The Effect of Powdered Orange Peels on the Removal of Textile Dye

Bashir, Dua (School: Gwinnett School of Mathematics, Science, and Technology)

This experiment's purpose was to suggest an inexpensive way to eliminate synthetic dye from textile wastewater in South Asia by utilizing orange peel powder. Cheaper alternatives are needed for activated carbon, an effective but expensive way of removing synthetic dyes. Many agricultural byproducts have been tested for their dye absorbance, so it was investigated whether orange peels could similarly remove dye. The researcher hypothesized that if the powdered orange peel dosage increased, then the dye removal percentage in the wastewater would increase. The independent variable was the powdered orange peel dosage added to the wastewater (0g, 0.2g, 0.4g, 0.6g, 0.8g, 1g) and the dependent variable was the dye removal percentage (calculated using the initial/final dye concentrations). After preparing the powder and wastewater (with a 10 mg/L dye concentration), dosages were measured to be put into 5 beakers with 25 mL of wastewater. One dosage was added to each beaker 10 minutes after each other (for enough data collection time). After two hours, measured absorbance was converted to concentration using Beer's law. After 10 trials for each dosage, the data displayed a positive correlation between the dosages and dye removal percentage. Through ANOVA testing, comparisons of both the calculated p-value (1.13835E-83) and F-value (15174.67898) proved a significant difference. Additionally, double SEM bars showed no overlap between the highest and lowest dosages. So, the null hypothesis claiming no significant difference between the independent and dependent variables was rejected, and the alternative hypothesis was accepted.