

Turbulent Tube and Fluidized Bed Flocculator

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By February 7

- Fixing Lab-Scale Flocculator:
 - Use zip ties to minimize unintended bends in the tubing between constrictions
 - Unclamp the constrictions of the flocculator, fill it up with water, and reclamp the restrictions to attempt to minimize the air bubbles.
 - Test gyroscope method, using a tripod or an exercise semisphere to swing around flocculator to eliminate air bubbles.
 - Vacuum seal the ends of the tubing and then fill it with water to potentially eliminate air bubbles.

By February 14

- Process Controller:
 - Set up and calibrate solenoid valves and turbidimeters
 - Program the system so it can work autonomously and collect organized data
 - Test each component of the flocculator system to insure that all of the components are in order.

By February 21

- Rapid mix and coagulant stock:
 - Set up coagulant stock system with mixer and dosing.
 - Determine how to best connect needle to coagulant stock source and connect it to the coagulant pump.

By February 28:

- Construct SWaT:

- Incorporate a tube settler so that different sizes of floc can be analyzed to test floc breakup theory.
- Set up turbidimeter to test effluent turbidity at the end of the flocculator
- Air tee at the top of the flocculator
- Set up flow measurement system, potentially using pressure sensors
- Run Experiments with Turbulent Flocculator
 - After process controller, coagulant stock, clay stock, the turbidimeters and pumps are set up talk to floc imaging team to see if it can be incorporated into our system.
 - Run experiments to test measure effluent turbidity.
 - Graph pC*.
 - Assess effect of air bubbles by measuring effluent turbidity of different amount of air within the flocculator.

By March 15:

- Design Fluidized Bed Flocculator:
 - Design and determine necessary materials through discussing with the laminar tube flocculator team
 - Discuss the best grain size with Fall 2013's sand sourcing team. The sand could be 500 μm in diameter or smaller.
 - Influent turbidity is 100 NTU and the coagulant dose is 5 mg/L PACl.

By April 18:

- Construct Fluidized Bed Flocculator
 - Use a 1 inch diameter PVC column with 1 m of sand fluidized to 1.3 m with an upflow velocity of 11 mm/s.
 - Determine parameters like the energy dissipation rate (energy loss through the fluidized bed divided by residence time).

By May 2:

- Test Fluidized Bed Flocculator
 - Compare the flocculation effect of the fluidized bed with a control with the same residence time but without any sand to see if the sand has a significant impact on the aggregation process.
 - Perhaps run experiments using a tube flocculator with the same head loss and the same residence time to determine whether the sand is beneficial.