The Effects of Natural and Artificial Dyes on Water Quality

Moeller, Grace (School: Lake Crystal Wellcome Memorial)

An experiment was conducted to study the impact of dyes on water quality. Untreated dye wastewater causes hypoxia, and a lower living standard for populations relying on the body of water. This experiment is a 3rd year continuum. Both natural and artificial dyes were tested. Natural Dyes used include Indigo, Turmeric, Red Cabbage, and Coffee. Artificial Dyes used include Rit Dye in Eggplant, Denim Blue, and Lemon Yellow, along with Alizarin Red Solution and Crystal Violet Solution. Dyes were prepared according to their preparation instructions. After all dye baths were prepared, the dye was separated into six jars. Five jars were filled with 1g or 10mL of a chemical variant. Variants were selected after research on common chemicals used in commercial dye production, as to simulate real-world applications. The variants are; AlK(SO4)2-12H2O, CuCl2, FeCl3-6H2O, Na2S2O4, and NaOH. Jar 6 was kept as a control with no variant added. After the dye solutions were created and separated into jars, two pieces of fabric were added and soaked for 30 minutes. Then fabric was removed, dye solutions were tested using an oxygen meter and pH meter. If the dyes are artificial, the overall water quality will be worse, and if the dyes are natural, the overall water quality will be better. This is because most chemicals are oxidative, the oxygen in the water will be consumed by chemical reactions, whilst natural dyes don’t possess these qualities, implying that natural dyes will have better water quality.

Awards Won: