

# Rapid Analysis throughout the Wastewater Treatment Process



## Summary

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, saving thousands of dollars a year with a more accurate solids test.

## Introduction

CEM has spent the last 40 years developing process control equipment that has proven to not only reduce analysis time, but do so, while maintaining the accuracy and precision associated with industry standard methods. This combination allows users of the SMART 6™ and Phoenix BLACK™ technologies to see ROI's in less than a year in many cases. The SMART 6 can provide solids and TSS results in just 2-3 minutes. The Phoenix BLACK 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.

## Technology

### SMART 6

The SMART 6™ is used in treatment facilities around the world, using proprietary technology to rapidly heat and analyze samples faster than any other loss-on-drying method available. The compact SMART 6 provides accurate solids analysis in under three minutes. This versatile and easy-to-use system can measure effluent solids from as low as 500 ppm to sludge with over 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 BLACK

The Phoenix BLACK™ Muffle Furnace uses innovative heating technology 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 BLACK can also perform 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.

## Experimental

To demonstrate the performance of the SMART 6, a variety of in-process samples were analyzed. **Table 1** demonstrates the repeatability of Phoenix BLACK, which is comparable to industry standards. **Table 2** highlights the time savings of Phoenix BLACK, which is capable of accurately measuring ash content in incinerator feed in only 60 minutes. Traditional muffle furnaces require 8 hours to complete the same analysis.

**Table 1:** SMART 6 Analysis of In-Process Waste Samples for Total Solids

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

**Table 2:** Phoenix BLACK Analysis of 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	

## Conclusion

The SMART 6, in conjunction with the Phoenix BLACK, can be used for volatile solids/suspended solids analysis. With results in minutes, these easy-to-operate systems are ideal for any user. Menu-driven software allows for the easy selection of methods and data management, 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.

### United States (Headquarters)

800-726-3331  
704-821-7015  
info@cem.com

### France

33 (01) 69 35 57 80  
info.fr@cem.com

### Germany, Austria, Switzerland

(49) 2842-9644-0  
info@cem.de

### Ireland

+353 (0) 1 885 1752  
info.ireland@cem.com

### Italy

(39) 35-896224  
info.srl@cem.com

### Japan

+81-3-5793-8542  
info@cemjapan.co.jp

### United Kingdom

(44) 1280-822873  
info.uk@cem.com

### [www.cem.com](http://www.cem.com)

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