Anaerobic Batch Reactor Testing of PHS A Peat Humic Substance

By: Robert R. Sharp III, Ph.D., P.E.

Chair of Environmental Engineering, Department of Civil and Environmental Engineering

Introduction

A study was done with PHS a Peat Humic Substance in four separate batch reactors with each reactor having different levels of PHS added to the systems. After the first five weeks of the study we found that at the higher dosages of PHS chosen by the college had a positive the impact on the reactors: R-1 Control: No PHS, R-2: 1 mg/l, R-3 2mg/l, R-4: 3mh/l. In discussion with JSH International it was discovered the impact on the reactors by PHS would increase at a lower dosage rate. In order to evaluate the results at lower dosage it was decided to change the dosage in reactors R-3 and R-4 to 0.5 mg/l and 0.25 mg/l and leaving R-1 and R-2 at the original dosage.

Operations

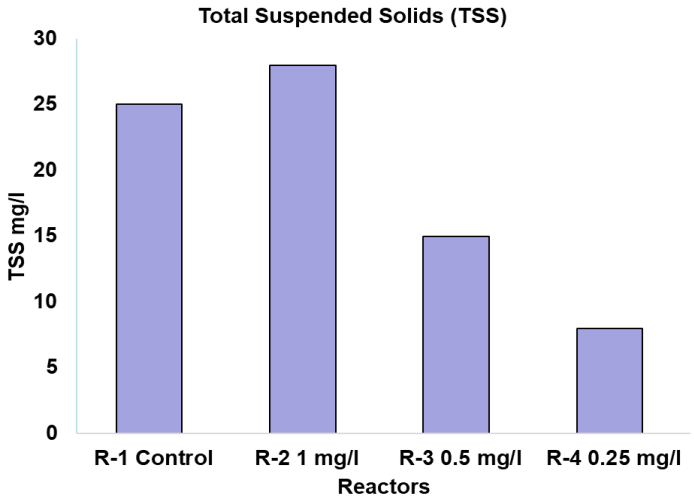
After 4 to 5 weeks of operation all four systems were running consistently in parallel and achieving a relatively high degree of treatment with effluent BOD averaging 12-4 mg/l and TSS averaging 35-20mg/l. Once the reactors achieved a steady state performance PHS was then added to each reactor at the high dosage rate. Data collected indicates the higher dosages of PHS had a positive impact on the reactors.

Findings

In the next following five weeks with the lower dosage rates in reactors R-3 & R-4 demonstrated PHS had an even greater impact on the reactors sludge settling, metals adsorption and BOD removal.

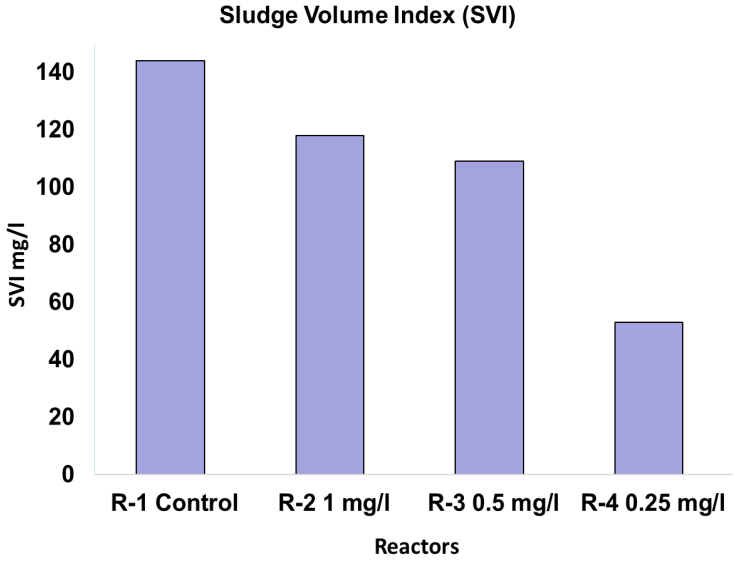
Effluent TSS

Effluent TSS data does not show any significant difference between the control and R-1. Data from R3 and R4 indicate that a lower dose of PHS will positively impact the settleability of the sludge, and support dosages greater then 1 mg/l are too high.



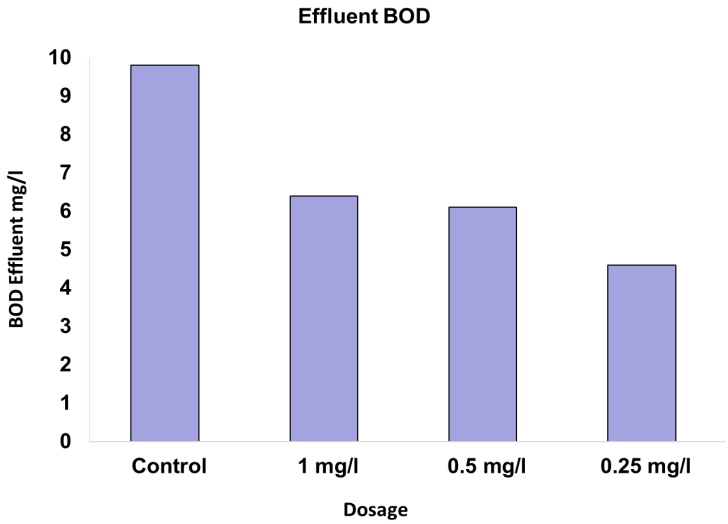
Sludge Volume Index (SVI)

The SVI has been one performance parameter that has consistently shown a positive impact by PHS. Results suggest that any dose of PHS 1 mg/l or less will enhance settling. The results on R3 and R4 support the effluent results that the ideal PHS dose is less than 1 mg/l.



Effluent BOD

PHS does enhance BOD removal and the results indicate the degree at which PHS enhances BOD removal. These low effluent concentrations show that the addition of PHS can reduce effluent BOD by 33% when PHS is applied at low dosage rates.



Conclusion

The most positive response we have seen throughout this study was the increase and consistency in sludge settleability which indicates that PHS increases coagulation which is a primary function of the Sludge Volume Index readings. In addition PHS has demonstrated the ability to improve the removal of BOD, TSS, and metals adsorption all important factors in wastewater treatment.