

Technical Bulletin

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3M[™] Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer: Bacterial recovery after 96-hour refrigerated storage

3M[™] Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer can be used to effectively collect environmental microbial samples in the presence of commonly used sanitizers in the food and beverage industry.

Objective

Demonstrate that 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer can maintain organism viability for up to 96 hours when held at 2–8°C.

Experimental Design

Samples of 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer were inoculated separately with the organisms listed in Table 1. Qualitative and quantitative testing was performed on each sample immediately after inoculation and then after storage at 2–8°C for 96 hours to assess organism viability.

Two sets (n = 3) of 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer samples were inoculated separately with approximately 500 Colony Forming Units per mL (CFU/mL) of each of the organisms listed in Table 1. A control set (n = 3) consisting of 10 mL of sterile DI water in 50 mL sterile tubes was also separately inoculated with each organism and processed following the same experimental conditions.

Each inoculated sample was tested for qualitative and quantitative recovery at time 0 and after storage at 2–8°C for 96 hours. Quantitative recovery was measured by plating 1 mL in duplicate on 3M[™] Petrifilm[™] Rapid Aerobic Count Plates. For qualitative analysis, the samples were enriched following the schemes described in Table 2 and tested with both chromogenic agar and the 3M[™] Molecular Detection Assay 2 appropriate for each organism. 10 µL from each enrichment was streaked onto the respective chromogenic agar; 20 µL of the same enrichment was used for detection using the respective 3M Molecular Detection Assay 2 following the manufacturer's instructions for use.

Table 1. Test organisms used for the study

Experimental conditions: 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer, DI Water

Organism	# Samples per Condition	Storage Time (hours) @ 2–8°C
Escherichia coli ATCC 43888	3	0,96
Salmonella enterica subsp. enterica, ser. Infantis ATCC 51741	3	0,96
Listeria monocytogenes ATCC 7644	3	0,96
Cronobacter sakazakii FSD 2193-03	3	0,96

ATCC®: American Type Culture Collection. Manassas, VA.

FSD: 3M Food Safety Department culture collection. St. Paul, MN.

Table 2. Enrichment and chromogenic agar conditions

Strain	Enrichment Media	Enrichment Incubation Temperature*	Chromogenic Agar	Agar Incubation Temperature*
E. coli	BPW-ISO	41.5°C ± 2°C	EZ-CHROM <i>E. coli</i> O157	37°C ± 2°C
S. enterica sv Infantis	BPW-ISO	41.5°C ± 2°C	EZ-CHROM Salmonella Plus	37°C ± 2°C
L. monocytogenes	Demi-Fraser + FAC	37°C ± 2°C	EZ-CHROM Listeria	37°C ± 2°C
C. sakazakii	BPW-ISO	41.5°C ± 2°C	Cronobacter spp. ChromoSelect Agar	41.5°C ± 2°C

*Enrichment and agar incubation time: 24 ± 2 Hours.

EZ-CHROM: Microbiology International. Frederick, MD.

 $ChromoSelect\ Agar:\ MilliporeSigma.\ St.\ Louis,\ MO.$

Results

Tables 3–6 summarize the results for qualitative detection with 3M Molecular Detection Assay 2 kits and chromogenic agar, quantitative enumeration with 3M Petrifilm Rapid Aerobic Count Plates and a one-way ANOVA analysis of quantitative recovery at Time 0 vs. 96-hour with storage at 2–8°C.

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			3M Environment with 10 mL W Neut	3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer		Vater
	Replicate	Spike Level (CFU/mL)	0 hours	96 hours	0 hours	96 hours
	1	114	+	+	+	+
E. coli	2	114	+	+	+	+
	3	114	+	+	+	+
<i>S. enterica sv</i>	1	249	+	+	+	+
	2	249	+	+	+	+
	3	249	+	+	+	+
L. monocytogenes	1	66	+	+	+	+
	2	66	+	+	+	-
	3	66	+	+	+	-
C. sakazakii	1	195	+	+	+	+
	2	195	+	+	+	+
	3	195	+	+	+	+

Table 3. Qualitative detection — 3M Molecular Detection Assay 2

 Table 4. Qualitative detection — Chromogenic agar

			3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer		DI Water	
	Replicate	Spike Level (CFU/mL)	0 hours	96 hours	0 hours	96 hours
	1	114	+	+	+	+
E. coli	2	114	+	+	+	+
	3	114	+	+	+	+
<i>S. enterica</i> sv Infantis	1	249	+	+	+	+
	2	249	+	+	+	+
	3	249	+	+	+	+
L. monocytogenes	1	66	+	+	+	+
	2	66	+	+	+	-
	3	66	+	+	+	-
C. sakazakii	1	195	+	+	+	+
	2	195	+	+	+	+
	3	195	+	+	+	+

		3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer		DI Water		
	Replicate	0 hours (Log CFU/mL)	96 hours (Log CFU/mL)	0 hours (Log CFU/mL)	96 hours (Log CFU/mL)	
	1	1.74	1.95	2.00	0.00	
E. coli	2	1.94	1.80	1.99	0.00	
	3	2.02	1.88	2.03	-0.30	
	1	2.20	2.03	2.35	0.00	
<i>S. enterica sv</i> Infantis	2	2.10	1.91	2.29	0.00	
	3	1.92	2.18	2.32	-0.30	
L. monocytogenes	1	1.92	1.72	0.74	-0.30	
	2	1.89	1.86	0.81	0.00	
	3	2.08	1.71	0.54	0.00	
C. sakazakii	1	1.61	1.81	2.21	-0.30	
	2	1.86	1.74	2.14	0.18	
	3	2.01	1.96	2.14	0.00	

Table 5. Quantitative Enumeration — 3M Petrifilm Rapid Aerobic Count Plates

Table 6. One-way ANOVA: Quantitative Recovery, Time 0 vs. 96-hour with storage at 2-8°C

		3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer		DI Water	
	n	Mean Std Dev		Mean	Std Dev
Time 0	12	1.941	0.160	1.797	0.676
96 hours	12	1.879	0.138	-0.085	0.167
P-Value		0.324		0.	00

In summary, the results showed that:

- Qualitative recovery after storage for 96 hours with 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer at 2–8°C was comparable to that at Time 0 (Table 3, Table 4)
- Quantitative recovery showed no statistical difference between Time 0 and 96 hours (P Value: 0.324) with the 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer (Table 5, Table 6)

Conclusions

3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer can maintain organism viability for up to 96 hours when held at 2–8°C. This allows for additional flexibility in transportation and microbial analysis of environmental samples collected with 3M Environmental Scrub Sampler with 10 mL Wide Spectrum Neutralizer.



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