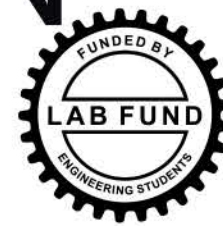


REMOVAL OF AZO DYE VIA ELECTRO-OXIDATION

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Background and Problem Statement

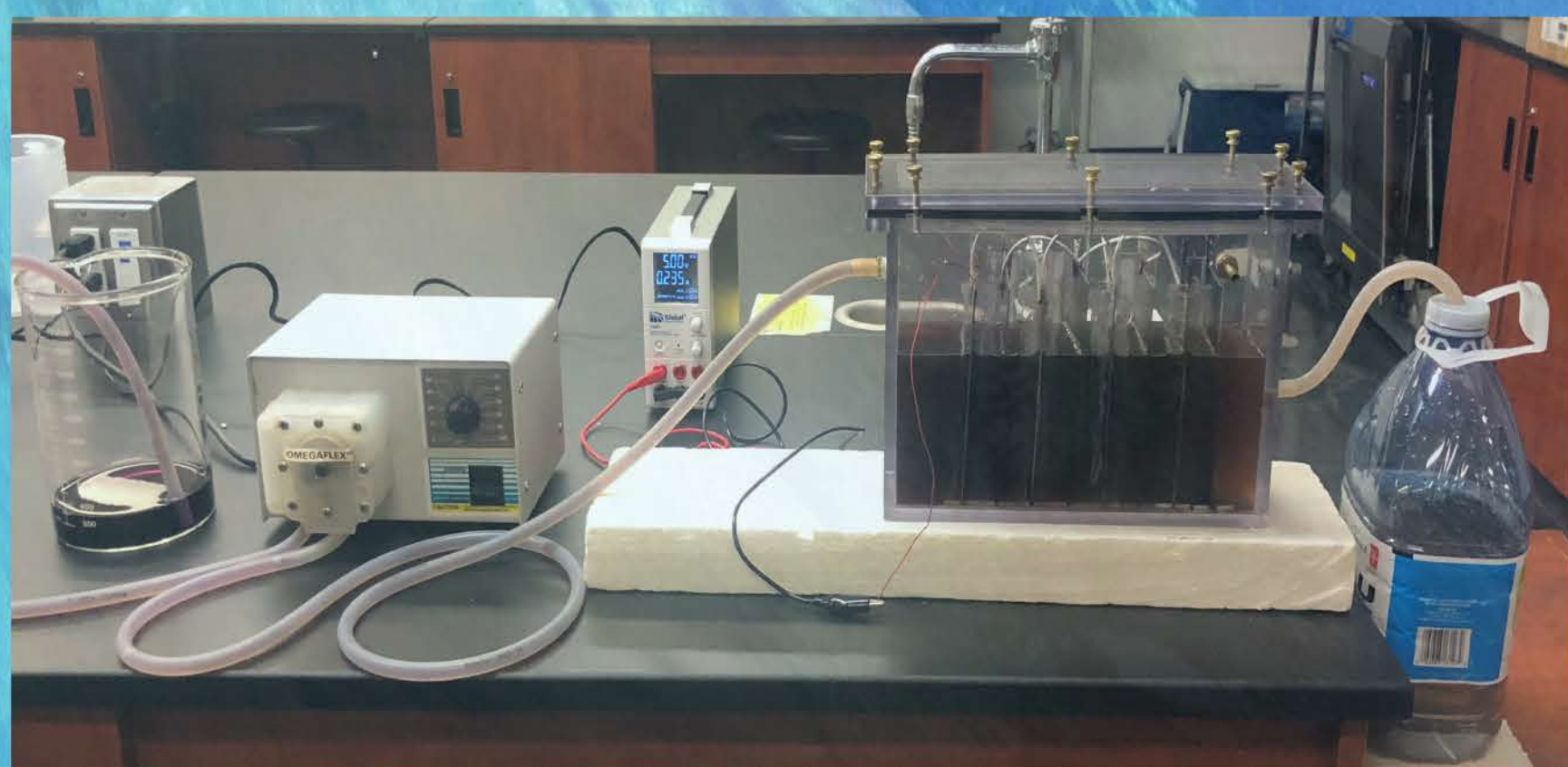
- The use of chemicals and dyes during manufacturing of textiles generates chemical oxygen demand (COD) and colour which negatively impact local ecosystems
- Azo dyes are the most commonly used non-biodegradable dye type in the textile industry and have demonstrated a higher level of toxicity to aquatic organisms
- The design of systems that can effectively remove azo dyes is imperative for the growing textile industries around the world

Design Objectives

The scope of the project is to produce a prototype unit for wastewater treatment in the textile industry. The goal of the project is to reduce COD and remove the colour of the wastewater through electrochemical oxidation to improve the water quality.

Design Overview

- The design is a baffled channel anodic oxidation unit made of plexiglass and steel electrodes with 3 cm spacing
- The design volume of 2.6 L with a targeted hydraulic retention time around 60 minutes
- Peristaltic pump was used to convey synthetic wastewater which was created using Eriochrome Black T through the system

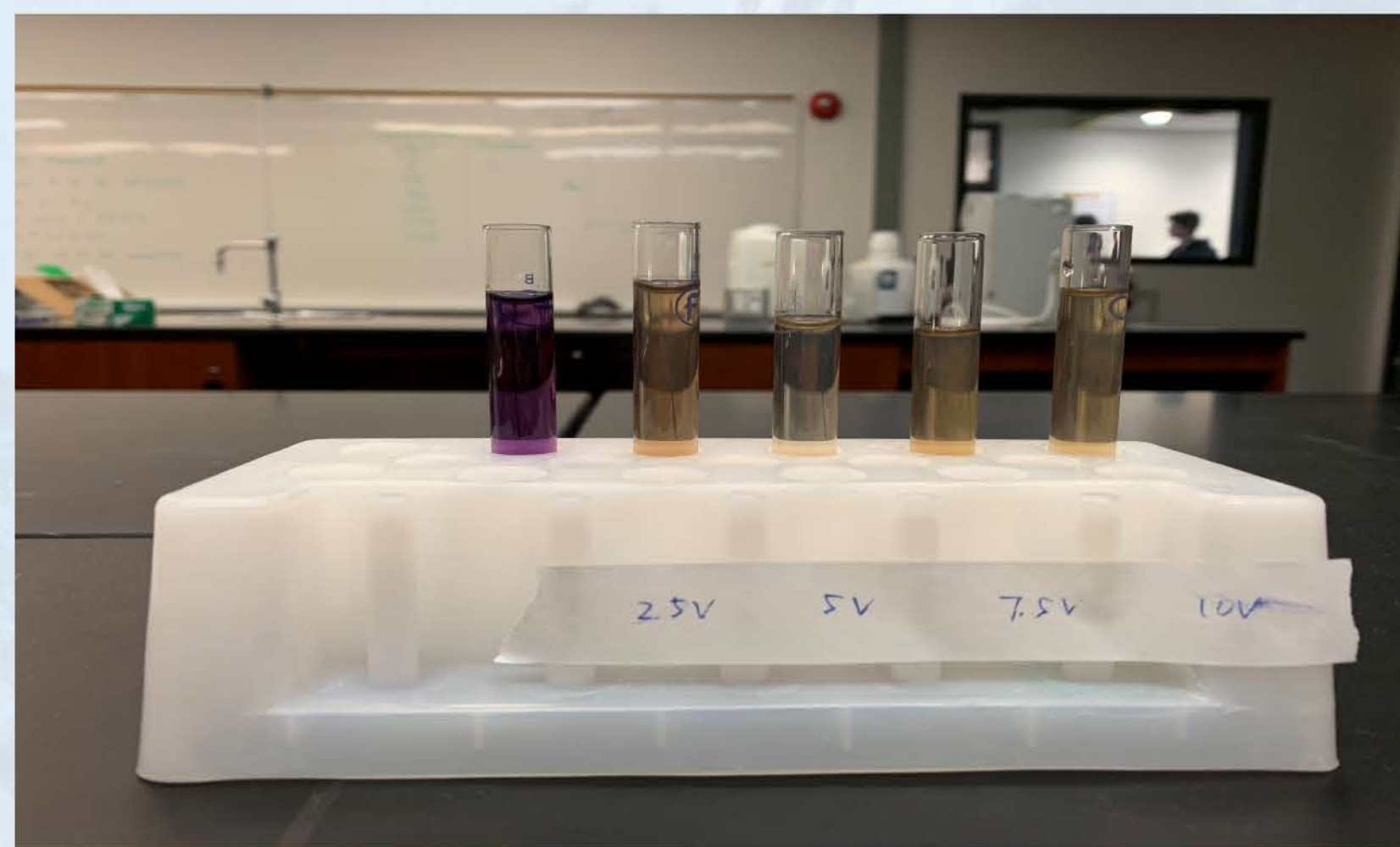


Test Methodology

- The reactor was tested against a synthetic wastewater solution containing 25 mg/L of Eriochrome Black T dye
- The reactor was tested at a variety of electrical potential differences while holding all other variables constant
- Wastewater flow rate was selected to give a hydraulic retention time of 60 minutes
- Throughout the test, current was monitored using the voltage generator and notes were taken based on the qualitative properties of operation
- The performance of the reactor was evaluated on the basis of percentage dye removal

Design Solution and Results

Voltage Density (V/cm)	Removal Efficiency
0.83	36.6
1.67	66.0
2.50	34.3
3.33	49.7



Conclusions and Recommendations

- Anodic oxidation can effectively reduce colour in textile wastewater by up to 70%
- Electrodes must be cleaned regularly to limit passivation
- Tests on different electrode materials recommended especially materials with high oxygen overpotential
- Testing at larger scale is also recommended
- Residual iron due to corrosion of steel electrodes results in red colour in effluent which may require subsequent treatment