Effect of Nitrogen Source on Decolourisation of Methyl Orange by *Ganoderma Lucidum*

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ABSTRACT

One of the *Ganoderma* species, a species of *Ganoderma* with red colour that grows in Europe and some parts of China, the *Ganoderma lucidum* thrives on decaying hardwood trees. The study explains the decolorization of Methyl Orange using *Ganoderma lucidum*. Due to the dye's unchangeable nature, a new successful method was developed for its degradation. *Ganoderma lucidum* was capable of the decolorization of Methyl Orange at the latest 150 mg/L dye concentrations, even when the environment was unexposed. In this research, the effect of different nitrogen source which were Ammonium Sulphate, Ammonium Nitrate, Potassium Nitrate, we carry out to study the complete decolorization of Methyl Orange by *Ganoderma Lucidum* within 11 days of incubation. The degradation of dye was studied by UV-Vis Spectroscopy.

Keywords: *Ganoderma Lucidum*, methyl orange dye, nitrogen source, UV-Vis spectroscopy

INTRODUCTION

Methyl orange is a pH indicator commonly used in titrations due to its clear and noticeable colour change at different pH levels. In acidic solutions, it appears red, while in basic solutions, it turns yellow. This indicator is particularly useful for titrating acids because of its colour transition (Lellis et al., 2019). *Ganoderma lucidum* is a red-coloured species of *Ganoderma* that has a limited distribution in Europe and parts of China, typically growing on decaying hardwood trees (Singh & Singh, 2010).

In Malaysia, recent statistics on the water pollution index highlight the extent of toxic waste and pollutants entering water sources. As clean water sources continue to dwindle, the demand for water treatment technologies is increasing alongside rising water supply needs (Asgher et al., 2010). Research indicates that fungal treatment is more effective than other water purification methods in terms of the processes involved and the substances required (Padmavathy, 2003). The objective of this study is to examine the decolorization of methyl orange dye by testing various nitrogen sources: ammonium Sulphate, ammonium Nitrate, potassium Nitrate. Additionally, it is essential to analyse the decolorization of methyl orange by Ganoderma lucidum using UV-Vis spectrophotometry and to record the resulting data.

METHODOLOGY

Preparing the Solution

To prepare the solution, 500 ml of distilled water was mixed with 0.025 g of methyl orange to achieve a concentration of 50 mg/L. Then, 25 ml of *Ganoderma lucidum*, making up 5% of the solution, was added.

Nitrogen Sources

In this experiment, 3 different nitrogen sources, namely Ammonium Sulphate, Ammonium Nitrate, Potassium Nitrate, were employed. The solution, prepared with each respective nitrogen source, contained 1.2g of that source, making up 1% of the solution. The solutions were divided based on the analysis days, which included day 0, day 4, day 7, and day 11. Each solution was securely sealed with parafilm and left at room temperature.

Decolorisation

Leave the solution at room temperature and seal it tightly with parafilm to isolate it from the surrounding environment. The decolorization of methyl orange will be analysed using a UV-vis instrument, with assessments made on day 0, day 4, day 7, and day 11.

Collecting Data

The data collected for all the nitrogen sources are analysed using UV-vis instrument following the day. Graph is plotted to find the most optimum nitrogen source to decolorised the Methyl Orange.

RESULTS AND DISCUSSION

Ganoderma WR-1 was effective in decolorization of industrial effluent comprising of a broad-spectrum of chemically different dyes. Agitation was found to be an important parameter, while yeast extract were the best nitrogen source, respectively, for amaranth decolorization. Orthogonal array design based optimized media could further enhance the rate of decolorization. Chemically different dyes studied were successfully decolorized by the culture. Industrial effluent (2%). The results show in Figure 1 until Figure 4.

Effect of Ammonium Sulphate on the Solution

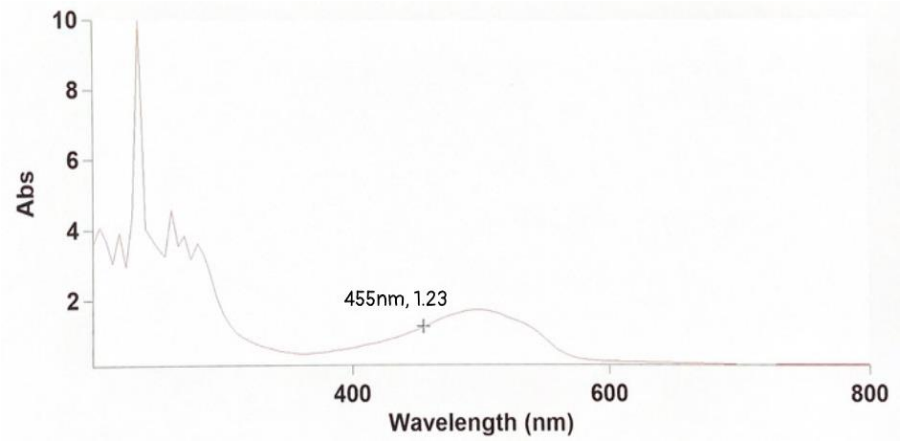

Figure 1. Uv-vis result of Ammonium Sulphate

Effect of Ammonium Nitrate on the Solution

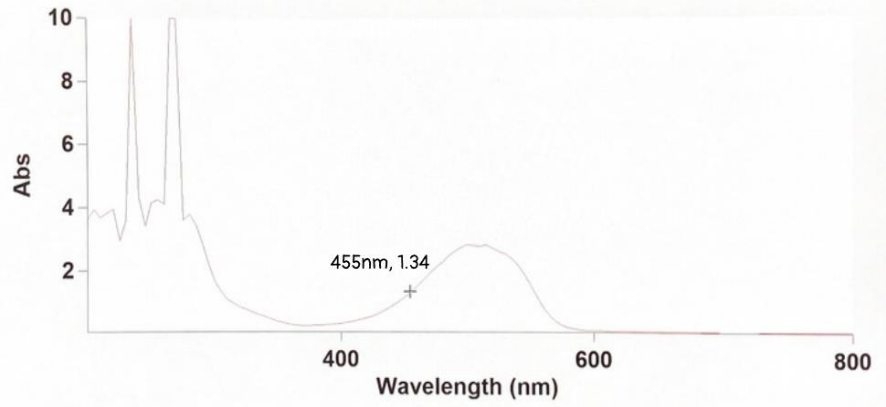

Figure 2. Uv-vis result of Ammonium Nitrate

Effect of Potassium Nitrate on the Solution

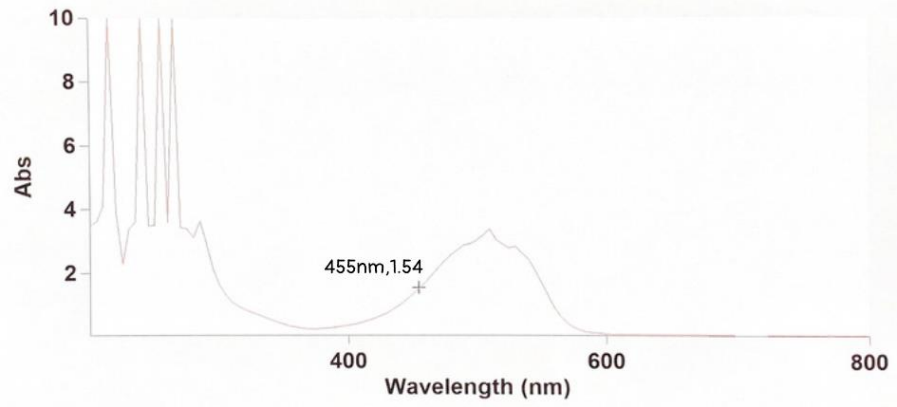

Figure 3. Uv-vis result of Potassium Nitrate

Decolorisation of Methyl Orange's Chart

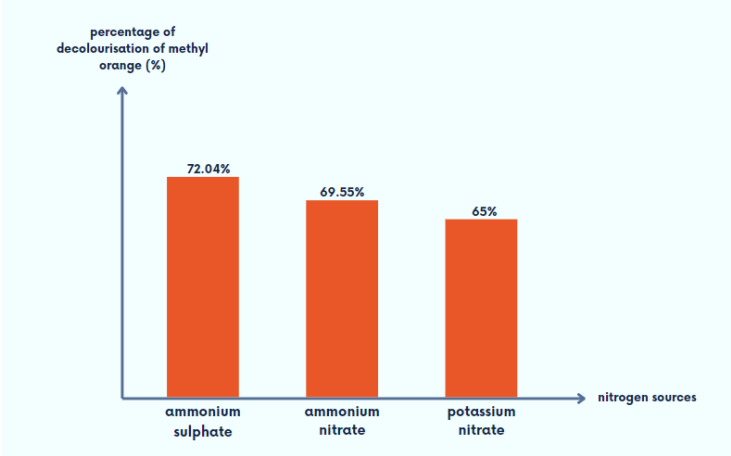

Figure 4. The percentage of decolorisation of methyl orange

CONCLUSION

Ganoderma Lucidum demonstrated its highest effectiveness in decolorizing methyl orange dye when paired with Ammonium Sulphate as the nitrogen source, achieving a rate of 72.04%. Conversely, its least effective performance in methyl orange dye decolorization was observed when Potassium Nitrate served as the nitrogen source, resulting in a rate of 65%.

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