

Report of Study Results for

Hygenall Corporation
2299 Woodbury Ave
Newington, NH 03801

***Evaluation of Lead (Pb) Removal from Hands using Hygenall Industrial
Cleanser Washcloths***

Study Performed by

Mark Boeniger, MS, CIH
8380 Jakaro Drive
Cincinnati, OH 45255

October 28, 2009

Purpose

In 2008 the Centers for Disease Control and Prevention (CDC) licensed the technology to market a pre-impregnated washcloth capable of removing lead, cadmium, arsenic and other elements from the hands and other surfaces. In previous evaluations of this washcloth at the National Institute for Occupational Safety and Health (NIOSH) at least 98% lead (Pb) removal was determined. The current evaluation was intended to test the Pb removal effectiveness of Hygenall Industrial washcloths and confirm their performance against the previous results.

Methods

A standardized protocol for evaluating Pb removal effectiveness was used that is similar to procedures used previously for this purpose. The two modifications that were performed was (1) to contaminate clean hands with 6000 micrograms (μg) of Pb instead of 3000, and to rinse the hands for 20 seconds instead of 30. These two modifications were done for practical reasons and were believed to reflect real world conditions. Briefly, known amounts of lead oxide (PbO) obtained from a battery manufacturing plant, were carefully weighed on a calibrated laboratory balance. When weighing, the objective was to weigh PbO on glassine waxed weighing paper to between 6000 and 6500 μg . After weighing this amount, the paper was folded twice, and inserted into small plastic bottles for storage until used. When used, the folded glassine papers were removed from the bottles, opened carefully, and the PbO transferred to the palm of one hand. Then both hands were rubbed together for 30 seconds to disperse the PbO over the palmer surfaces of the hands. Next, a wet Hygenall Industrial washcloth was rubbed over the palmer surface of both hands for 30 seconds and the washcloth discarded. The hands were immediately rinsed under tepid running water for 20 seconds and dried briefly with a paper towel. Finally, the palmer surface of both hands was sampled for lead using two Aramsco Lead Wipes™ that were both used for 30 seconds. The sample washcloths were both placed into the same sampling container to be analyzed together. This procedure was repeated five times for each type of cleansing washcloth. Laboratory analysis was performed by a ELAP certified laboratory (ALS Laboratory Group (formerly DataChem Labs), 960 W. LeVoy Drive, Salt Lake City, UT 84123). Pb results were reported in micrograms and the limit of analytical detection was 2.5 μg . Media blanks were prepared by removing the wipes from their foil packet and placing these into storage tubes that were labeled similar to the study samples. In addition, weighed PbO aliquots were transferred directly to the sample wipe to be used for quality assurance purposes and to confirm the aliquot weightings. The percent removal was determined by dividing the amount of lead sampled after a decontamination test run by the amount applied to the palms, i.e. 5500 μg . From previous laboratory testing of the sampling method, the recovery of PbO from the palms using two of the cellulosic wipes, as were used in this study, was 68%.¹ This incomplete recovery fraction was taken into account when estimating how much Pb was actually present on the hands after cleaning.

Results

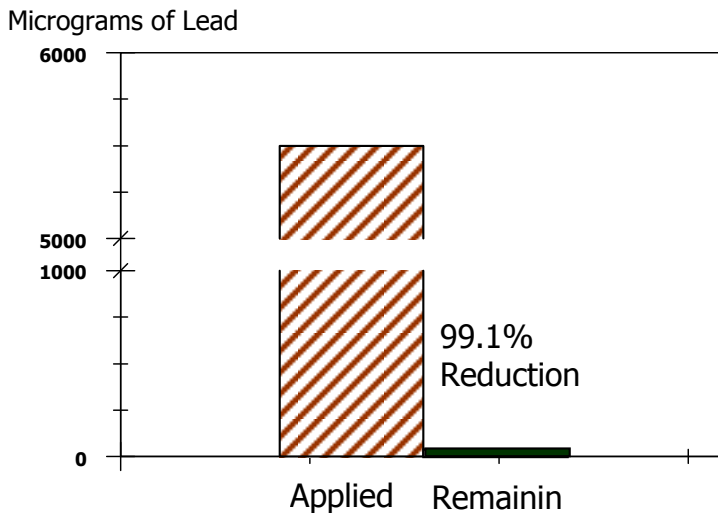
Three ‘spiked’ sampling wipes were produced by transferring the weighed PbO directly to the testing wipes instead of the hands. The reported results received from the analytical laboratory for each of these three samples were 5500 µg of lead. Less than 2.5 µg of lead was found in two blank samples that were submitted blind to the analytical laboratory.

Results of the evaluations are reported in both graphical form and using simple descriptive. The raw testing results are provided in Table I. Figure 1 depicts the results showing the amount of lead present before cleaning, and after cleaning with Hygenall Industrial, using a simple bar plot.

Table I – Results of Testing Hygenall Industrial Washcloths for Removal of Lead from the Hands. In each of five replicate runs, 5500 µg of PbO dust was used to contaminate the hands. The amount of Pb remaining after decontaminating the hands, in micrograms, is shown.

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HI1	35
HI2	48
HI3	33
HI4	30
HI5	38
Mean	36.5
Median	34
Std. Dev.	7.9
Min.	30
Max.	48

Figure 1 – Amount of Lead Applied to the Hands and Remaining after using Hygenall Industrial



Discussion

The five test runs with Hygenall Industrial washcloths resulted in a mean recovery of 36.5 µg of lead. Results were very consistent with a minimum of 30 µg and a maximum of 48 µg of lead recovered by sampling the hands after Hygenall Industrial washcloths were used. Correcting for incomplete sampling recovery, the percentage removal was 99.1%. These results compare very favorably to the results reported from previous testing that was performed at CDC/NIOSH.²

References

¹ Boeniger M: Comparison of Wipe Media for Sampling Lead from the Hands. J.Occup Environ Hyg. 3(8):428-34, 2006.

² United States Patent No. 7,604,997 B2, Oct. 20, 2009. Washcloths and Methods for Removal of Metal Contamination from Surfaces.