

**Glossary**  
**COSEE-West**

**Workshop: February 2, 2008**

“The CO<sub>2</sub> Shuffle: The Roles of Ocean and Atmosphere in Earth’s Carbon Cycle”  
glossary terms from <http://waterontheweb.org/resources/glossary.html>

**A acid:** A solution that is a proton (H<sup>+</sup>) donor and has a pH less than 7 on a scale of 0-14. The lower the pH the greater the acidity of the solution.

**acidity:** A measure of how acid a solution may be. A solution with a pH of less than 7.0 is considered acidic. Solutions with a pH of less than 4.5 contain mineral acidity (due to strong inorganic acids), while a solution having a pH greater than 8.3 contains no acidity.

**acidification:** The process by which acids are added to a water body, causing a decrease in its buffering capacity (also referred to as *alkalinity* or *acid neutralizing capacity*), and ultimately a significant decrease in pH that may lead to the water body becoming acidic (pH < 7).

**alkalinity:** Acid neutralizing or buffering capacity of water; a measure of the ability of water to resist changes in pH caused by the addition of acids or bases. Therefore, alkalinity is the main indicator of susceptibility to acid rain. In natural waters it is due primarily to the presence of bicarbonates, carbonates and to a much lesser extent occasionally borates, silicates and phosphates. It is expressed in units of milligrams per liter (mg/l) of CaCO<sub>3</sub> (calcium carbonate) or as microequivalents per liter (µeq/l) where 20 µeq/l = 1 mg/l of CaCO<sub>3</sub>. A solution having a pH below about 5 contains no alkalinity.

**B buffer:** A substance which tends to keep pH levels fairly constant when acids or bases are added.

**buffering capacity:** Ability of a solution to resist changes in pH when acids or bases are added.

**C carbon cycle:** The circulation of carbon atoms through the earth's whole ecosystem.

**carbon dioxide:** A gas which is colorless and odorless; when dissolved in water it becomes carbonic acid; CO<sub>2</sub> is assimilated by plants for photosynthesis in the "dark" cycles of photosynthesis.

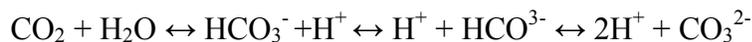
**carbonate ion:** The CO<sub>3</sub><sup>-2</sup> ion in the Carbonate Buffer System; the collective term for the natural inorganic chemical compounds related to carbon dioxide that exists in natural waterways. Combined with one proton, it becomes Bicarbonate, HCO<sub>3</sub><sup>-</sup>, and with two protons, Carbonic Acid.

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**carbonate buffering system:** The most important buffer system in natural surface waters and wastewater treatment, consisting of a carbon dioxide, water, carbonic acid, *Bicarbonate*, and *Carbonate* ion equilibrium that resists changes in the water's pH. If acid (hydrogen ions) is added to this buffer solution, the equilibrium is shifted and carbonate ions combine with the hydrogen ions to form bicarbonate. Subsequently, the bicarbonate then combines with hydrogen ions to form carbonic acid, which can dissociate into carbon dioxide and water. Thus the system pH is unaltered (buffered) even though acid was introduced.



**chemical equilibrium:** Concentrations of reactants and products at which a reaction is in balance; there is no net exchange because the rate of the forward reaction is taking place at the same rate of the reverse reaction.

**G gas solubility:** The ability of a gas to dissolve into another substance.

**K Keeling curve:** A graph of the continuous measurements of atmospheric carbon dioxide concentrations collected on Mauna Loa, Hawaii since 1958 under the supervision of scientist Charles David Keeling. The measurements continue to be taken today...

**O ocean acidification:** The name given to the ongoing decrease of the pH of the Earth’s ocean caused by its uptake of anthropogenic carbon dioxide from the atmosphere.  
[http://en.wikipedia.org/wiki/Ocean\\_acidification](http://en.wikipedia.org/wiki/Ocean_acidification)

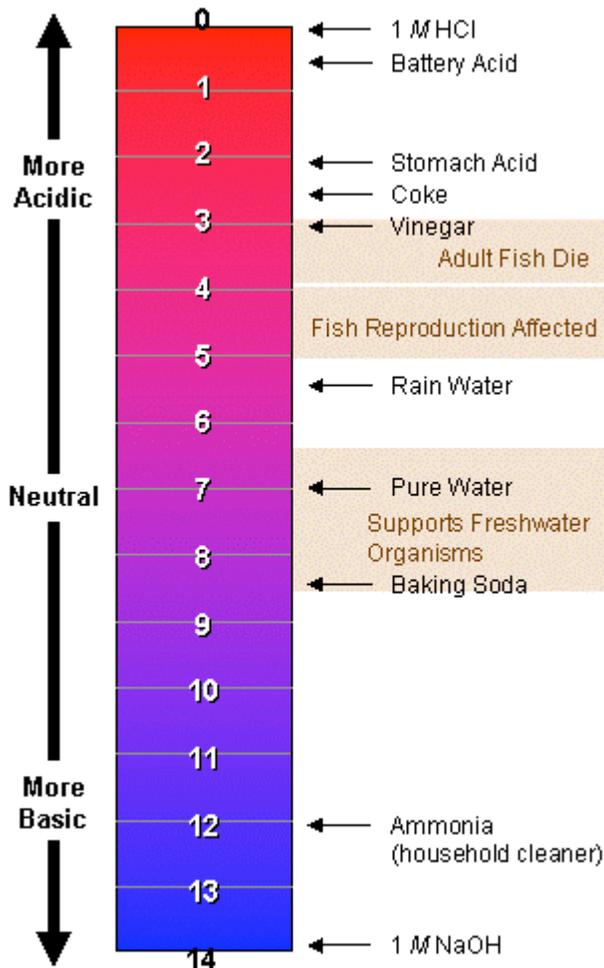
**P pH:** A measure of the concentration of hydrogen ions.

**pH scale:** A scale used to determine the alkaline or acidic nature of a substance. The scale ranges from 0-14 with 0 being the most acidic and 14 the most basic. Pure water is neutral with a pH of 7.

**S salps:** transparent, gelatinous animals in the zooplankton that occur as individuals and in colonies that form chains up to several meters long. Salps consume microscopic marine plants called phytoplankton. In some years, salp swarms may replace krill, which also eat phytoplankton. But while krill provide a rich, critical food source for whales and penguins, salps provide little nutrition.

## What is pH?

pH is a unit of measurement used to express the degree of acidity of a product. The pH scale runs from 0, meaning very acidic, to 14, which is very basic. You can actually taste the difference in many cases. An acid food will taste very sour while a basic (alkaline) food will taste bitter. Here is a pH scale example:



From pH 0-6 is acidic, from pH 8-14 is basic, and pH 7 is neutral, between the two extremes, so it is neither acidic nor basic (alkaline).

The scale is actually referring to the concentration of hydrogen ( $H^+$ ) ions in the product being tested. The more  $H^+$  ions that are present, the more acidic the product will be. The scale is logarithmic, meaning that each pH unit has 10 times more  $H^+$  ions than the one above it.