

Process Control in Wastewater Treatment Plants



Introduction

The modern world will always need wastewater treatment plants, and these plants will always need a way to improve process control. Process control can relate to proper viscosity for pumping, effluent testing, or digestion efficiency in tanks. But the ability to monitor and control polymer costs in cake solids is one of the most cost effective tests that any plant could perform, savings thousands of dollars a year with a more accurate solids test.

CEM has spent the last 40 years developing process control equipment that has proven to not only reduce analysis time, but to do so while maintaining the accuracy and precision typically found with industry standard methods. This combination allows users of the SMART 6™ and Phoenix™ technologies to see ROI's in less than a year in many cases. The newly introduced SMART 6 can provide solids and TSS results in just 2-3 minutes. The Phoenix Muffle Furnace can quickly provide an ash result in under 30 minutes, as compared to the standard 8 hour test, allowing users to optimize feed rates for incinerators. Each system allows the user to greatly reduce analysis time, while maintaining confidence that the results are accurate and reliable.

Key Benefits

- Easy-to-use, rugged, and durable systems
- Reduce solids analysis and combustion times
- No fume hood space required
- Complete systems for weighing, analyzing, and collecting data
- Menu-driven software for simple entry and storage of operating parameters

SMART 6

The SMART 6 is the newest system from CEM Corporation. Improving upon the SMART Turbo, which is used in treatment facilities around the world, the SMART 6 uses the proprietary new iPower® technology to heat samples faster and more accurately. The compact SMART 6 provides accurate solids analysis in under 3 minutes. This versatile and easy-to-use system can measure effluent solids as low as 500 ppm and sludge up to 60% solids. Having the ability to rapidly determine the cake solids during dewatering, enables quick equipment adjustments to reduce polymer costs. For example, if the lowest polymer cost per dry ton of solids is achieved at a target value of 20% solids, operators can perform hourly solids tests and reduce the polymer feed every time the cake is greater than 20%. Even a modest 10% reduction in polymer use could save thousands of dollars per year.

Phoenix Muffle Furnace

The Phoenix Microwave Muffle Furnace is an innovative heating technique for rapidly determining volatile solids in the waste treatment plant. What previously took operators hours can now be accomplished in minutes with this 1200°C ASTM conforming muffle furnace. The Phoenix performs many high temperature applications, up to 10 times faster than traditional methods. Most volatile solids analyses can be performed in 10-15 minutes, versus hours using standard methods. Volatile solids analysis can provide the information needed to optimize operation of the wastewater facility. Having test results within minutes transforms the exercise from mundane record keeping to active process control.

A rapid microwave method can also determine the ash content of waste samples in 1 hour. This rapid testing method allows waste characterization information to be utilized for optimal waste feed rates. Adjustments can be made to the waste feed rates to reduce fuel consumption costs and control variances in emission levels.

Conclusion

The SMART 6, in conjunction with the Phoenix, can be used for volatile solids/suspended solids analysis. With results in less than 20 minutes, these easy-to-operate systems are ideal for any user. Menu driven software allows for the easy selection of methods and data storage so results aren't lost. Both rugged and durable, these systems aid in reducing combustion time, optimizing polymer usage, improving accuracy of blending in composting and chemical stabilization, and maintaining high solids to reduce incineration and transportation costs.

WWTP Solids and Ash Data

% Solids in Wastewater Samples				
Sample	Sludge	Sludge Cake	Press Cake	Liquid Thickener
1 (% solids)	4.58	14.42	19.29	2.25
2 (% solids)	4.56	14.87	19.66	2.25
3 (% solids)	4.57	14.46	19.67	2.21
4 (% solids)	4.57	15.03	19.64	2.26
5 (% solids)	N/A	14.54	19.68	2.25
Average	4.57	14.66	19.59	2.24
Specification or Optimal Result	4.00 - 5.00	14.32	20.00	2.25

% Ash in Incinerator Feed				
Sample	Initial Weight (g)	Final Weight (g)	% Ash	Run Time (min)
1	14.2584	0.0059	0.041	60
2	13.7465	0.0061	0.044	60
3	14.505	0.0058	0.040	60
4	13.5341	0.59	0.044	60
		Average	0.042	
		Reference	0.0403	

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