FURROW PUMP

Newsletter Volume 3

GENERAL pH

In theory, pH control is no big deal. You just balance your process chemistry or throw in some chemical, and your problem goes away. Nice thought. **In reality, pH control has occasionally been known to border on being a black science**. Really competent scientists have written thick textbooks on pH chemistry. Others have written books on process control and the mechanics of equipment systems. That's all great, but what does that do for you toward solving your particular pH problem? Not much. What you need is someone with experience who has some common sense, and who will practically and economically address the peculiarities of your situation. That's what we do. We've done hundreds of pH systems, and have a couple of observations to share. **For one, each and every pH control system is unique. For another, hydraulics are not fair.** The information given here will eventually include pH Equipment, An Example of pH Science, Basic pH System Questions, Choosing a Chemical, Batch pH Treatment, Continuous pH Treatment, and Batch/Continuous pH Treatment. Since this is an ongoing process, I'm sure other topics will come up as well.

pH is a measure of hydrogen ion activity in a solution. That matters because hydrogen is what we use to gauge the acidity or alkalinity of that solution. And that matters because pH is one of the most common measurements used to determine a given water's positive compatibility with life--both for us and the impact of the water we produce upon the world that supports us. A water's pH is an important consideration for water softening, disinfection, corrosion control, chemical coagulation, industrial wastewater treatment, and water treatment in general.

A scientist named Sorensen devised the 0 to 14 pH scale in 1909. While very important, the actual hydrogen ion concentrations are very small and rather hard to work with. For example, a neutral pH of 7 represents 0.0000001 grams of hydrogen ions in a liter of water (10^{-7} grams). The definition of pH is the logarithm of one over the hydrogen ion concentration. Through some mathematical manipulation, Sorensen took the concentration exponent, in this example 7, as his simplified measure of pH. Like the Richter Scale for earthquakes, each whole number is ten times stronger that the one before. The acid range is from 0 to 7 units, with 0 being the most acid, and the alkaline range is from 7 to 14, with 14 the most alkaline. By definition then, a pH of 5 is ten times more acid than a pH of 6, and a pH of 9 is ten times more alkaline that a pH of 8.

Treating domestic water supplies for pH can be pretty straightforward, often requiring little or no equipment. The water source is usually stable, and therefore predictable, so a fixed device like an in-line filter can sometimes provide for small adjustments. Systems requiring a larger pH change might call for a chemical feed pump or pH controller.

Practical and effective pH control for wastewater, however, can get complicated. Industrial wastewater in particular presents some interesting challenges. We almost always deal with pre-existing collection systems and tankage, so we have to adapt the new pH equipment to work in the old environment. Individual plant chemistry, solids loading, chemical buffering capacity, mixing capability, flow variations, retention time, periodic chemical fluctuations--all of these things and more effect the pH of your treated water.

FURROW PUMP

BASIC pH SYSTEM QUESTIONS

To pull together a pH system for you, we'll need to ask some questions to understand what your water is like, how much there is to treat, and the standard you want it treated to. The more we can learn about your water, from its source to its point of discharge, the better we'll be able to do for you. Please try to answer the questions that apply to your application.

1. Your water source:
   - Where does your water come from? (City water supply, ground water, well, other...)
   - What can you tell us about the nature of your water? (Water test, pH, basic character...)

2. What you do with your water:
   - Will you be treating a raw water directly from its source, or will it be a process water or wastewater?
   - If it is a process water, what would you like done with it?
   - If it is a wastewater, what have you put into it? Please give us a description of your wastewater (pH, color, solids, temperature, water test, etc. -- basically, anything you've got.)
   - Are there any special considerations we should be aware of? (Oil, proteins, heavy metals, abrasives, sulfur, cyanide, other...)

3. Your water flow and plumbing:
   - Is your flow constant or intermittent?
   - If you are going to treat a raw water or a process water, what is the line size, the plumbing material, and the water pressure?
   - Do you have a flowmeter that provides an output signal?
   - If you have a wastewater, tell us about your collection system. Is there a place for adequate mixing to occur? Do you have any existing tankage? What about pumps or any other water-handling equipment?
   - Do you have occasional surges, or dumps, of either high or low pH water?

4. Your output water:
   - What is the target pH for your water? If it is a wastewater, what is your effluent "window" for pH discharge?
   - Is your pH treatment system voluntary, or are you under regulatory supervision? If you are being watched, do you need to record your effluent pH? Do you need a "fail-safe" system?

Tell us your whole story. What else do we need to know to do the best possible job for you? The more we know, the better our shot at putting together a successful, economical, and practical pH treatment system right from the start. And we'll stick with you to insure that your system works effectively. Give us a call or send a message.