# THE REMOVAL OF CRYSTAL VIOLET DYE USING PLANT-BASED SORBENTS

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## ABSTRACT

### THE REMOVAL OF CRYSTAL VIOLET DYE USING PLANT-BASED SORBENTS

The widespread use of crystal violet dye in the textile industry has led to significant wastewater pollution, posing a threat to safe drinking water worldwide. This pollution affects human health and aquatic life by contaminating fresh body water and reducing dissolved oxygen levels through the inhibition of photosynthesis metabolism. Additionally, traditional waste management methods, such as open burning, contribute to air pollution. To address these issues, adsorption using plant-based sorbents has emerged as an effective technique. This project aims to prepare sorbents from banana peels (BP), pineapple wastes (PW) and sugarcane bagasse (SCB) and evaluate their effectiveness in removing crystal violet dye. The study will investigate the impact of concentration, pH, and contact time on the dye removal process. The anticipated outcomes include insights into the preparation of plant-based sorbents and a comprehensive understanding of their performance in dye removal.

# CHAPTER 1

# RESEARCH BACKGROUND

## 1.1 Introduction

Crystal violet (CV) dyes or also known as triphenylmethane are widely used in the textile dye manufacturing industry as well as a biological stain in human and veterinary medicine. It also provides a deep violet color as printing inks and paints. Crystal violet is more toxic than negative dyes (Essandoh M, et al., 2021). Around 100 tonnes of liquid effluents were added per year by the textile industry, and it is considered as the biggest contributor among the contributors for dyes (Katheresan, et al., 2018). Water contaminated by various dyes can harm plants, resulting in the annihilation of an entire ecosystem (Uddin, et al., 2009). Thus, multiple techniques were studied to treat wastewater from harmful effluent before being disposed to the environment. Nanotechnology provides a better option for wastewater treatment as it gives an outstanding adsorption capacity (Madhura et al., 2018). Adsorption or removal of dyes from the wastewater is the most common technique used these days as it is efficient and cost-effective (Foroutan et al., 2020). Adsorption process includes the attachment of one or more adsorbates to an adsorbent through chemical or physical bonds.