

August 24, 2010

SOP for Calibrating Hypobromous Acid Systems

Background:

At some locations the chlorine bleach used to activate the HBr (FCN #944) has created some corrosion and odor issues that can be minimized by re-calibrating the blending and delivery system. The purpose of this SOP shall be to instruct personnel how to deliver hypobromous acid without any (or very little) detectable excess chlorine bleach.

Previously, some excess bleach was used in the process to assure all the bromine in the HBr was being utilized, but occasionally the bleach content is excessive due to mixing efficiencies or other variables. The resultant pH of the blended concentrate has typically been in the pH range of about 7.5 (plus or minus). Using this calibration procedure, this value will drop into the 6.9-7.3 range for most facilities.

Terminology: Test kit values:

1. TH = Total chlorine + bromine
2. B = available bromine
3. Chlorine (C) = TH - B

Procedure:

1. The system pH probe must be cleaned and calibrated before this adjustment and must be done on a minimum weekly basis thereafter. A bypass pipe may need to be installed to allow pH calibration during system operation.
2. Using the modified DPD procedure, test the system efficiency several times using the DPD test method to get a reasonable base line for excess chlorine "C".
3. With the HBr system in operation, gradually and incrementally turn down the bleach pump, testing several times to confirm the "C" values between each adjustment.
4. When the "C" value becomes zero and is *confirmed* by several tests (do not use one or two readings), note the pH value on the pH controller. This reading should be between 6.9 and 7.3, depending on each location's quality of source water. This new pH should be confirmed daily over the next several days, which will account for variable process conditions. As part of routine QC checks the pH value should be logged.
5. This observed pH then becomes the new "target" pH for the system. Set the pH 'low' and 'high' alarms about 0.2 pH units above and below the target pH.
6. Note: if the average total bromine value is below 220 ppm then the HBr feed rate should be increased, which will conversely lower the pH value slightly. Therefore, sometimes the only adjustment that may be necessary is to turn up the HBr feed pump. If the HBr feed rate is increased, then return to step #3 above to perform the calibration.

Please be aware that a free chlorine "C" reading of 1-5 ppm may be acceptable from time-to-time, as differences in testing and sampling will create some variances. But, if the "C" reading is consistently apparent and detectable, the primary mixing unit may be in need of adjustment. The above target pH ranges may be variable from plant to plant, so each target pH will have to be established at each location, but most should fall within the ranges given.

The above procedure may result in a very slight loss in bromine (0-2%), but will help in reducing corrosion and odor potentials (previously attributed to excess bleach).