

# WHAT IS PH?

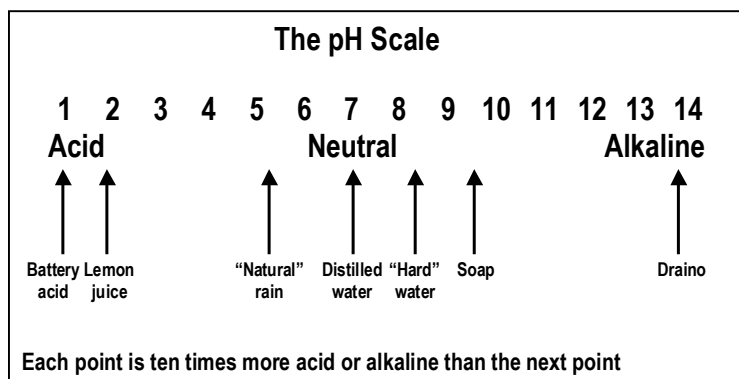
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## Pittsburgh African Violet & Gesneriad Society

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### AUGH! CHEMISTRY!

- pH is an expression of the amount of hydrogen ( $H^+$ ) and hydroxide ( $OH^-$ ) ions are present in a given sample. Ions are particles that hold either a positive or negative charge, and can bond together to form molecules, such as table salt, fertilizer, etc.
- pH is measured in water, because ions are only present when dissociated (dissolved) in water. This is similar to table salt, which is a molecule consisting of sodium and chloride elements ( $NaCl$ ). When solid salt is placed in water and dissolved, these elements dissociate into two ions, a positively charged sodium ion ( $Na^+$ ), and a negatively charged chloride ion ( $Cl^-$ ).
- The more acidic a substance, the more  $H^+$  ions it contains.
- The more basic (alkaline) a substance, the more  $OH^-$  ions it contains.
- A neutral substance contains the same amount of hydrogen and hydroxide ions.
- pH is determined on a 14 point scale, with 7 (middle) being neutral, between 1 – 7 being acidic, and between 7 – 14 being basic.



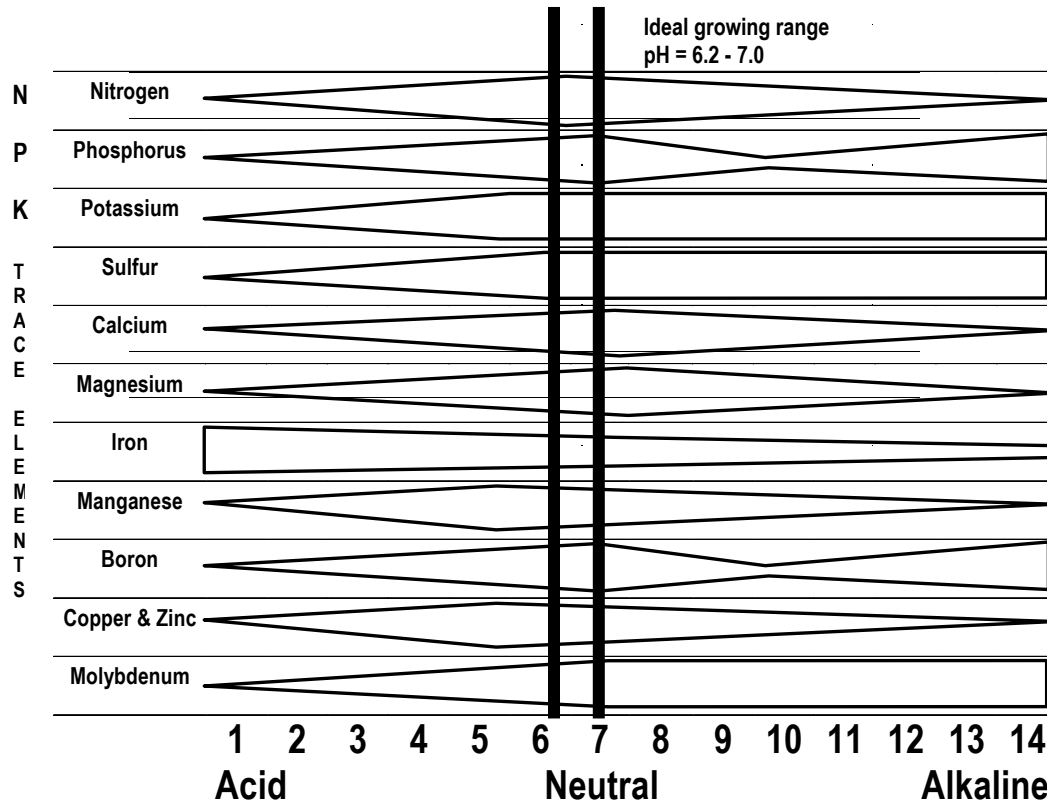
- pH is commonly measured by means of an electrode, which physically measures the amount of hydrogen ions that are present in a liquid sample.
- pH paper and indicating solutions, though not as accurate as the electrode method, are also used to measure pH. These products react with a color change depending on the pH. Litmus paper, made from cabbage juice, is a crude way of determining pH.
- Soil, consisting mostly of peat moss, is made of extremely complex hydrocarbon molecules. Hydrocarbon molecules consist mostly of hydrogen and carbon. As peat moss breaks down, so do these complex molecules, releasing hydrogen ions and lowering pH!
- Some substances with high pH (basic or alkaline):  
Soap, bleach, drain cleaner, detergents, mineral water, urine, lime, chalk
- Some substances with low pH (acidic)  
Vinegar, orange juice, battery acid, natural rainwater, wine, sweat, coffee, cola

### AUGH! MATH!

- Because pH is determined on a logarithmic scale, each point on the scale represents a 10-fold increase in pH.
- For the mathematically minded, pH is determined with the following formula:  $pH = -\log[H^+]$ , or the negative log of the hydrogen ion concentration.

## WHAT DOES THIS MEAN FOR MY PLANTS?

- African violets prefer a slightly acid to neutral pH, anywhere between 6.2 and 7.0.
- Watering with neutral water is best, as adding fertilizer releases some H<sup>+</sup> ions, making the water slightly acidic, in the perfect range for AVs, about 6.5 – 6.7.
- Most nutrients are most available near a neutral pH. A lower or higher pH results in chemical reactions that cause nutrients to be “locked” in unusable forms or become toxic to the plant. Maintaining a near neutral pH assures your plant is getting fed properly. For example, if your pH is too low, nitrate nitrogen (slow release nutrition) gets converted to ammonia nitrogen (quick release nitrogen), which at high concentrations, is harmful to plants. Iron can also be toxic at low pH levels. At too high a pH, calcium reacts with other ions, forming insoluble minerals, making the calcium unavailable to plants.
- Improper pH can also cause fertilizer salt build-up in your soil and on pots. These salts can be the result of insoluble minerals being formed, which collect in unusable form on your pot rims.
- As soil breaks down, hydrogen ions are released, thus decreasing your soil’s pH. A regular repotting schedule, using fresh soil, alleviates this problem.



## CHECKING AND ADJUSTING YOUR pH: SOIL & WATER

- Tap water in the Pittsburgh area is controlled around the neutral point to slightly acid, so adjustment is typically unnecessary. Those with wells or other water sources may want to check their water.
- pH kits for water testing can be purchased in local pet stores in the aquarium department. Most cost under \$5.
- If you are interested in testing soil, garden centers typically sell these kits. Soil testing involves adding distilled water to a soil sample and reading the pH with either a liquid or paper pH indicator. These kits are usually more expensive, and not necessary unless you’re curious!
- Manually adjusting your soil pH after it is beyond ideal is almost impossible, as using water mixed with vinegar or scratching lime into the soil (to increase pH) will result in little change. Best bet = REPOT!
- If you find your water pH needs to be adjusted, aquarium departments often sell products such as “pH up” and “pH down.” With some experimentation and a good pH test, you can determine how many drops of these products need to be added to your watering can for an ideal pH at watering time.
- Remember, test your pH after you add fertilizer, as some of these fertilizer molecules contain hydrogen ions and lower the pH slightly.
- Adding vinegar to the water can also be used to lower pH, although the organic nature of the vinegar quickly allows for algae & mold growth in your watering can.