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INVESTIGATION OF THE CATALYTIC PROPERTIES OF SILVER PARTICLES OBTAINED THROUGH BIOSYNTHESIS

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INTRODUCTION

Currently, obtaining catalytic materials is a global need in various production processes, in addition to the growing need for their application in environmental remediation, energy production, among others. KHAN et al. (2020). With the world's population growing and with the development and expansion of industries, there is a consequent increase in environmental pollution. In this sense, many organic and toxic pollutants have reached the environment due to various industrial processes. Among these pollutants are organic dyes, which are among one of the forms of contamination of the environment. KHANDAN et al. (2020). Noble metal nanoparticles, such as those from silver, are well recognized as catalysts. Thus, green methods have been applied to obtain nanoparticles. These methods employ solutions of aqueous plant extracts which are made up of biomolecules which can promote the reduction of metal ions into nanoparticles. SHABAANI et al. (2020) The aim of this study is to obtain water-soluble phytochemical extracts from the species *Cymbopogon nardus* and use these extracts to obtain silver particles that are more efficient as catalytic surfaces

METHODOLOGY

Initially, 7.5 g of cinnamon in natura were weighed and 75 mL of distilled water were added until the extract was obtained, which was then centrifuged and filtered. Next, 1.0 g of silver nitrate was added to 8 mL of cinnamon extract. This mixture remained at rest. After this period, the metal extract/salt mixture was centrifuged and the solid fraction placed for drying. Then, the solution of a liquid effluent was simulated for this, a solution of 6,25.10-5 M of methylene blue was prepared. Then 15 mL of the dye solution was added to 24 mg of the solid compound obtained by biosynthesis. Tests were also performed by mixing 15 mL of methylene blue solution with 24 g of silver nitrate, and 15 mL of methylene blue solution with 8 mL of cinnamon extract.

RESULTS AND DISCUSSION

In order to analyze the catalytic potential of the compound resulting from the silver salt treated by biosynthesis, and to also study the effect of the extract and the isolated metal salt on the removal of the dye from the aqueous medium, analyzes were carried out in the UV-vis spectrophotometer in the wavelength range from 300 to 900 nm.

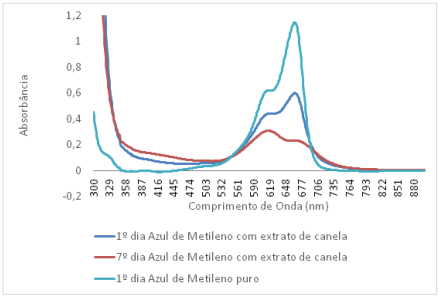

Figure 01 - UV-vis spectra of monitoring the degradation of methylene blue dye in the presence of pure extract.

Source: The Authors, 2022.

It can be seen in figure 01 that the cinnamon extract contributes to the degradation of the dye in a time interval of seven days.

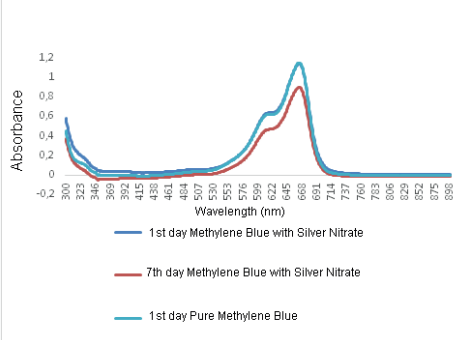

Figure 02 - UV-vis spectra of monitoring the degradation of methylene blue dye in the presence of silver nitrate.

Source: The Authors, 2022.

Figure 02 shows that when the dye solution is placed in contact with the silver salt, the degradation of the dye is much slower when compared to the results of figure 01, experiment with pure extract.

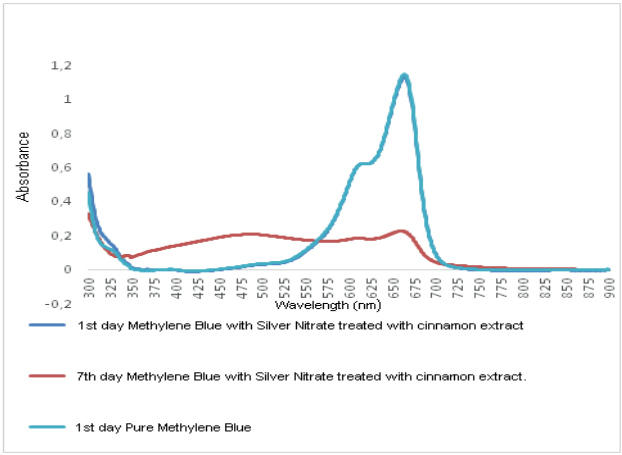

Figure 03 - UV-vis spectra of monitoring methylene blue dye degradation in the presence of extract-treated silver.

Source: As Autoras, 2022.

Figure 03 shows that the most effective action in the degradation of the methylene blue dye was with the silver compound resulting from the biosynthesis process, when compared to the results of figures 01 and 02.

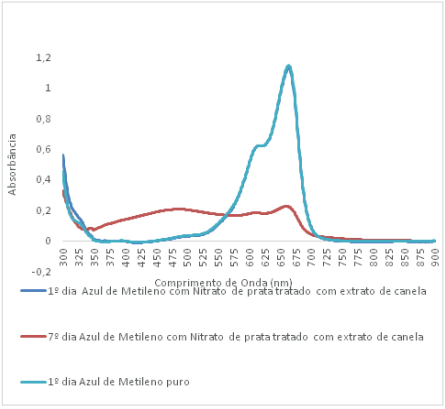

Figure 04 – Comparison between the resulting solutions: methylene blue with silver nitrate (on the left); methylene blue with cinnamon (in the center) and methylene blue with treated silver.

Source: The Authors, 2022.

CONCLUSION

Through the tests it can be observed that the silver salt treated by biosynthesis was more efficient than the untreated silver salt. This shows the modification of the metal surface and the improvement of the catalytic efficiency of the obtained material.

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