Cleaning Studies of AHP Versus Leading Brands

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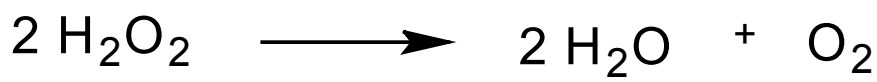
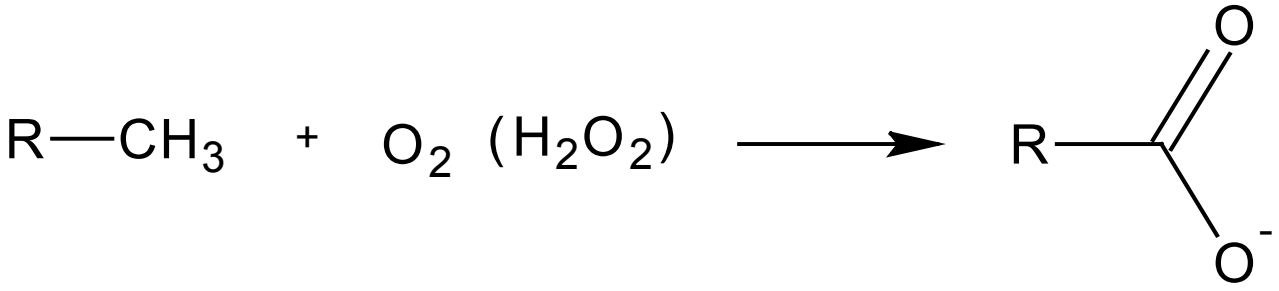
Fundamentals of AHP cleaning

1 Hydrogen Peroxide:

- Helps loosen residues that cling to surfaces by oxidizing them.
- Oxidation of organic soils gives them a negative charge and makes them more water soluble.





Fundamentals of AHP Cleaning

2 Surfactants:

- Surfactants are water soluble surface active agents
- Surfactants are comprised of a hydrophobic (oil soluble) tail and hydrophilic (water soluble) head
- 2 main groups of surfactants in AHP:
  - Anionic: Insert their tail in the greasy soil and introduce electrostatic repulsive interactions that reduce soils adhesion to the surface, lift the soil, and retard its redeposition. (Figure 1)

Fundamentals of AHP Cleaning

- Non-ionic: Help introduce steric repulsion and solubilize the soil in the aqueous solution.

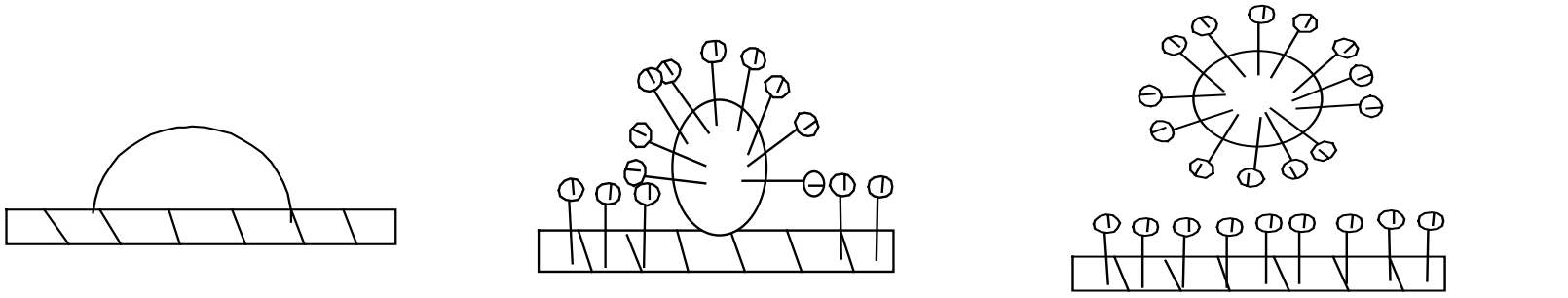
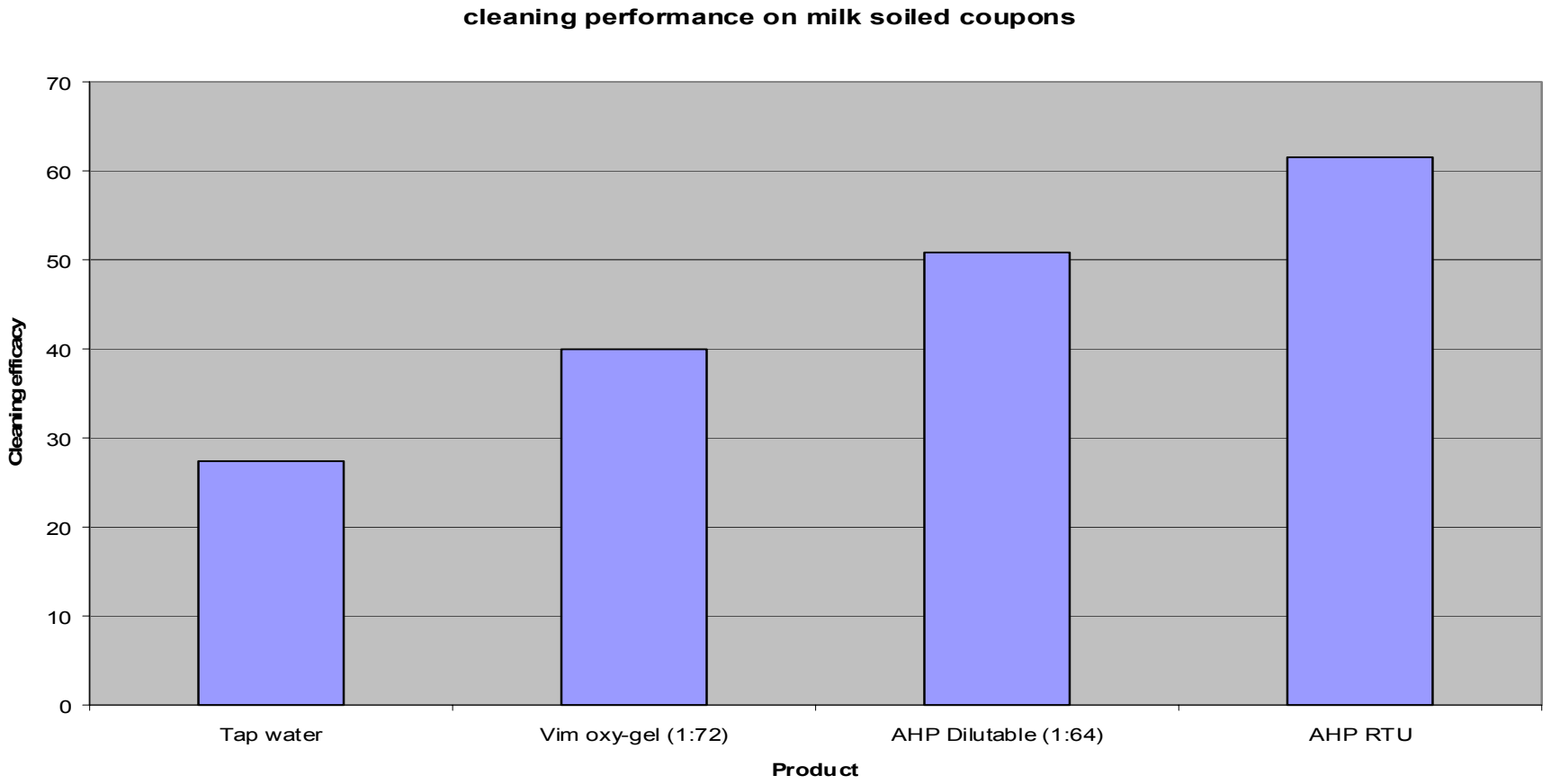


Figure 1. General mechanism of soil removal by surfactants

Methods of Measuring Cleaning Efficacy (EC)

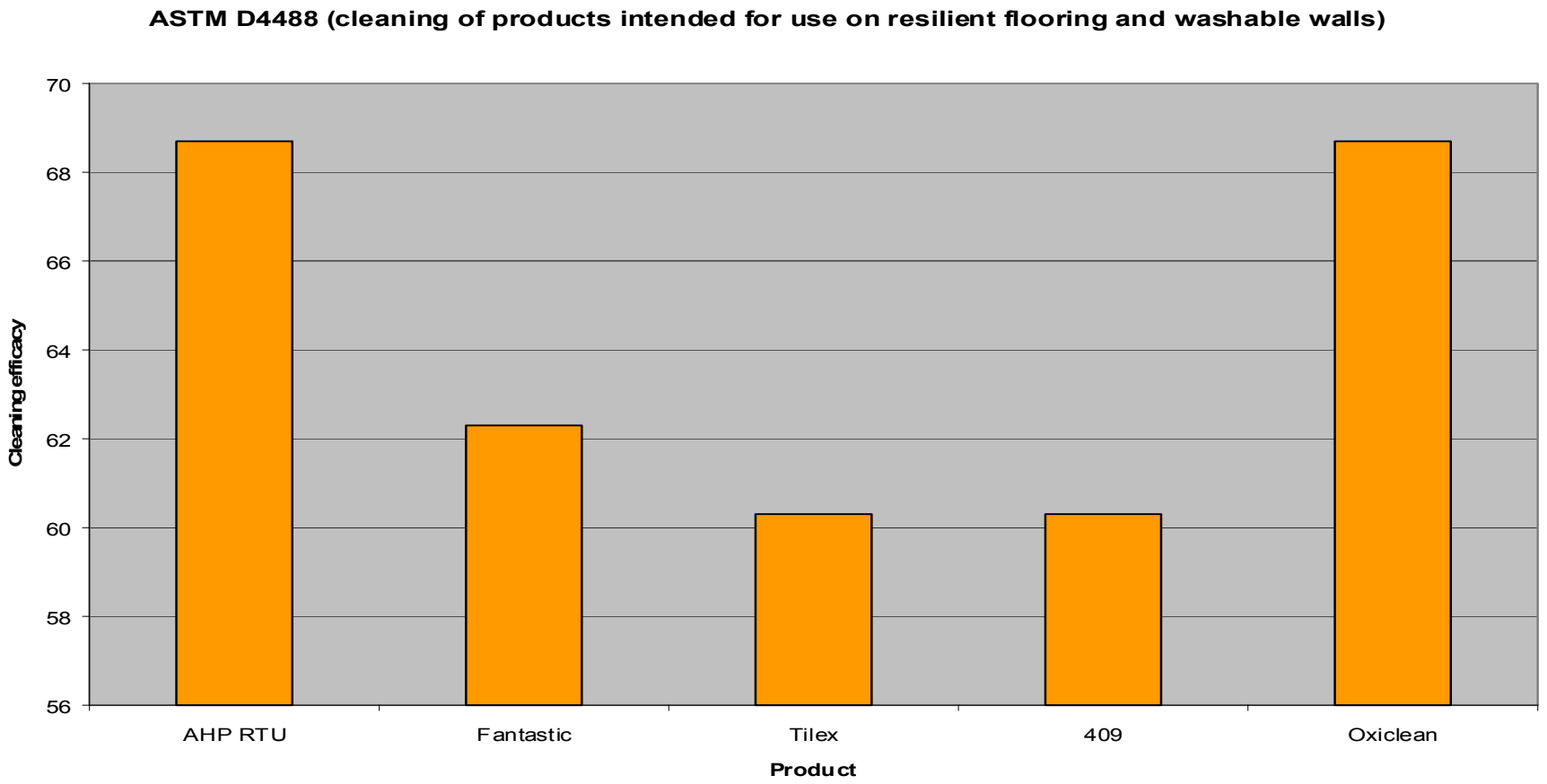
- Milk Soil cleaning test:
  - Focused on protein, lipid (fat), and carbohydrate based soils.
    - 304 stainless steel panel is immersed in milk until about 15 mg of soil is deposited on the panel.
    - The panel is immersed in the cleaning solution under controlled environment
    - The weight difference between cleaned panel and soiled panel is measured, cleaning efficacy (EC) is calculated.

Milk soil cleaning test results



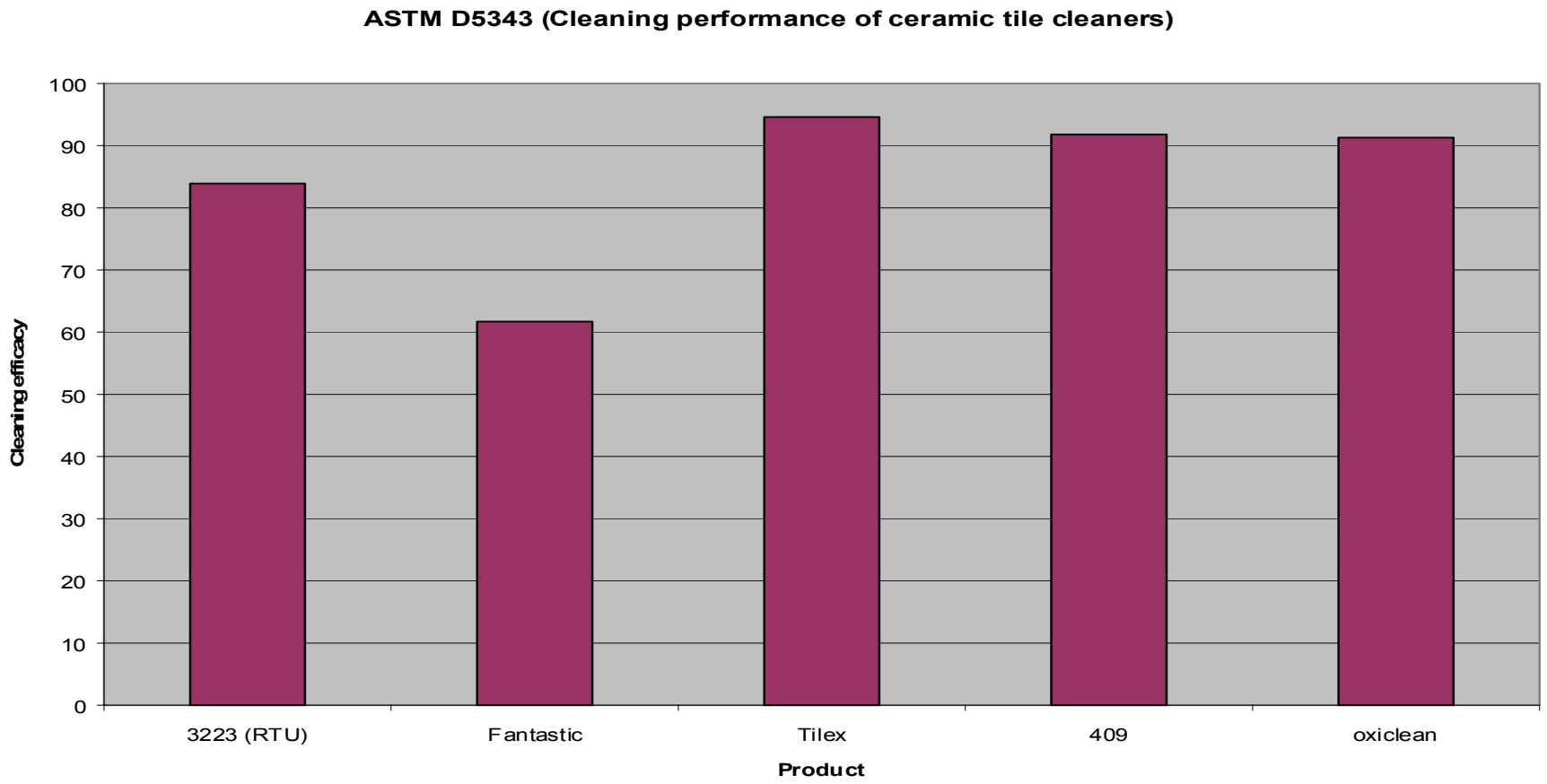
- ASTM D4488-95 (Approved 2001)
  - Standard guide for cleaning performance of products intended for use on Resilient Flooring and Washable Walls
    - Focused on greasy soils.
      - A masonite wallboard tile is soiled with a mixture of oily soils specifically instructed in the ASTM.
      - The soiled tile is cleaned with back and forth stroking movements, using straight-line washability apparatus.
      - The difference in the reflectance of the tile surface before and after the cleaning is measured, and cleaning efficacy is calculated.

ASTM D4488 Cleaning results



- ASTM D5343-97
  - Standard Guide for Evaluating Cleaning Performance of Ceramic Tile Cleaners
    - Focused on cleaning bath tubs and ceramic walls.
      - Soils are artificially applied in a standardized manner to a ceramic tile surface (As instructed in the ASTM).
      - The soiled surfaces are cleaned using a Gardner straight-line washability apparatus .
      - Cleaned substrates are evaluated using reflectance measurements.

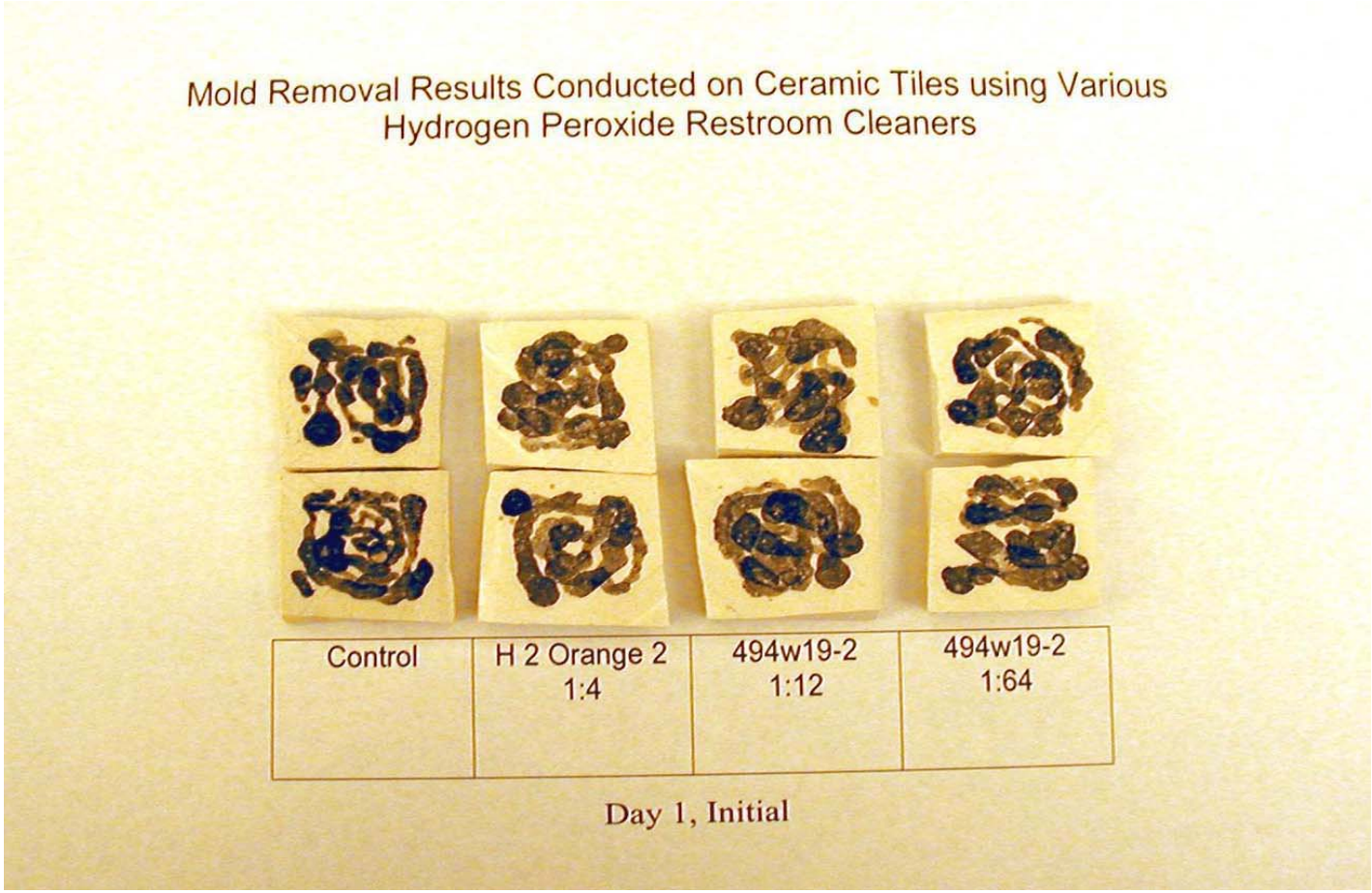
ASTM D5343 Cleaning results



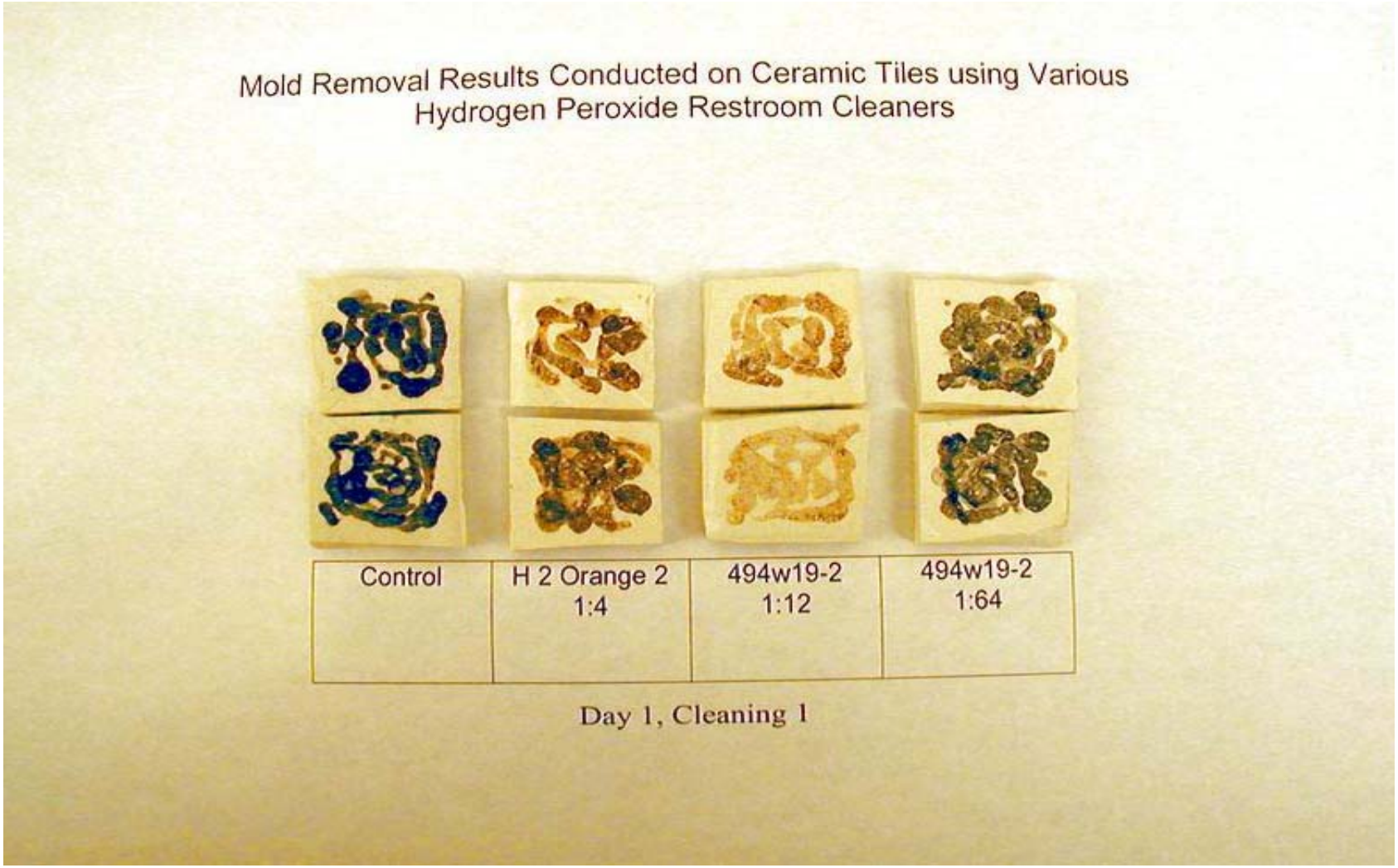
Aspergillis niger de-staining studies

- To determine the mold de-staining efficacy of AHP versus leading brand restroom cleaners on a ceramic tile substrate.
  - A mold culture of Aspergillis niger is inoculated on ceramic tile.
  - The tiles are immersed in the cleaning solution for 10 minutes.
  - The tiles were monitored at different intervals.
    * Note: 494w19-2 is the same as AHP RTU.

Aspergillis niger de-staining results



Aspergillis niger de-staining results



Aspergillis niger de-staining results

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