

Identifying Acids and Bases

Acid-base indicators are substances that _____ when added to an acid or a base.

Example: **Litmus paper** turns _____ when in an acid and _____ when in a base.

The pH Scale

pH: a measure of the acidity of a solution. pH stands for “power of hydrogen”, and it is related to the concentration of hydrogen ions [H⁺] in a solution.

$$[H^+] = 10^{-pH} \text{ mol/L}$$

Examples:

$$[H^+] = 10^{-5} \text{ mol/L}$$

$$[H^+] = 10^{-2} \text{ mol/L}$$

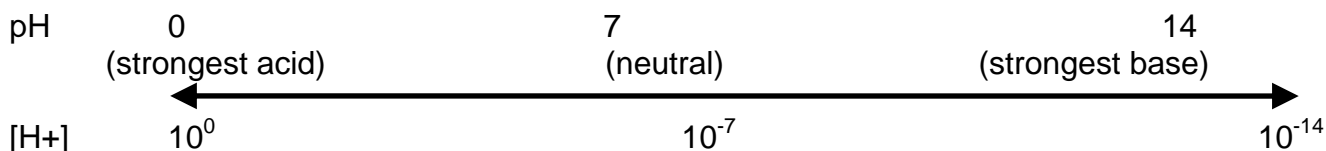
$$pH = 8$$

$$pH = \underline{\hspace{2cm}}$$

$$pH = \underline{\hspace{2cm}}$$

$$[H^+] = \underline{\hspace{2cm}}$$

“**pH scale**” – shows the range of pH values, usually from 0 to 14



When the pH number changes by one, the [H⁺] concentration changes by _____ times.

Ex: pH of 3 is _____ times more acidic than pH of 4. pH of 4 is _____ times more acidic than pH of 6.

When is it important to know pH?

- Swimming pools / hot tubs
- pH balance in our bodies – blood pH is normally 7.4 (slightly _____)
- pH of soil – some plants like beans prefer slightly basic soils, while other plants like potatoes prefer acidic soil.
- Baby shampoo has the same pH as baby’s tears.

Do p. 303 # 5 – 6 and p. 304 # 8 – 11, 14 (Answers on p. 506)

Characteristic Reactions of Acids and Bases

- 1) Acids react with metals
Acid + metal → salt + hydrogen gas

eg: hydrochloric acid (HCl) reacts with magnesium (Mg):

- 2) Acids react with carbonates
Acid + carbonate → salt + carbon dioxide gas + water

eg: HCl reacts with sodium carbonate (Na_2CO_3)

- 3) Acids react with bases – this is called a NEUTRALIZATION reaction.
Acid + base → salt + water

eg: HCl reacts with sodium hydroxide (NaOH)

p. 318 # 2a, 3 (Note: chemical formulas for acids are given on p. 497) p. 323 # 1, 2

Who Cares about pH?

It is important to balance between acids and bases in a number of practical household applications.

- swimming pools
- tanks of tropical fish
- hot tubs

To control the acidity of the water in each of these examples, you need to...

- **adjust the pH by adding either an acid or a base! (NOT add water!!)**
- If the pH is too low, then the water is too _____. To adjust the water, you should add a _____. This will cause the pH to _____.
- If the pH is too high, then the water is too _____. To adjust, you should add an _____. This will cause the pH to _____.

pH balance in our bodies

- Our stomachs contain _____ acid, which is important in digesting food. The acid-food mixture then moves to the small intestine.
- Bile is a base made by the liver, and it is added to the food in the intestines. This helps to reduce the _____ of the food coming from your stomach so that it won't burn through your intestines!

pH and soil

- The pH of soil determines what types of plants will grow in it.
 - Peas and beans like neutral to slightly basic soils (pH of _____)
 - Potatoes and blueberries prefer acidic soils (pH less than _____)
- Gardeners can add fertilizers to the soil to adjust its pH so that they have the best growing conditions for their crop.