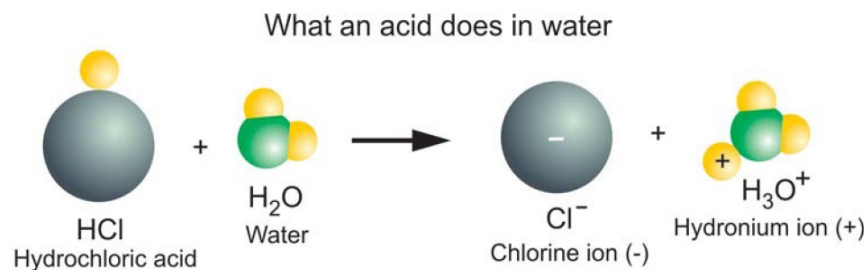


Chapter 21.3 Learning Goals

- Differentiate between acids and bases.
- Define pH.
- Explain the significance of acids, bases, and pH to living organisms and the environment.

21.3 What are acids?

- An *acid* is a compound that dissolves in water to make a particular kind of solution.
- Chemically, an acid is any substance that produces *hydronium ions* (H_3O^+) when dissolved in water.



21.3 What are acids?

Some properties of acids are:

1. Acids create the sour taste in food like lemons.
2. Acids react with metals to produce hydrogen (H_2) gas.
3. Acids change the color of blue litmus paper to red.
4. Acids can be very corrosive, destroying metals and burning skin through chemical action.

Some Common Acids
(relatively weak)



Oranges and citrus fruit



Vinegar

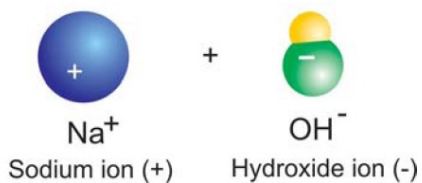


Lemon juice

21.3 Bases

- A base is any substance that dissolves in water and produces *hydroxide ions* (OH^-).

What a base does in water

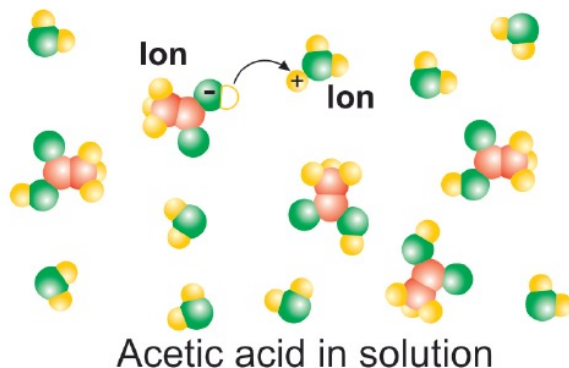
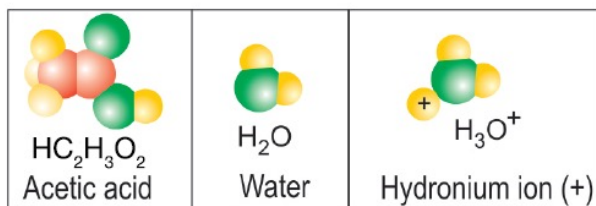


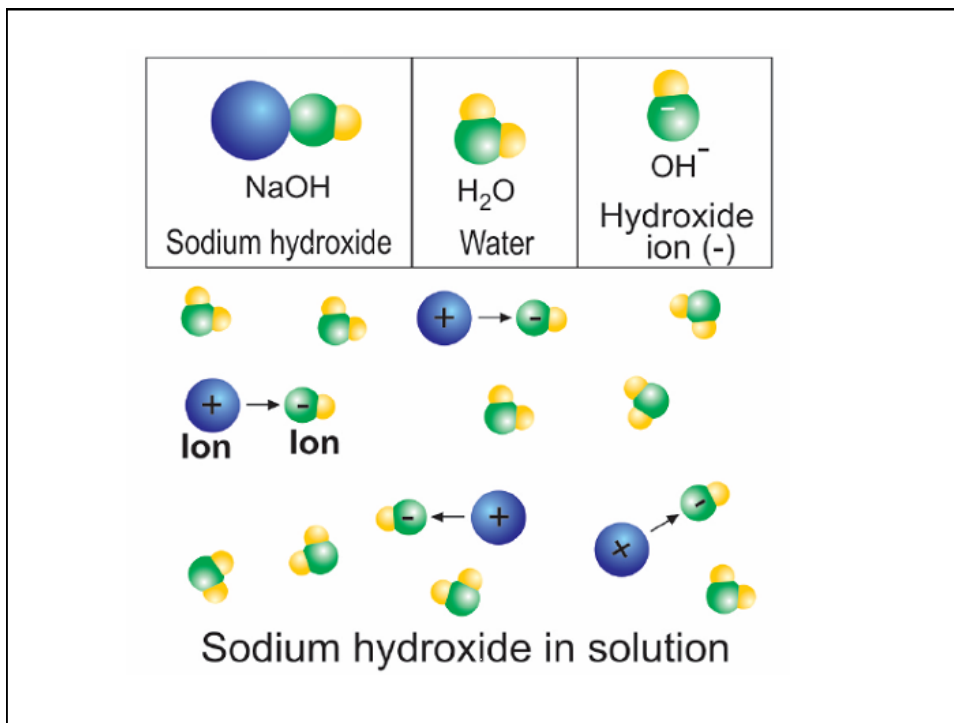
21.3 What are bases?

Some properties of bases are:

1. Bases create a bitter taste.
2. Bases have a slippery feel, like soap.
3. Bases change the color of red litmus paper to blue.
4. Bases can be very corrosive, destroying metals and burning skin through chemical action.

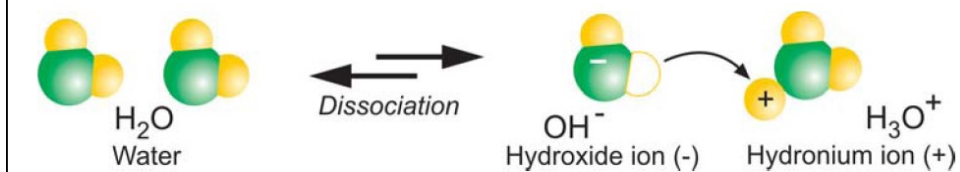
Some Common Bases



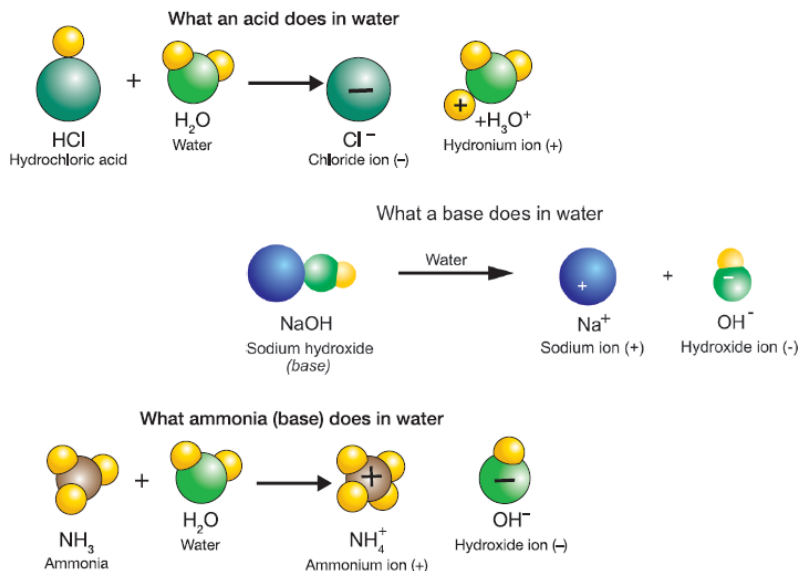


21.3 Acids and bases

- One of the most important properties of water is its ability to act as both a weak acid or as a weak base.
- In the presence of an acid, water acts as a base.
- In the presence of a base, water acts as an acid.



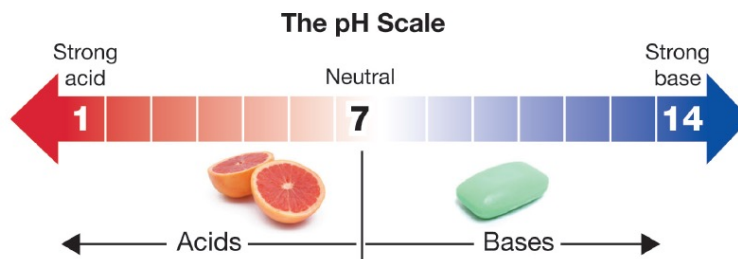
Acids and Bases in Water



21.3 The pH scale

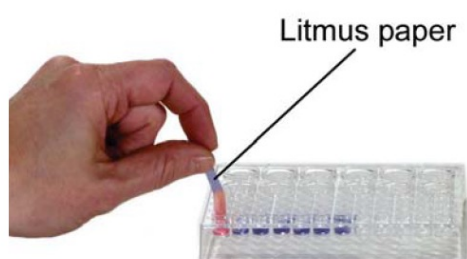
- The *pH scale* ranges from 0 to 14.
 - Acids have a pH less than 7.
 - A base has a pH greater than 7.

Pure water has a pH equal to 7

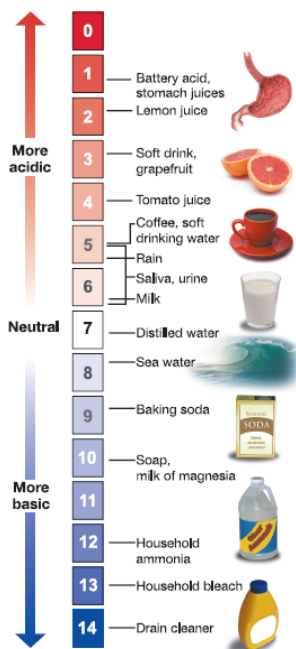


21.3 The pH scale

- Red and blue litmus paper are pH indicators that test for acids or bases.



pH Scale



21.3 pH in the environment

- The pH of soil directly affects the availability of nutrients for plants.

**Blueberries
grow best in
what pH soil?**



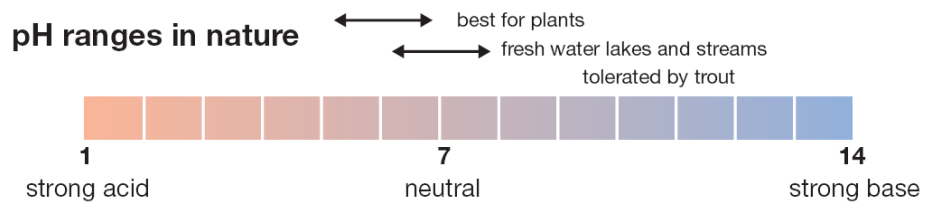
21.3 pH in the environment

- The pH of water directly affects aquatic life.



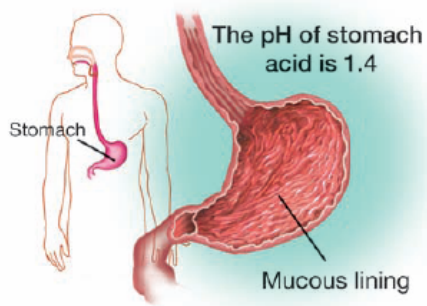
**How are frogs
and amphibians
sensitive to pH
changes?**

pH Ranges in Nature



21.3 Acids and bases in your body

- Many reactions, such as the ones that occur in your body, work best at specific pH values.



21.3 pH and blood



- The pH of your blood is normally within the range of 7.3–7.5.
- Holding your breath causes blood pH to drop.
- High blood pH can be caused by hyperventilating.

21.3 Neutralization reactions

- When acid and base solutions are mixed in the right proportions, the positive ions from the base combine with the negative ions from the acid.
- A new ionic compound forms and water is one of the products.
- This is a neutralization reaction.

Neutralization of HCl by NaHCO_3

