual *elements categorized?*

- Metals, non-metals, and metalloids.
- Transition metals grouped together.
- Lanthanoids and Actinoids, usually separated from the rest of the table.
- By Group, alkali metals, halogens, noble gases, and so on.
- By Period, indicating the number of shells of an element's neutral atom.
- Diatomic elements, H_2 , N_2 , O_2 , S_2 , F_2 , Cl_2 , Br_2 , I_2

Classification of Compounds

How many different ways are individual *compounds categorized*?

➤ Ionic compounds versus Covalent compounds

➤ Acids and bases



General Differences between Acids and Bases

Acids

- Sour taste
- Corrosive, corrode metals
- Formula generally begin with H or CH
- Produces H^+
- $pH < 7$

Both acids and bases

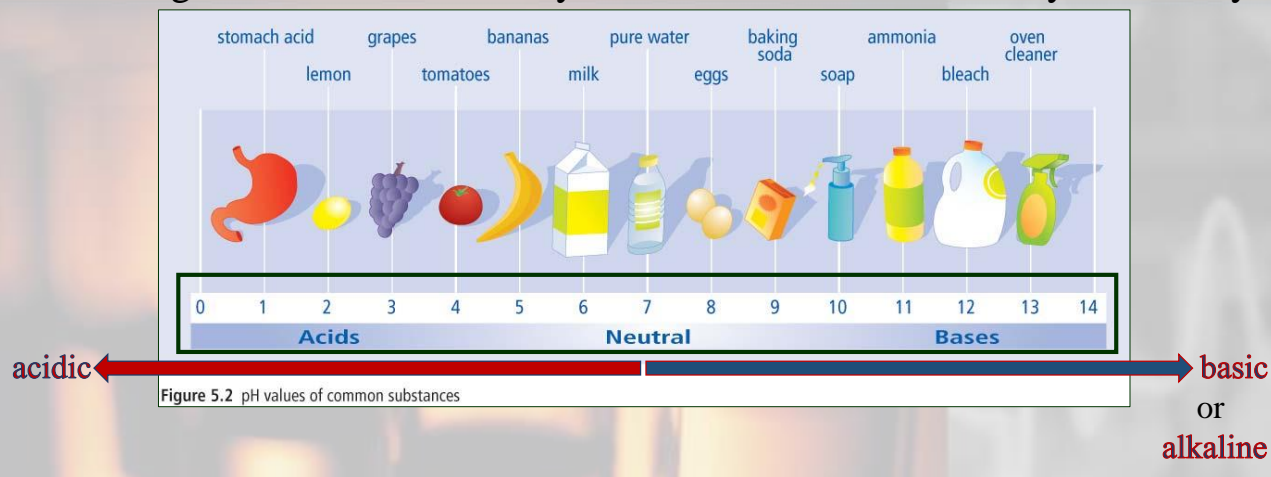
- Corrosive
- Conduct electricity

Bases

- Bitter taste
- Slippery feel
- Caustic
- less reactive with metals
- Formula generally ends with OH
- Produces OH^-
- $pH > 7$

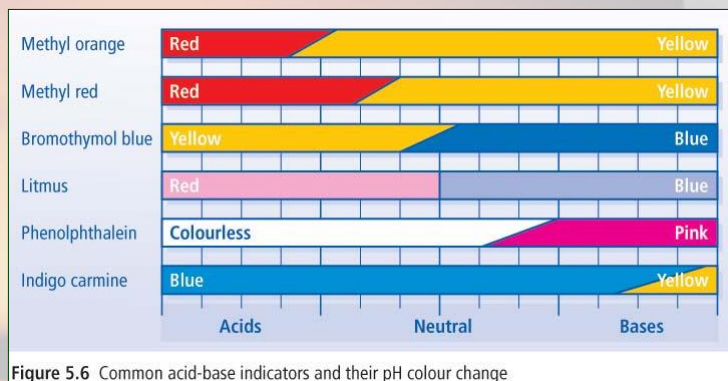
pH Scale

- A scale from 0 to 14 utilized to indicate how acidic, or how basic, a substance is.
- A change in one unit is actually a 10 times increase in acidity or basicity.



Acid-Base Indicators

- **Acid-Base indicators** are chemical that change colour depending on the pH of a solution.
- They are often utilized to determine the pH of a solution or to determine the concentration of H^+ or OH^- .



Names of Acids

Many ionic compounds create acidic solutions when dissolved in water
These compounds have different names when dissolved in water.

Formula	Chemical name	Formula in Solution	Name in Solution
HF	hydrogen fluoride	HF _(aq)	hydrofluoric acid
HCl	hydrogen chloride	HCl _(aq)	hydrochloric acid
HBr	hydrogen bromide	HBr _(aq)	hydrobromic acid
HI	hydrogen iodide	HI _(aq)	hydriodic acid
H ₂ SO ₄	hydrogen sulfate	H ₂ SO _{4(aq)}	sulfuric acid
H ₂ SO ₃	hydrogen sulfite	H ₂ SO _{3(aq)}	sulfurous acid
HClO ₄	hydrogen perchlorate	HClO _{4(aq)}	perchloric acid
HClO ₃	hydrogen chlorate	HClO _{3(aq)}	chloric acid
HClO ₂	hydrogen chlorite	HClO _{2(aq)}	chlorous acid

Suffix *-ate* → drop “hydrogen” and change *-ate* to *-ic acid*.

Suffix *-ite* → drop “hydrogen” and change *-ite* to *-ous acid*.

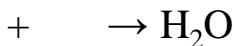
H⁺ and OH⁻ Ions

➤ Acids produces H⁺ in solution

➤ Bases produces OH⁻ in solution

➤ As the concentration of H⁺,
acidity increases

➤ As the concentration of OH⁻,
basicity increases



Neutralization
acid-base reaction

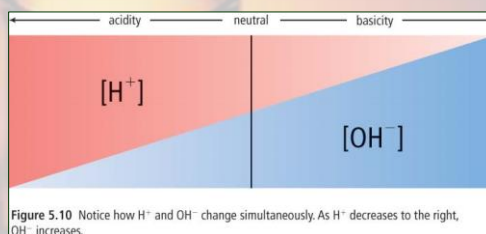


Figure 5.10 Notice how H⁺ and OH⁻ change simultaneously. As H⁺ decreases to the right, OH⁻ increases.

Summary

Acids

↑ concentration of H^+
 $pH < 7$

Neutralization reaction

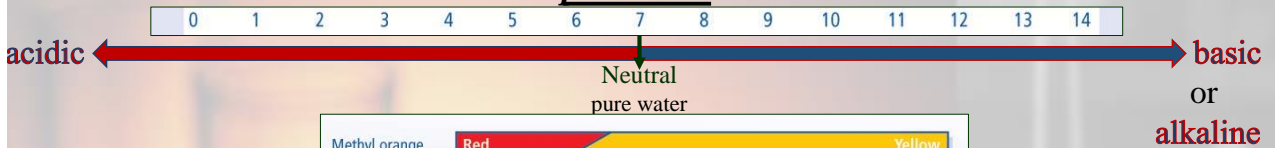
Reaction between an
 acid and a base



Bases

↑ concentration of OH^-
 $pH > 7$

pH scale



Methyl orange	Red	Yellow
Methyl red	Red	Yellow
Bromothymol blue	Yellow	Blue
Litmus	Red	Blue
Phenolphthalein	Colourless	Pink
Indigo carmine	Blue	Yellow
	Acids	Bases