

**Contact Time Required to Kill The Disease Organisms Listed
(0.5 ppm Iodine, pH 7.5, 20-65 C)**

BACTERIA	MINIMUM CONTACT TIME
* Escherichia coli	50 seconds
** Salmonella typhosa P-1	1 minute
** Salmonella typhosa P-5	1 minute
** Salmonella typhosa P-10	1 minute
** Salmonella paratyphi P-12	1 minute
** Salmonella schottmulleri P-3	2 minutes
** Salmonella typhimurium P-611	5 minutes
** Shigella flexneri P-7	2 minutes
** Shigella dysenteriae 11 P-8	2 minutes
** Shigella sonnei I P-9	2 minutes
** Streptococcus fecalis E-40	2 minutes
*** Staphylococcus aureus	50 seconds
*** Staphylococcus epidermidis	1 minute
VIRUS	MINIMUM CONTACT TIME
* Poliovirus Type 1	9 minutes
CYSTS (@ 1 ppm Iodine)	MINIMUM CONTACT TIME
* Entamoeba Histolytica	30 minutes



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SGS U.S. Testing Company Inc.

Screening Study to Assess Antibacterial Properties
of Water Bottle

Test Report No. 202381

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REPORT OF TEST

SUBJECT: Evaluation of antibacterial properties of a water purifier system.

SAMPLE ID: Sample received from client on 2/29/96. Identified the sample as:
water bottle

Sample is a one pint clear plastic water bottle with blue cap. Inside the
neck of the bottle is "shot glass" shaped filter composed of a
composite including Iodine resin.

TEST: Antibacterial testing was based on methods outlined in United States
Environmental Protection Agency's "Guide Standard and Protocol for
Testing Microbiological Water Purifiers.", Revised April 1987.

PROCEDURE: NOTE: this study is only a screen of antibacterial effectiveness for this
product, and does not offer data on viral or protozoan efficacy as
required by above referenced document.

March 12 -March 18, 1996

TEST DATES:

TEST PROCEDURE OUTLINE:

TEST SPECIES: *Klebsiella terrigena* ATCC 33257

TEST WATER: EPA Test Water #2
One liter of deionized water was amended as follows:

- 1.) pH adjusted to 4.97 with HCl.
- 2.) Total Organic Carbon (TOC) adjusted to 17.0 mg/L with humic acid.
- 3.) Turbidity adjusted to 34 NTU with AC Spark Plug Dust.
- 4.) TDS adjusted to 1450 mg/L with sea salts.
- 5.) Temperature adjusted to 4°C by placing in refrigerator for 4 hours.

CONTACT TIME: 0, 1.0, 2.5, and 5.0 minutes

RECOVERY MEDIA: Violet Red Bile Agar (VRBA)

NEUTRALIZER: 0.1 Normal Sodium thiosulfate

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ST PROCEDURE OUTLINE:

One liter of test water was inoculated with one ml of *Klebsiella terrigena* so that the final concentration was approximately 1×10^7 cfu/100 ml.

110 ml of the inoculated test water was poured through the neck of the bottle. Once the entire volume was filtered, the timer was initiated.

At the designated contact time, 100 ml of the water was filtered through a 0.45 micron filter. Simultaneously, one ml of water was placed in 9 ml of phosphate buffered water with 0.1 N sodium thiosulfate. After filtering the 100 ml, the funnel was rinsed with 100 ml of 0.1N sodium thiosulfate.

The filter was placed on a plate of VRBA and incubated at 35°C for 48 hours. The one ml which was neutralized with 0.1N sodium thiosulfate was plated with VRBA and incubated at 35°C for 48 hours.

UTRALIZATION:

was essential to verify that the neutralization of the active antimicrobial agent as outlined above was effective. This was accomplished as follows:

One ml of filtered test water was added to 9 ml of 0.1 N sodium thiosulfate phosphate buffered water.

1 - 100 cfu of *K. terrigena* were added to this test tube and to ten ml of phosphate buffered water without filtered water.

Both sets of inoculated water were plate counted with VRBA. Similar plate counts would indicate adequate neutralization.

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RESULTS:

TABLE 1: NEUTRALIZATION

	<i>K. terrigena</i> A (cfu/ml)	<i>K. terrigena</i> B (cfu/ml)	Average (cfu/ml)
Control	9	16	13
Purified/Neutralized	11	16	14

Summary: Counts between the control sample and the purified and neutralized sample are similar, indicating that the neutralization method employed was effective.

TABLE 2: RECOVERY COUNTS OF INOCULATED AND PURIFIED WATER

Contact Time (minutes)	Recovered <i>K. terrigena</i> (cfu/100ml)	Percent Reduction
0	13,300,000	not applicable
1.0	18	99.99986%
2.5	30	99.99977%
5.0	39	99.99970%

Conclusion:

EPA Guide Standard and Protocol for Testing Microbiological Water Purifiers requires a six log reduction of bacterial counts (99.9999%). The data derived from this study indicates a five plus log reduction was achieved by Pres to Pure.

Discussion:

The data indicate that the antibacterial efficacy of this product is not time dependent (at least not after one minute of exposure), as essentially the same results were achieved after 1, 2.5 and 5 minutes of contact time. The surviving organisms represent a plateau in the death/time curve. This plateau may represent a reaction between our test water and the active agent, or of residual bacteria remaining in the neck of the bottle which do not pass through the filter, and therefore do not contact the iodine resin.

REPORT OF TEST