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CLEANER CONCENTRATION USING FOAM HEIGHT

with MICRO-90[®], MICRO[®] GREEN CLEAN, SURFACE-CLEANSE/930[®],
MICRO[®] A07, and ZYMIT[®] PRO

Linda Wolfe
lwolfe@ipcol.com
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SUMMARY

The foam level is proportional to the concentration of the cleaner.

The concentration of each cleaner (Micro-90, Micro Green Clean, Micro A07, Surface-Cleanse/930, and Zymit Pro) may be estimated by entering the cleaner's foam height into the equations for either the blender method or the graduated cylinder method.

The equations in this report should be used as a guideline only. It is recommended that customers follow the procedures used in this report to create their own calibration curve. Many variables may be different for the customer, such as water hardness, water temperature, soil matrix and soil load.

PURPOSE

To develop a method to estimate the concentration of Micro-90, Micro Green Clean, Micro A07, Surface-Cleanse/930, or Zymit Pro by the volume of foam produced upon agitation.

INTRODUCTION

Micro-90, Micro Green Clean, Micro A07, Surface-Cleanse/930, and Zymit Pro were tested using two methods of creating foam. Each cleaner was tested at 2%, 1%, 0.5%, 0.1%, 0.01%, and 0.001% (w/w) concentrations in distilled water.

Using the blender method, the cleaner solution is pureed for 1 minute and then poured into a graduated cylinder. The graduated cylinder method involves vigorously shaking the cylinder 10 times to create foam. For both methods, the initial volume of foam was recorded and a scatter plot created. The cleaner's concentration is estimated using the pertinent best fit line equation.

Customers may use this method as a guideline to change or replenish their cleaning tanks based on the calculated concentration. It is recommended that the customer repeat this method to create a calibration curve that is better suited for the customer's work environment.



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EXPERIMENTAL

1. Materials and reagents

- a. Micro-90 lot #150415
- b. Micro Green Clean lot #130326
- c. Micro A07 lot #30205
- d. Surface-Cleanse/930 lot #140303
- e. Zymit Pro
- f. Distilled water
- g. Graduated cylinders, 1000-mL & 500-mL.
- h. Blender (Oster, 12 speed)

SET-UP

a. Graduated Cylinder test:

Micro-90, Micro Green Clean, Micro A07, Surface-Cleanse/930, and Zymit Pro were diluted to 2%, 1%, 0.5%, 0.1%, 0.01%, and 0.001% for a final volume of 100mL in a 500mL graduated cylinder. The graduated cylinder was shaken vigorously 10 times to create foam at room temperature. The total volume was taken immediately after shaking the graduated cylinder.

b. Blender test:

Micro-90, Micro Green Clean, Micro A07, Surface-Cleanse/930, and Zymit Pro were diluted to 2%, 1%, 0.5%, 0.1%, 0.01%, and 0.001% for a final volume of 250mL. The blender was set to puree for 1 minute at room temperature. After 1 minute of pureeing, the cleaning solution was poured from the blender into a 500mL graduated cylinder; if more than 500mL foam was created, a 1000mL graduated cylinder was used instead. The volume was taken immediately after blending.



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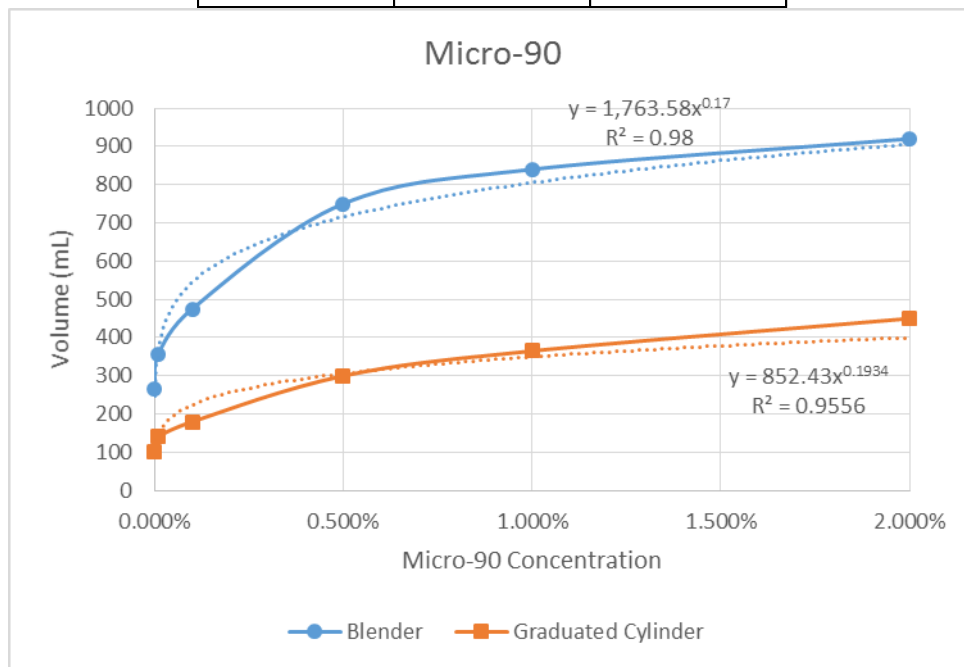
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RESULTS & DISCUSSION

1. Micro-90

Micro-90		
	Blender	Graduated Cylinder
Concentration	Volume (mL)	
0.001%	265	102
0.010%	355	140
0.100%	475	180
0.50%	750	300
1%	840	365
2.000%	920	450



- a. The concentration of Micro-90 can be found using the following equations, where x equals the concentration, and y equals volume of foam in mL:

i. Using the blender method:
$$x = \left(\frac{y}{1763.58} \right)^{\left(\frac{1}{0.17} \right)}$$

ii. Using the graduated cylinder method:
$$x = \left(\frac{y}{852.43} \right)^{\left(\frac{1}{0.1934} \right)}$$

- iii. Multiply x by 100 for percent concentration.



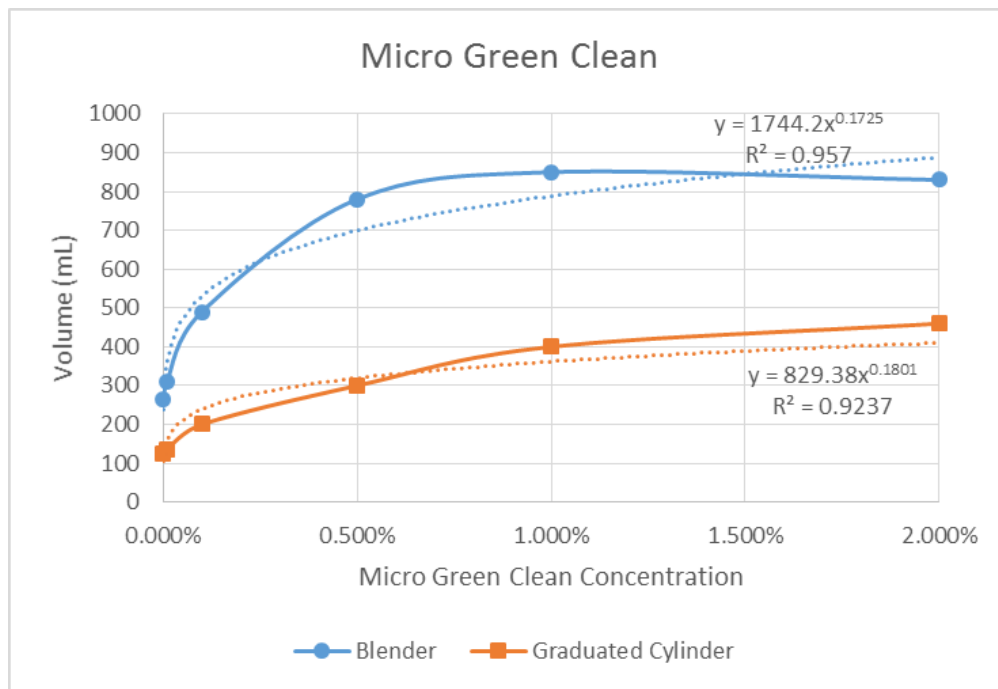
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2. Micro Green Clean

Micro Green Clean		
	Blender	Graduated Cylinder
Concentration	Volume (mL)	
0.001%	265	125
0.010%	310	135
0.100%	490	200
0.50%	780	300
1%	850	400
2.000%	830	460



- a. The concentration of Micro Green Clean can be found using the following equations, where x equals the concentration, and y equals volume of foam in mL:

i. Using the blender method: $x = \left(\frac{y}{1744.2} \right)^{\left(\frac{1}{0.1725} \right)}$

ii. Using the graduated cylinder method: $x = \left(\frac{y}{829.38} \right)^{\left(\frac{1}{0.1801} \right)}$

- iii. Multiply x by 100 for percent concentration.

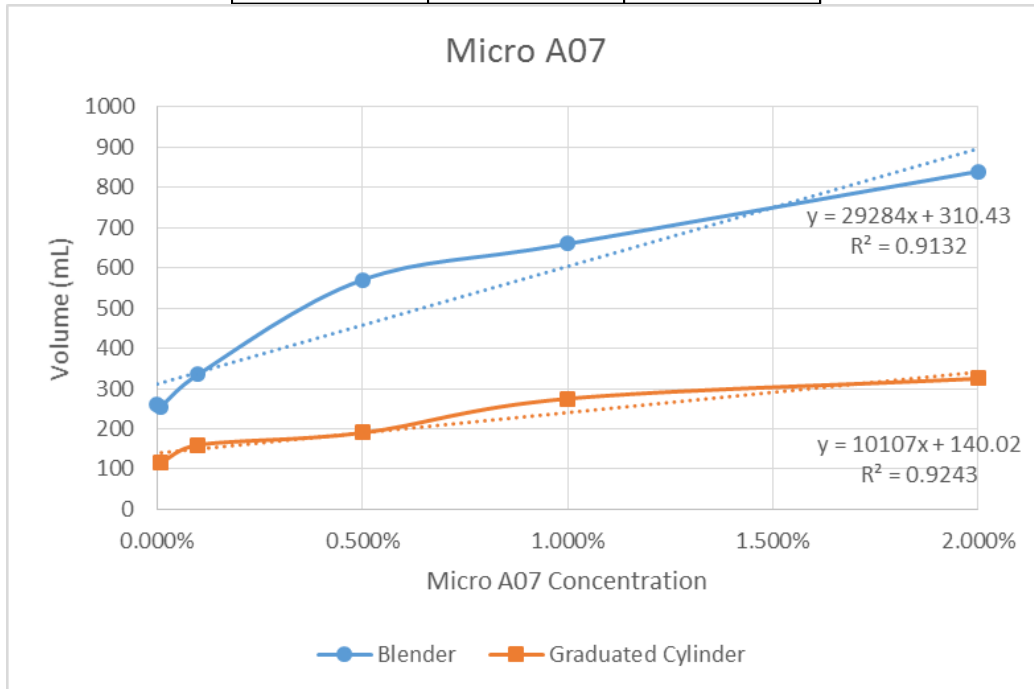


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3. Micro A07 609-386-8770 | Fax: 609-386-8438 | www.ipcol.com

Micro A07		
	Blender	Graduated Cylinder
Concentration	Volume (mL)	
0.001%	260	
0.010%	255	115
0.100%	335	160
0.50%	570	190
1%	660	275
2.000%	840	325



- a. The concentration of Micro A07 can be found using the following equations, where x equals the concentration, and y equals volume of foam in mL:

i. Using the blender method: $x = \frac{(y - 310.43)}{29284}$

ii. Using the graduated cylinder method: $x = \frac{(y - 140.02)}{10107}$

- iii. Multiply x by 100 for percent concentration.



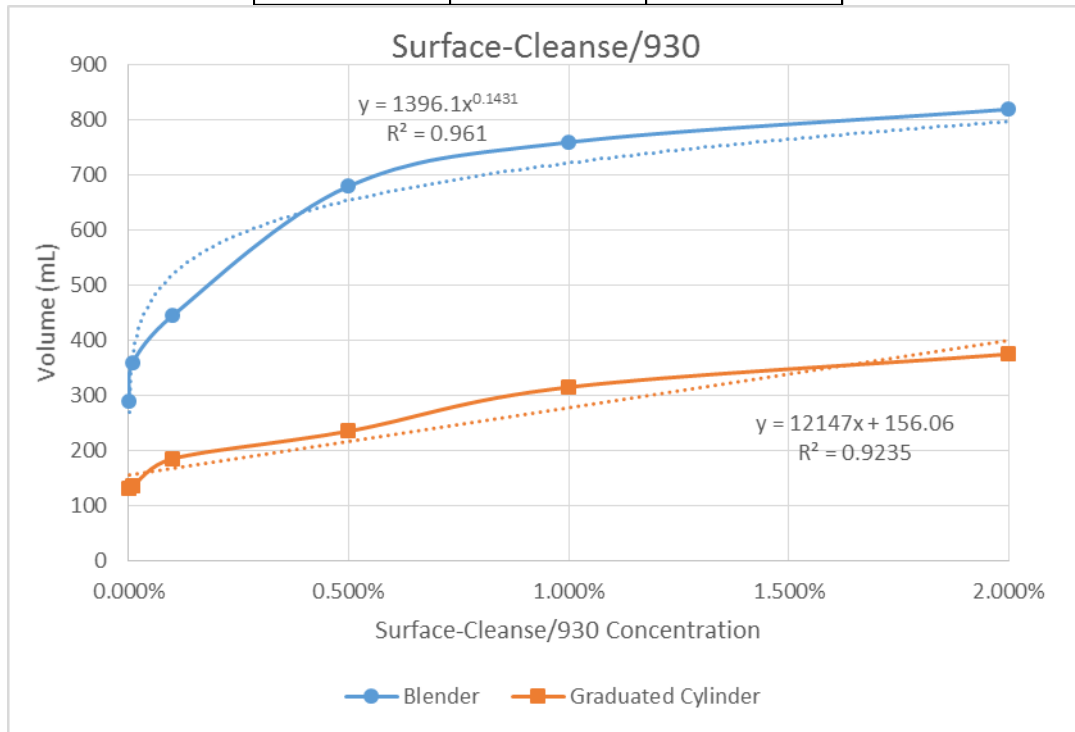
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4. Surface-Cleanse/930

Surface-Cleanse/930		
	Blender	Graduated Cylinder
Concentration	Volume (mL)	
0.001%	290	130
0.010%	360	135
0.100%	445	185
0.50%	680	235
1%	760	315
2.000%	820	375



- a. The concentration of Surface-Cleanse/930 can be found using the following equations, where x equals the concentration, and y equals volume of foam in mL:

i. Using the blender method:
$$x = \left(\frac{y}{1396.1} \right)^{\left(\frac{1}{0.1431} \right)}$$

ii. Using the graduated cylinder method:
$$x = \frac{(y - 156.06)}{12147}$$

- iii. Multiply x by 100 for percent concentration.



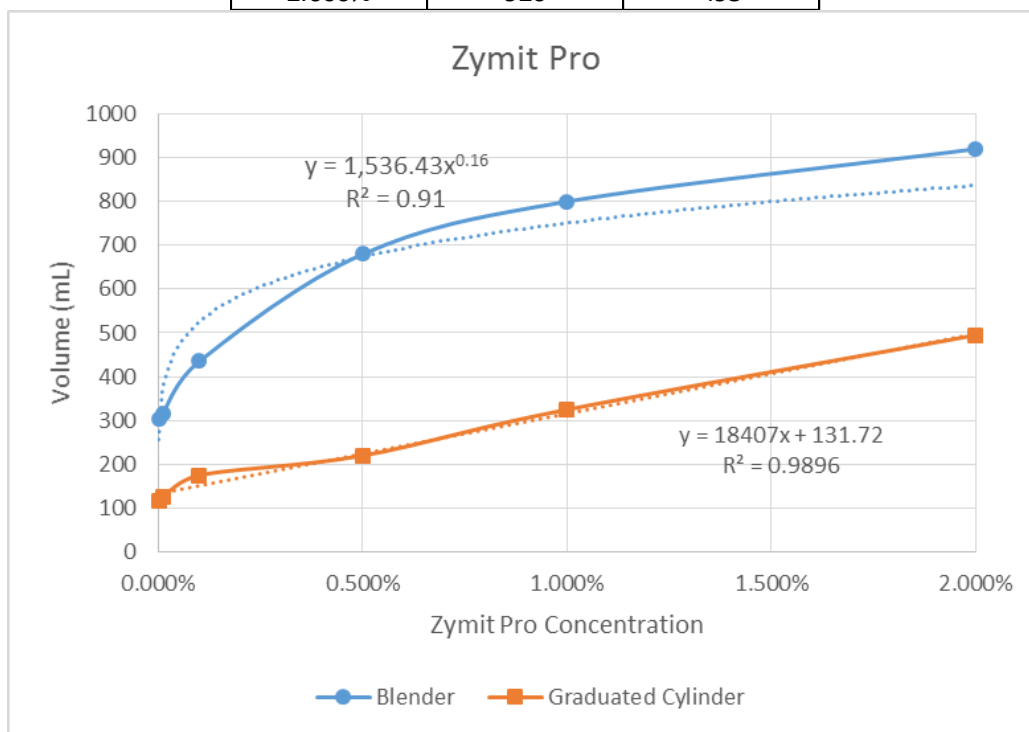
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5. Zymit Pro

Zymit Pro		
	Blender	Graduated Cylinder
Concentration	Volume (mL)	
0.001%	305	115
0.010%	315	125
0.100%	435	175
0.50%	680	220
1%	800	325
2.000%	920	495



- a. The concentration of Zymit Pro can be found using the following equations, where x equals the concentration, and y equals volume of foam in mL:

- i. Using the blender method: $x = \left(\frac{y}{1536.43} \right)^{\left(\frac{1}{0.16} \right)}$
- ii. Using the graduated cylinder method: $x = \frac{(y - 131.72)}{18407}$
- iii. Multiply x by 100 for percent concentration.