Clay Pot Research

Current Research

Semester Goals:

1. Determine a suitable experimental setup that will log the change in pressure over time in order to calculate flow rate through the clay pot.
2. Determine a range of influent water turbidities the clay pot can remove for <5 NTU
3. Determine if the rate of water flow through the pot decreases with successive experiments or influent turbidities
4. Determine if the treatment of a lower influent turbidity water is compromised because a higher influent turbidity water was treated before

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Experimental Setup

The clay pot is placed inside a larger bucket (approximate volume=12L), so that the pot rim is positioned perfectly on the rim of the bucket. The large bucket has a hole at the bottom and a tube is connected to a pressure sensor. The tube has a closed valve at the end to make sure no water empties through the tube until the user manually changes the valve position. One liter of water is poured into the large bucket as a starting water level (or zero pressure) before any experiment. In Process Controller, the sensor should be zeroed at the start of the experiment. At the start of the experiment, the Process Controller state should be changed to Data Collection, where data is collected every second. We will use 7 L as the limit of the clay pot volume, so each experiment should use 7 L of influent solution.

The pressure sensor will record the change in pressure (or water height) in the large bucket over time. This data will be used to calculate the flow rate of water through the clay pot using MathCAD data collection and analysis tools.

Experiment

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Determine the clay pots initial flow rate (background flow rate) with clean water
1. In Process Controller, use a new "Current Folder" for the collected data to be saved to with the day's date. Save the Process Controller method under a different experiment name if anything in the program is changed.
2. Empty the large bucket with any excess water.
3. Pour 1 L of water into the large bucket as a background level.
4. In Process Controller, zero the pressure sensor in the "Volts" section.
5. Pour 7 L of tap water into the clay pot and place the white lid over the pot to reduce contamination.
6. After the pot is emptied, analyze the pressure data.

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Determine if the Manufacturer's cleaning directions are accurate
1. Mix a clay solution of 100 NTU
2. Allow the solution to run through the pot
3. Repeat steps 1-2 several times to build a nice coating of clay on the inside
4. Clean the pot according to the directions provided by the manufacturer
5. Allow a ithaca tap water solution to run through the pot
6. Measure the effluent turbidity at 15 minute increments for one hour.

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Determine the range of influent water turbidities the clay pot can remove

1. Mix a clay solution of 10 NTU
2. Allow the solution to run through the pot
3. Measure the volume of water that seeps out in the first 15 minutes, 30 minutes, 1 hour, and hour increments until the pot is empty
4. Measure the Turbidity of the effluent water at each of these time intervals
5. Clean the pot according to the directions provided by the manufacturer
6. Repeate 1-5 for influent turbidities of 25 NTU, 50 NTU, 75 NTU, 100 NTU, 125 NTU

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Changes in Flow Rate

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Flow rate or Effluent Turbidity changes over time due to continuous use of high turbidity

1. Mix a clay solution of 100 NTU
2. Allow the solution to run through the pot
3. Measure the volume of the water that seeps out in the first 15 minutes, 30 minutes, 1 hour, and hour increments until the pot is empty
4. Measure the turbidity of the effluent water at the same time intervals as step 3
5. Repeat steps 1-4 several times

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