Filtering the Future

Problem

Microplastics are small plastic particles that contaminate water and are difficult to remove. Many communities, including San Luis, Arizona, may not have access to advanced filtration systems. This project investigates whether common household materials can effectively remove microplastic particles from water.

Hypothesis

If thicker and more absorbent materials such as cotton are used to filter water, then they will remove a higher percentage of microplastic particles than thinner materials like coffee filters or sand combined with a coffee filter.

Dependent Variable

The percentage of microplastic particles removed, measured by the change in lux (light transmission) before and after filtration.

Independent Variable

The type of filter material used:

Coffee filter

Cotton

Coffee filter with sand

Materials

- Water
- Glitter (microplastic substitute)
- Coffee filters
- Cotton balls (7 per trial)
- Sand (1 teaspoon per trial)
- Funnels
- Measuring cup
- Measuring spoons
- Clear cups
- Light meter (lux meter)
- Stopwatch or timer
- Notebook or digital data tab

Procedure

1. Measure 200 mL of water and pour it into a clear cup.
2. Add 1/8 teaspoon of glitter and stir until evenly mixed.
3. Measure and record the lux value before filtering.
4. Place a funnel over an empty cup.
5. Insert the filter material (coffee filter, cotton, or coffee filter with sand).
6. Slowly pour the glitter water through the filter.
7. Record how long the filtration takes.
8. Measure and record the lux value after filtering.
9. Measure the remaining water volume if water is absorbed.
10. Repeat steps 1–9 for three trials per filter type.
11. Calculate the percent of microplastics removed.

Constants

200 mL of water per cup

1/8 teaspoon of glitter per cup

Same funnel and cup setup

Same method of pouring

Same light meter and measurement position

Same room lighting and temperature

Abstract

This experiment tested how well common household materials remove microplastics from water. Coffee filters, cotton, and a coffee filter with sand were used to filter water mixed with glitter. Lux measurements showed that cotton removed the most microplastics, followed by coffee filters, while the sand filter was least effective.

Conclusion

The results showed that cotton was the most effective filter for removing microplastics, while the coffee filter with sand was the least effective. This supports the hypothesis that thicker materials remove more particles from water.

Control

- No-filter control: glitter water that was poured directly into a cup without any filter to show how much glitter remains without filtration.
- Clean water reference: water without glitter to confirm lux readings for clear water.