

Chemistry 512: Toward Efficiency in Laundry Chemistry!

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Background/Purpose

Against the backdrop of the environmental impact of laundry and the lack of understanding of optimal laundry conditions, this study will scientifically analyze the impact of temperature and detergent type on cleaning effectiveness for everyday soiling. We will also evaluate detergent residue and energy consumption, and propose sustainable and household-friendly laundry methods.

Elements

1. Target Elements

(1) Fiber type

Linen, cotton, wool, silk, nylon, polyester, acrylic

(2) Stain type: Cooking oil, egg white, mud

(3) Detergent type: Acid detergent, neutral detergent.

(Comparison: no detergent)

(4) Cleaning conditions: Temperature: 10°C (low), 25°C (room temperature), 40°C (high), concentration (×0.5, ×1.0, ×1.5,)

2. Experimental Procedure

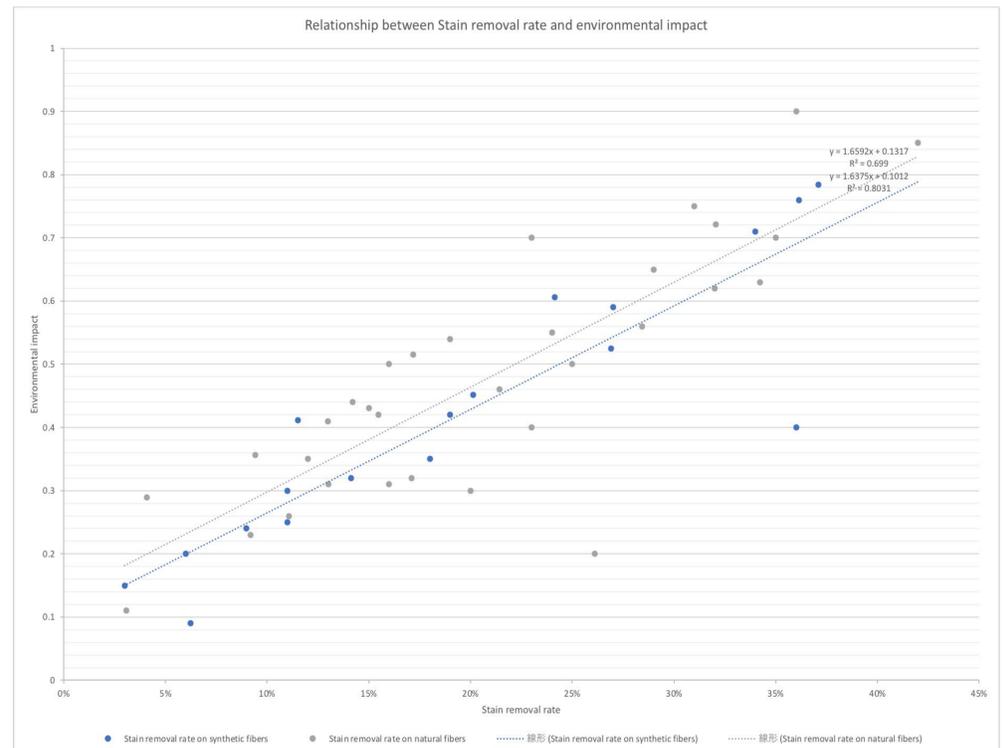
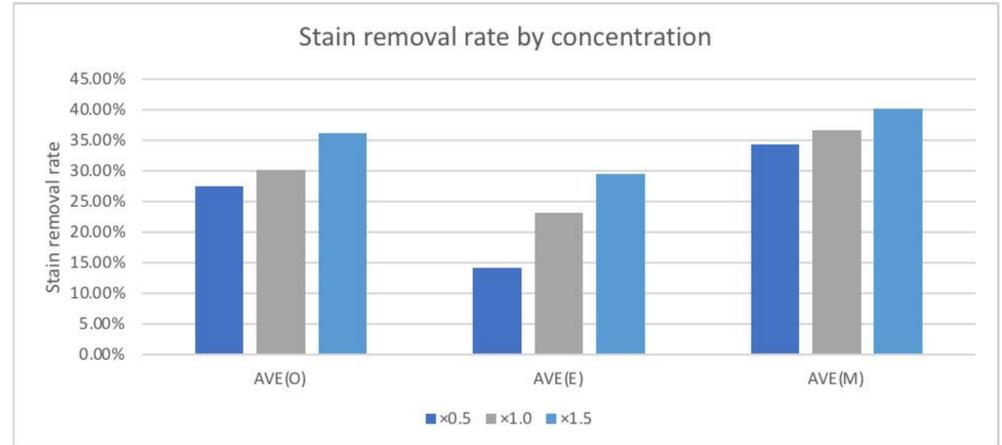
(1) Washing: 30 minutes of washing under different conditions, natural drying

(2) Measurement: Stain removal effect: Mass difference of stains before and after washing

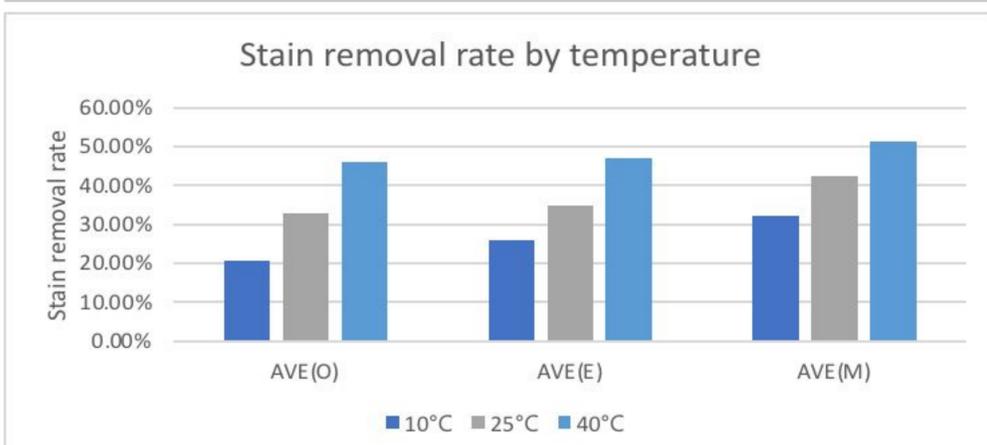
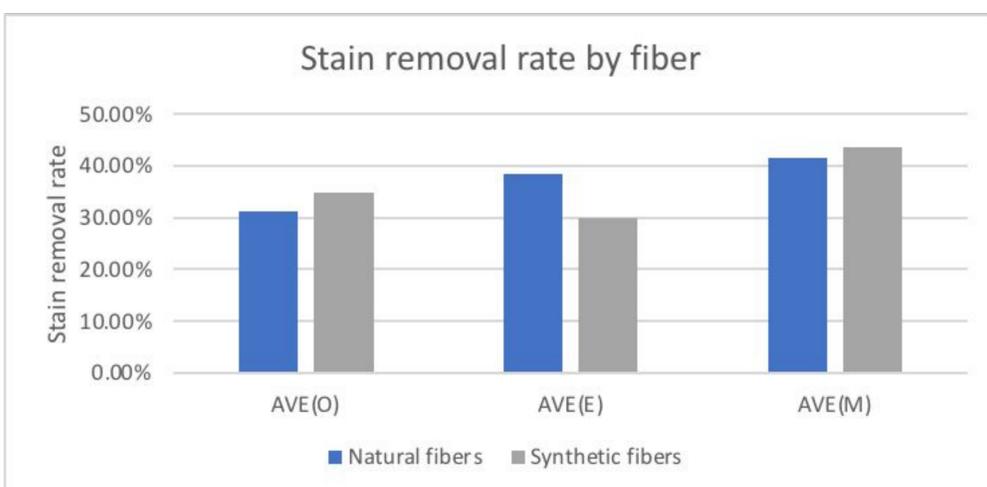
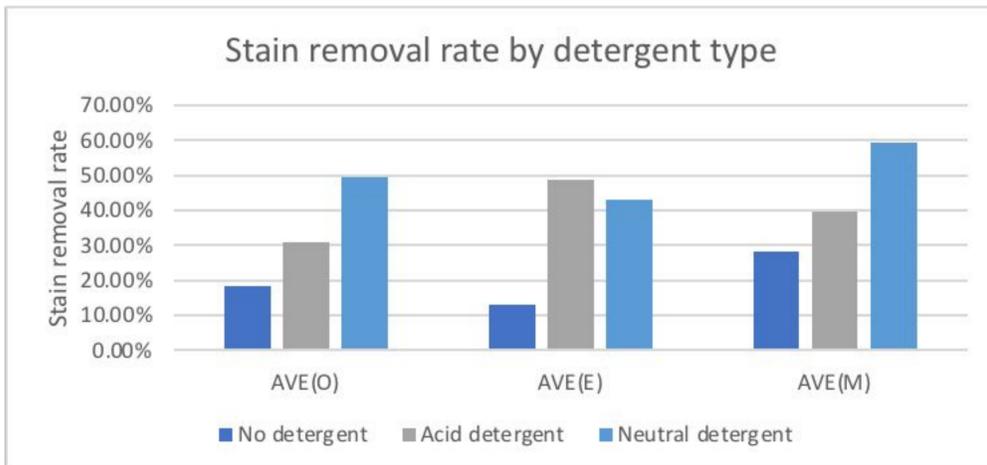
Environmental impact of wastewater: COD measurement of wastewater

(3) Analysis: Evaluation of stain removal rate and environmental load rate. The environmental load rate is scored based on COD, water consumption, water temperature, and detergent

(4) Application: Proposal of best cleaning conditions



~Result~(Graph)



Conclusion

(1) The removal rates were significantly different when detergent was used and when no detergent was used.

→Based on the results, we believe that neutral detergent is suitable for mud and oil stains, and acidic detergent is suitable for egg white stains.

(2) Stain removal efficiency increased as the water temperature was increased.

→The relationship between water temperature and stain removal efficiency is significant.

(3) The higher the stain removal rate, the higher the environmental load.

(4) There is no significant difference in stain removal rate between natural and synthetic fibers.

→There is no significant difference in stain removal rates between natural and synthetic fibers, because each has different characteristics.

Natural fibers: Stains and detergents are easily adsorbed, so even if stains are attached, they are likely to be decomposed.

Synthetic fibers: Since dirt does not easily penetrate into the fibers, it is thought that dirt is easily removed even if detergent is not adsorbed.

Prospect

Since the number of trials and conditions are too few to determine the optimal conditions for each washing fibers, we cannot say for sure that this is the best move. We would like to experiment in the future to see what changes occur under conditions of time, detergent type, and higher water temperature.

earlier literature

Proposals for changes in the laundry environment and washing behavior that removes stains well

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