

ABSTRACT

The rapid growth of industries goes hand in hand with the increase in waste and waste generation. Waste processing and management are carried out through various methods to achieve efficiency and effectiveness. In this context, liquid dye waste from the textile industry becomes a major concern due to its impact on the quality of freshwater. An important step following dyeing waste treatment is measuring the loss of color in the treated wastewater. Although this measurement typically employs a UV-Vis spectrophotometer, the high cost of acquiring such equipment means not all organizations have access to it. Consequently, test samples must be sent to laboratories equipped with the device, incurring logistical costs and research obstacles.

An affordable alternative tool that can generate valid data is necessary to support research in water purification. The required method involves measuring the degradation of color absorption in a solution, a task that can be accomplished using a photometer based on Lambert-Beer's law. This method utilizes monochromatic light without breaking down polychromatic light, allowing the separation of wavelengths from 350nm to 750nm, encompassing colors such as red, orange, yellow, turquoise, green, light blue, blue, and purple. The development of the apparatus is designed to be a low-cost system, utilizing light sensors and leveraging the properties of light.

Each color of light possesses a complementary color with respect to the solution's color. Suitability is also based on the degradation values of color absorption attached to the table with corresponding percentages. Experimental validation presents graphs that are compared with theory, yielding a similarity level of >97% in the apparatus. The creation of a portable photometer adheres to the low-cost system concept, complete with data visualization through a local web host.

Keywords: Lambert-Beer, solution, low-cost, photometer, spectrophotometer.