

# Methods Part 1: Microplastic Removal

(using magnetite)

## INDEPENDENT VARIABLE

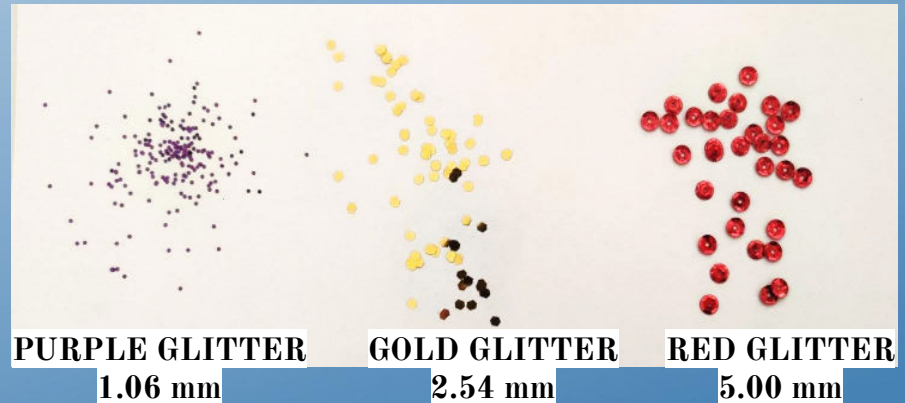
3 glitter sizes

## DEPENDENT VARIABLE

Percent mass of glitter remaining after  
removal

## CONTROL GROUP

No glitter extraction



# Methods Part 2: BPA Removal

(using activated carbon)

## INDEPENDENT VARIABLE

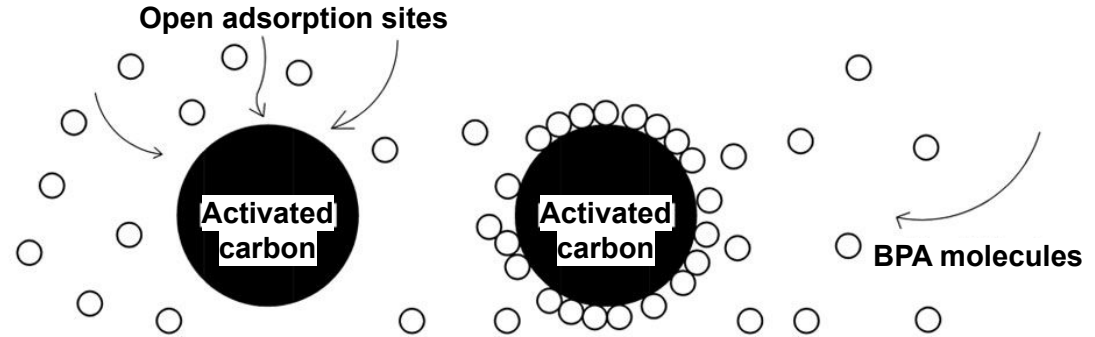
Activated carbon extraction of BPA

## DEPENDENT VARIABLE

Absorbance (Colorimeter reading)

## CONTROL GROUP

BPA in water without being removed by activated carbon



During adsorption, BPA molecules stick onto the surface of the activated carbon.

# BPA Removal Method

## STEP 1

Calibrate  
colorimeter  
with control  
group



## STEP 2

Dissolve 0.07g  
BPA in 3g  
acetone



## STEP 3

Add BPA  
solution to 250  
mL distilled  
water

## STEP 4

Pour solution  
over 20g  
activated carbon  
in coffee filter



## STEP 5

Fill cuvette and  
test absorbance



## STEP 6

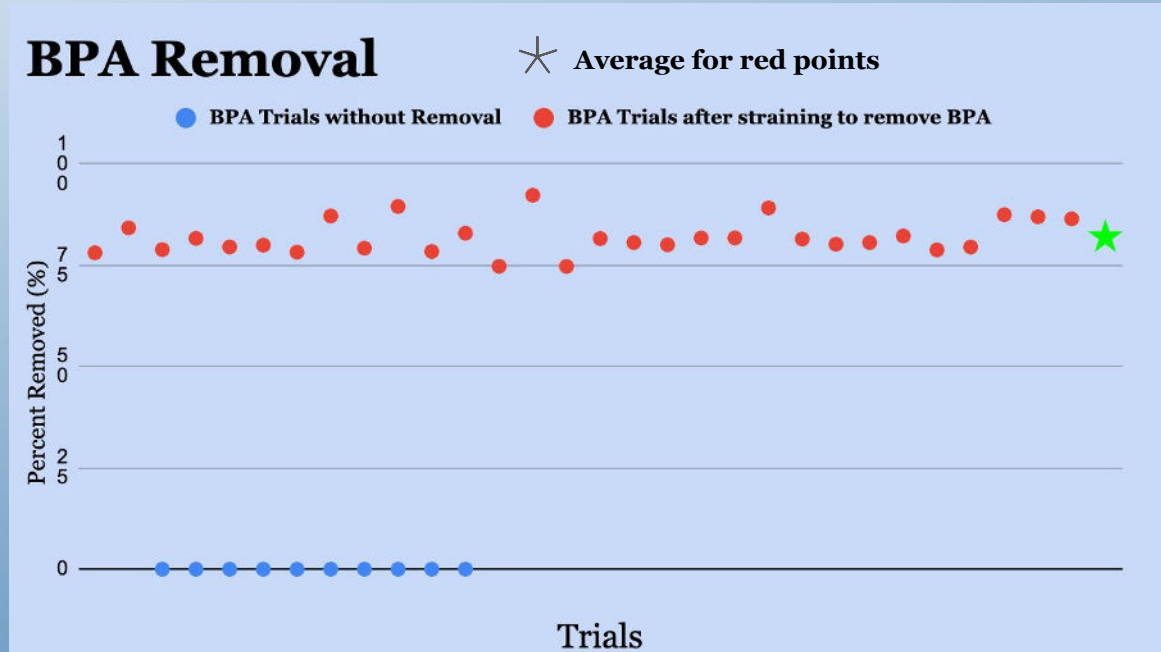
Dispose water  
safely in the  
Chemistry Lab  
at my high  
school



# BPA Removal Data Analysis

**30 TRIALS**  
**82% of BPA removed**

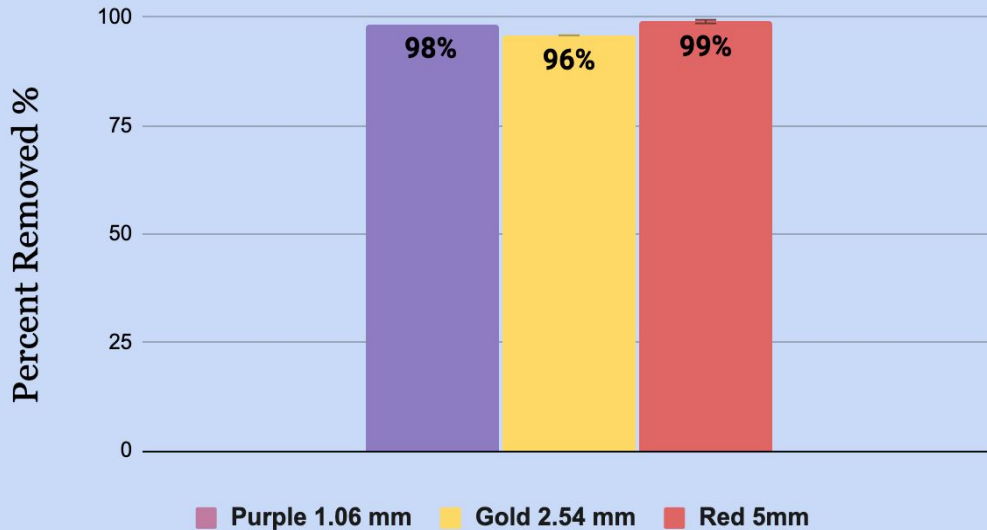
**T Test Results:**  
**P-value 0.0001**  
**SEM: 0.75**



# Microplastic Removal Data Analysis

Ttest P-value **0.0001**

## Percent Removal of Glitter



**60 trials total. 20 trials per glitter size.**

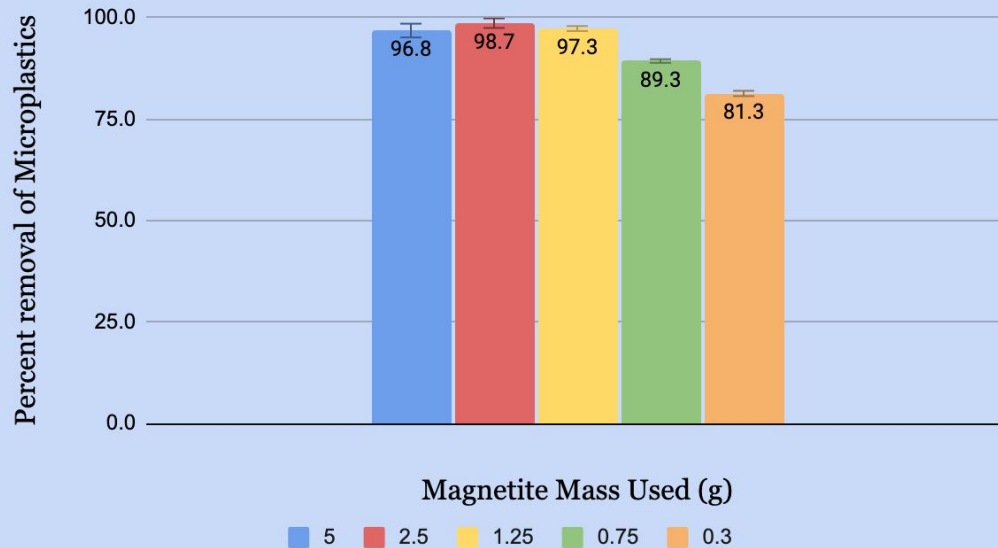


**Glitter was strained on paper towel in order to collect and mass. Combined mass of glitter remaining was averaged over 20 trials.**

# Magnetite Cost Optimization

Optimizing the amount of magnetite used drastically lowers the cost while maintaining efficacy.

**The Efficiency of Microplastic Extraction Based on Magnetite Used**



40 trials total testing 5 different sizes.



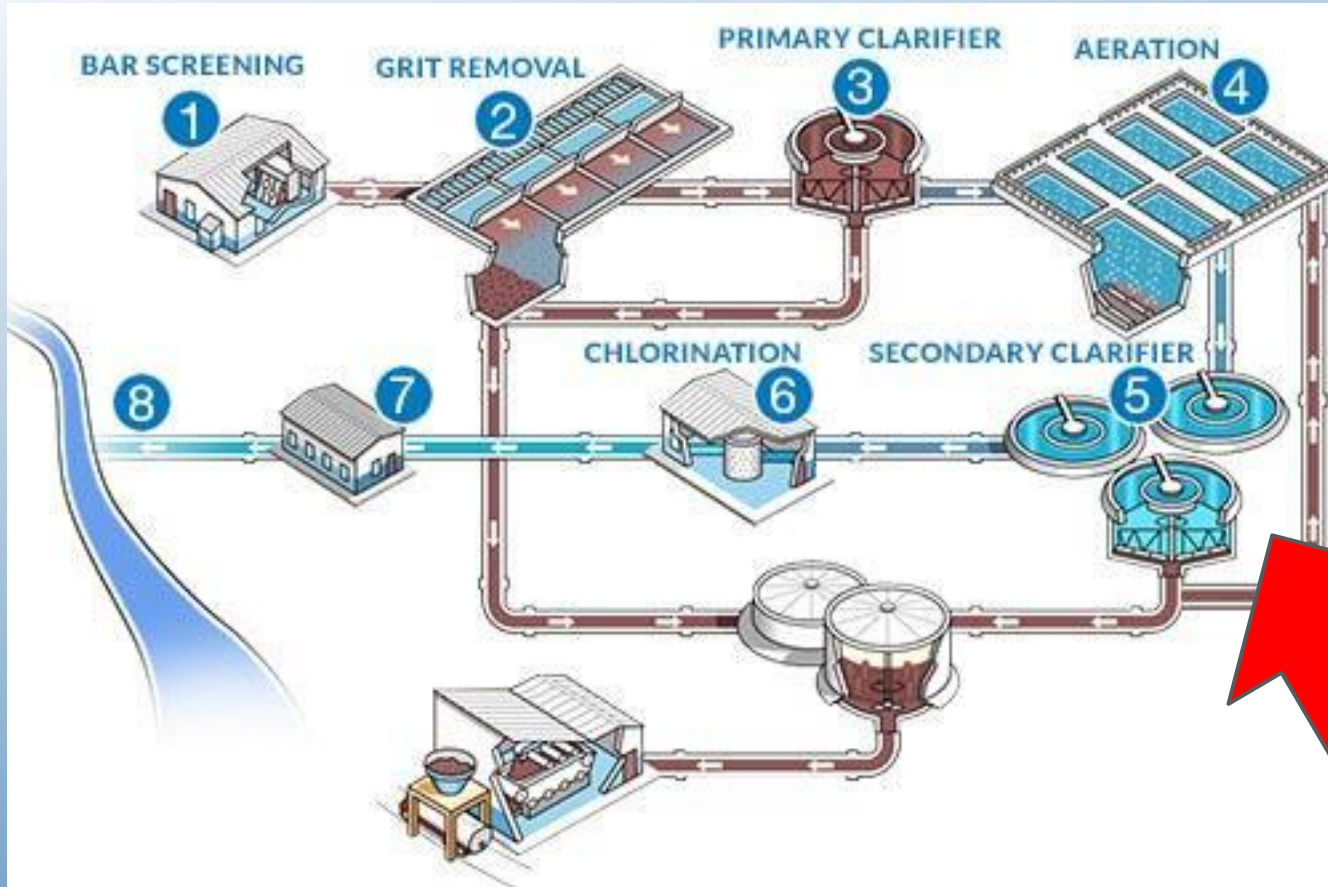
**\$1 of magnetite**  
**=**  
**500 gallons purified**

**ANOVA**

**P-value 0.00022**

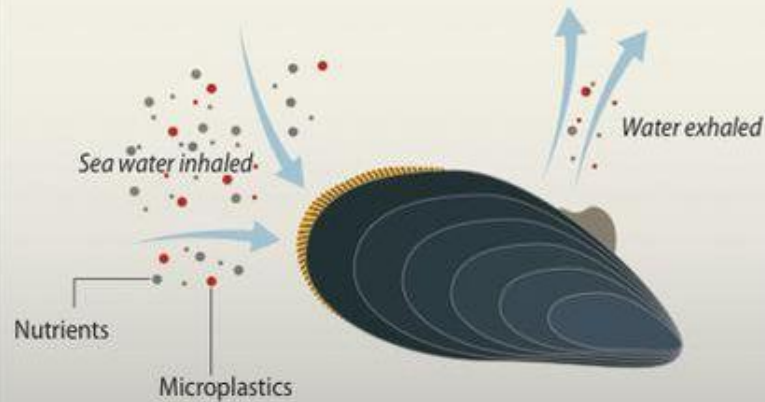


# Applications in Wastewater Treatment

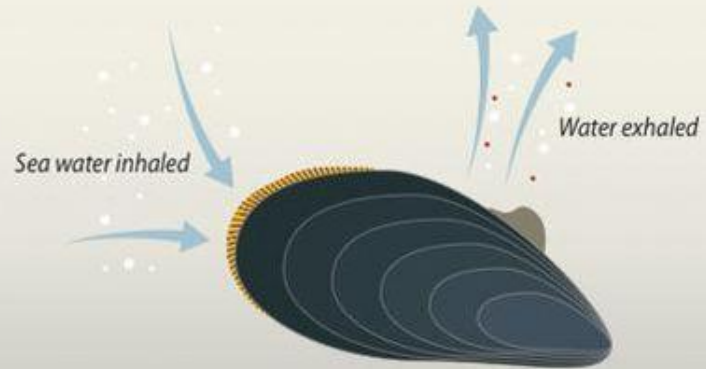


# Applications in Aquatic Farming

Because they filter water, bivalves (such as mussels, oysters, clams and others) can absorb and excrete microplastic present in the sea water where they are cultivated



After harvesting, shellfish are usually kept in clean water to get rid of contaminants. The shellfish expel some microplastics, while others remain inside, reach the market and end up on the consumer's plate



Sources: Tjärnö Marine Biological Laboratory, Strömstad, Sweden; personal communication with Dr. Sarah Dudas