

Calcium Hypochlorite Flow Controller Research

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Calcium Hypochlorite Experiments

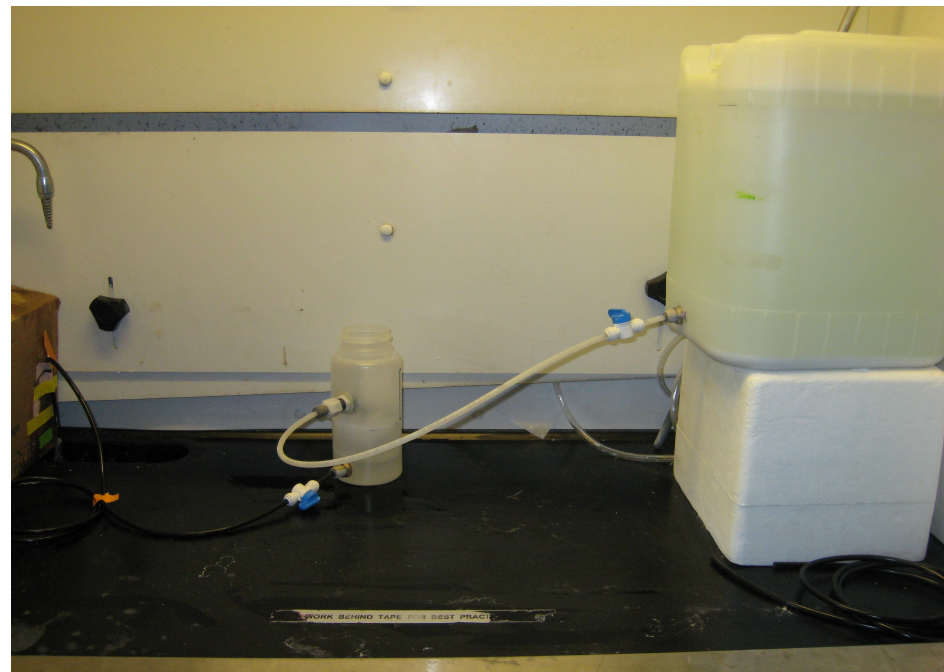
Introduction

In Honduras, a Calcium Hypochlorite solution is used in the Agua Clara flow controllers to chlorinate the drinking water. Unfortunately, due to the precipitation of calcium carbonate, the system clogs, which leads to large decrease in the flow rate (and thus dosing) of the chlorinating solution. The goal of these experiments were to find the contributing factors to failure (significantly decreased flow rate) by modeling a hypochlorinator in use in Honduras.

Procedure

The experimental model is displayed below. The five gallon stock tank consists of a calcium hypochlorite solution at a concentration of 17.435 g/L. After mixing the solution, it was allowed to settle for approximately half an hour. In Honduras, the stock tank consists of a 55 gallon tank that runs for approximately three days. In order to model this, the stock tank was run at 8 hour intervals and refilled when it was depleted, and then run again. The target flow rate used 48.1 mL/min, the same as 55 gallons/ 3 days. Overnight, the flow rate was to be slowed down to approximately a third of the flow rate by decreasing the change in head by a third. It would be evident that the system had reached failure when the flow rate had decreased significantly. Steps would then be taken to determine which portion had failed.

Experimental Set Up



Results

For the first several days of the experiment, the flow rate fluctuated slightly, and no significant drop had occurred. By Thursday, the fifth day of the experiment, we experienced a drastic drop in the flow rate. On Friday, another drastic drop had occurred. A simplified chart of the flow rates, excluding many of the data points, is included below. A full chart of the flow rates is attached to this page.

Simplified Flowrate Chart

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Conclusion

The flow rate had significantly decreased by day 6 of the experiment. By this point, approximately 20 gallons of the solution had run through the system. It was determined that the float valve was what had clogged first, because the head in the constant head tank had been decreasing. Furthermore the flow of solution into the constant head tank had decreased significantly, despite the fact that the tube leading from the stock tank was completely full with water. Because of this finding, we now have a more firm idea of what part of the system is first to fail and would require cleaning earlier than the rest of the system. Finally, it has not yet been determined whether failure is due to the volume of solution flowing through the system, velocity of the solution or simply the amount of time that the solution had spent in the flow controller. An efficient cleaning process has not been properly defined, due to the lack of time to complete the experiment. This will be one of the main focuses for this experiment when it is continued in the Fall.

No labels

