

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2016
 DateRun: 10/11/2016
 Experimenters: George Liang, Vinh Tran, Alicia McCarthy, Austin Buda
 ClientType: Cleaner Manufacturer
 ProjectNumber: Project #1
 Substrates: Liquid
 PartType: Part
 Contaminants: Odor
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Smell
 Purpose: To evaluate supplied products for malodor elimination

Experimental Procedure: Clean 250 ml glass bottles were filled with 6 ml of whole milk. The bottles were capped and stored at room temperature for three days. At the end of the 3rd day, the bottles were opened and observed for signs of malodor.

A panel of three was subjected to evaluating the untreated bottles after the 3rd day. Cleaning products were used at the recommended concentrations. Three bottles were treated for each supplied cleaning product for three treatment cycles. One treatment cycle consists of two sprays of the cleaning product directly into the contaminated milk bottle. Bottles were capped and swirled to mix the cleaner with the milk after each cycle.

The panel of three was subjected to rating the malodor in the bottle after each treatment cycle at random until all three treatment cycles were done.

After the panelists rated the odors, bottles were recapped and allowed to sit overnight. Bottles were reopened and assessed for malodor. An initial overnight rating of the contaminated bottles was done to see if the malodor had increased back to its initial malodor level from the overnight sit. Thereafter, each bottle was subjected to one treatment cycle and the same panelist from the day before gave a rating for each contaminated bottle. The rating was according to the scale set as 1 being the best and 5 being the worst.

An effective cleaning product would have a rating of two or below after its 3rd treatment cycle. The treatment of the contaminated bottles was stopped at a maximum of six sprays (three treatment cycles); the cleaning product is considered ineffective if the malodor rating is not 2 or below after its third cycle of treatment.

Results:

| Cleaner | Post Clean | Original | | Average |
|----------|------------|--------------|-----|----------------------|
| Bottle 1 | 4.5 | 5.0 | 5.0 | 4.8 |
| Bottle 2 | 4.5 | 4.5 | 4.0 | 4.3 |
| Bottle 3 | 5.0 | 5.0 | 5.0 | 5.0 |
| | | | | % Average: 4.7 |
| Cleaner | Post Clean | Sprays: 2 | | Average |
| Bottle 1 | 5 | 5.0 | 4.0 | 4.7 |
| Bottle 2 | 4.5 | 4.8 | 4.5 | 4.6 |
| Bottle 3 | 5.0 | 4.0 | 5.0 | 4.7 |
| | | | | % Average: 4.6 |
| Cleaner | Post Clean | Sprays: 4 | | Average |
| Bottle 1 | 4.5 | 4.0 | 4.5 | 4.3 |
| Bottle 2 | 4.0 | 4.8 | 4.5 | 4.4 |

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| | | | | |
|----------|--|--------------|-----|----------------------|
| Bottle 3 | 2.5 | 3.5 | 3.0 | 3.0 |
| | | | | % Average: 3.9 |
| Cleaner | Post Clean | Sprays: 6 | | Average |
| Bottle 1 | 2.5 | 5.0 | 3.0 | 3.5 |
| Bottle 2 | 4.0 | 5.0 | 3.5 | 4.2 |
| Bottle 3 | 2.5 | 5.0 | 3.5 | 3.7 |
| | | | | % Average: 3.8 |
| Cleaner | Pre Clean | Original | | Average |
| Bottle 1 | 5.0 | 5.0 | 5.0 | 5.0 |
| Bottle 2 | 5.0 | 5.0 | 4.5 | 4.8 |
| Bottle 3 | 5.0 | 5.0 | 5.0 | 5.0 |
| | | | | % Average: 4.9 |
| Cleaner | Pre Clean | Sprays: 2 | | Average |
| Bottle 1 | 3.7 | 3.5 | 2.5 | 3.2 |
| Bottle 2 | 3.0 | 2.0 | 3.0 | 2.7 |
| Bottle 3 | 1.5 | 2.0 | 2.5 | 2.0 |
| | | | | % Average: 2.6 |
| Cleaner | Pre Clean | Sprays: 4 | | Average |
| Bottle 1 | 3.5 | 3.0 | 3.0 | 3.2 |
| Bottle 2 | 2.0 | 2.0 | 2.5 | 2.2 |
| Bottle 3 | 1.0 | 1.0 | 1.0 | 1.0 |
| | | | | % Average: 2.1 |
| Cleaner | Pre Clean | Sprays: 6 | | Average |
| Bottle 1 | 1.5 | 1.0 | 1.0 | 1.2 |
| Bottle 2 | 1.5 | 1.5 | 1.5 | 1.5 |
| Bottle 3 | 1.0 | 1.0 | 1.0 | 1.0 |
| | | | | % Average: 1.2 |
| Cleaner | Biological Liquid Odor Control/Cleaner | Original | | Average |
| Bottle 1 | 4.0 | 5.0 | 4.5 | 4.5 |
| Bottle 2 | 5.0 | 5.0 | 4.5 | 4.8 |

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| | | | | |
|----------|--|--------------|-----|----------------------|
| Bottle 3 | 5.0 | 5.0 | 5.0 | 5.0 |
| | | | | % Average: 4.8 |
| Cleaner | Biological Liquid Odor Control/Cleaner | Sprays: 2 | | Average |
| Bottle 1 | 4.5 | 3.5 | 3.0 | 3.7 |
| Bottle 2 | 4.5 | 3.5 | 4.0 | 4.0 |
| Bottle 3 | 5.0 | 4.0 | 4.0 | 4.3 |
| | | | | % Average: 4.0 |
| Cleaner | Biological Liquid Odor Control/Cleaner | Sprays: 4 | | Average |
| Bottle 1 | 4.5 | 2.5 | 3.5 | 3.5 |
| Bottle 2 | 4.5 | 4.0 | 3.2 | 3.9 |
| Bottle 3 | 5.0 | 3.5 | 3.5 | 4.0 |
| | | | | % Average: 3.8 |
| Cleaner | Biological Liquid Odor Control/Cleaner | Sprays: 6 | | Average |
| Bottle 1 | 3.0 | 4.0 | 2.0 | 3.0 |
| Bottle 2 | 4.0 | 4.2 | 3.0 | 3.7 |
| Bottle 3 | 4.0 | 5.0 | 3.5 | 4.2 |
| | | | | % Average: 3.6 |
| Cleaner | Odor Eliminator (Spring Scent) | Original | | Average |
| Bottle 1 | 5.0 | 5.0 | 5.0 | 5.0 |
| Bottle 2 | 5.0 | 4.7 | 5.0 | 4.9 |
| Bottle 3 | 5.0 | 5.0 | 5.0 | 5.0 |
| | | | | % Average: 5.0 |
| Cleaner | Odor Eliminator (Spring Scent) | Sprays: 2 | | Average |
| Bottle 1 | 2.0 | 3.0 | 2.5 | 2.5 |
| Bottle 2 | 2.0 | 2.5 | 2.5 | 2.3 |
| Bottle 3 | 2.0 | 2.0 | 2.0 | 2.0 |
| | | | | % Average: 2.3 |
| Cleaner | Odor Eliminator (Spring Scent) | Sprays: 4 | | Average |
| Bottle 1 | 2.0 | 2.0 | 3.0 | 2.3 |

CLEANING LABORATORY EVALUATION SUMMARY

| | | | | |
|----------|-----------------------------------|--------------|-----|----------------------|
| Bottle 2 | 1.5 | 2.0 | 2.0 | 1.8 |
| Bottle 3 | 1.5 | 2.5 | 1.0 | 1.7 |
| | | | | % Average: 1.9 |
| Cleaner | Odor Eliminator (Spring Scent) | Sprays: 6 | | Average |
| Bottle 1 | 1.5 | 1.0 | 1.0 | 1.2 |
| Bottle 2 | 1.0 | 1.0 | 1.0 | 1.0 |
| Bottle 3 | 1.0 | 1.0 | 1.0 | 1.0 |
| | | | | % Average: 1.1 |

Summary Table

| Cleaner | Sprays | % Average |
|---|--------|--------------|
| Post Clean | 6 | 3.8 |
| Pre Clean | 6 | 1.2 |
| Biological Liquid Odor Control/Cleaner | 6 | 3.6 |
| Odor Eliminator | 6 | 1.1 |

Summary:

| Substrates: | Liquid | | | | |
|-------------------------------|--|--------|-------------|-------------------------------------|---------------|
| Contaminants: | Odor | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Fisher Scientific | Absolute Ethanol | 0 | 0.00 | <input type="checkbox"/> | |
| Rochester Midland Corporation | PRS Water Damage Pre Clean | 100 | | <input checked="" type="checkbox"/> | Rank 1.2 |
| Rochester Midland Corporation | PRS Water Damage Post Clean | 100 | | <input type="checkbox"/> | Rank 3.8 |
| Rochester Midland Corporation | Biological Liquid Odor Control Cleaner | 100 | | <input type="checkbox"/> | Rank 3.6 |
| Wurth | Odor Eliminator | 100 | | <input checked="" type="checkbox"/> | Rank 1.1 |

Conclusion:

Treatment of bottles is given a rating for its malodor level, with 1 being the best to 5 being the worse. An effective cleaner would have a rating of 2 or below after the 3rd treatment cycle. The only effective cleaners were Pre Clean and Odor Eliminator. After the 3rd treatment cycle, Post Clean and Biological Liquid Odor Control/Cleaner was not as effective in eliminating the malodor from the contaminated bottles, because the malodor ratings for the cleaning product: Post Clean is at 3.8. Whereas the rating for the cleaning product: Biological Liquid Odor Control/Cleaner cleaning product is at 3.6. The most effective overall cleaner is listed as follows: Odor Eliminator, Pre Clean, Biological Liquid Odor Control/Cleaner and Post Clean.