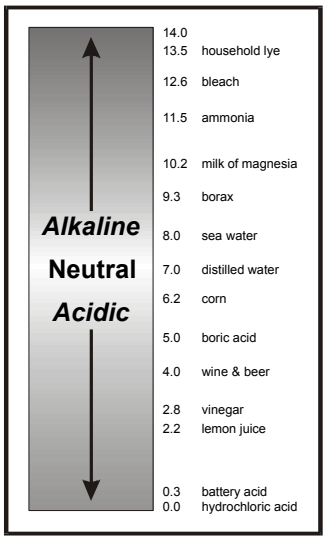
# pH INFORMATION SHEET

pH (hydrogen ion concentration) is a measure of the effective acidity or alkalinity of a solution. The pH scale usually is considered as extending from 0 to 14 with 0 being the most acidic, 7 being neutral and 14 being the most alkaline. It is expressed as the negative logarithm of the hydrogen ion concentration. Pure water has a hydrogen ion concentration equal to $10^{-7}$ moles per liter at standard condition. The negative logarithm of this quantity is 7. Thus, pure water has a pH value of 7. When a strong acid (such as hydrochloric acid) fully dissociates (or ionizes) in water, a solution of this acid will have a pH value of 0.0. Conversely, a base (sodium hydroxide) fully ionized in water will have a pH value of 14.




pH is measured in two basic ways. The colormetric method is a visual identification method where the color of a tested pH paper is checked against a color chart. This method is sufficient where accuracy is not required and manual testing methods suffice. When accuracy is needed in both the laboratory environment and online process control, the electrometric method must be used. Using pH sensors, this method is continuous and easily adapted to automatic control systems. Glass electrodes are now the standard approach to electrometric pH measurements.

pH is adjusted by adding chemical reagent to the monitored liquid in order to neutralize it. If you are measuring an acidic solution, a caustic reagent is used to raise it up to a neutral (7) pH. Many parameters affect the accuracy of a pH control system. These parameters include instrument calibration, sensor condition, sensor placement, pump capacity, liquid retention time in vessel, mixing rate in vessel, and flow rate.

## pH Controllers, Recorders & Sensors

pH controllers and recorders are used in monitoring, controlling and recording pH levels of various industrial and chemical processes. They are sensitive to stray electronic signals in their immediate environment and should be protected from electrical motors and pumps. Care must be taken in maintaining pH controllers, recorders and the sensors that they use.

- Controller Location: Units should be protected from environmental conditions. They should not be subject to moist, humid air or to temperature extremes.
- Controller Wiring: The pH unit must have a "clean" power source not attached to pumps or motors. It must also have a good earth ground. The ground must be checked occasionally to assure it is at "0" mV potential.
- Connection to Other Equipment: When connecting large pumps or valves to pH control relays, be certain to run power through 10 amp relays, not directly to controller.
- Sensor Storage: pH sensors should be kept wet at all times and stored in an upright position. Improper storage or care of the probe may significantly shorten the lifespan.
- Sensor Cable: The pH sensor cable should not be extended longer than 12' unless a preamplifier is used. Do not splice or coil pH sensor cable. Do not run cable near AC power lines.
- Sensor Lifespan: The lifespan of a pH sensor is a function of many variables. As a rule, the higher your application temperature, and the more your pH deviates from neutral (pH 7), the shorter the effective lifespan of your probe. Sensor condition can be checked by reading the millivolt (mV) display in a pH 7 buffer. Ideally the reading should be 000. As your sensor deteriorates, the reading will drift away from 000. If the reading is ± 40mV or larger, the probe should be changed. At this point it has degraded more than the calibration adjustment in the unit can accommodate.