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New Spectrophotometric Methods for Determining Albendazole in Bulk and Dosage Forms in the Presence of Cerium as an Oxidant and Both Indigo Carmine and Alizarin Red Dyes

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Abstract

New spectrophotometric techniques have been created to measure albendazole in tablet, suspension, and bulk dose forms. Utilizing known excess ceric ammonium nitrate (Ce4+) to oxidise an albendazole solution in methanol, the amount of unreacted Ce4+ was then measured using two different dyes, indigo carmine and alizarin red, in combination with a universal buffer. Maximum absorbance for the reaction was seen at 610 nm for indigo carmine and 401 nm for alizarin red. Numerous variables, including buffer type, dye volume, oxidant volume, time, temperature, organic solvents, and sequence addition, were investigated. Albendazole was found to fulfil Beer's law between 1.32 and 7.95 g mL-1 with both dyes having molar absorptivities of 4.69 103 L.mol-1. cm-1 for indigo carmine and 97.53 103 L.mol-1.cm-1 for methylene blue.alizarin crimson .In terms of the limit of detection, which was reported to be as low as 0.24 and 0.35 g mL-1 for indigo carmine and alizarin red, respectively, the approaches also demonstrated a high level of sensitivity. Statistical analysis revealed that the approaches had low standard deviation values and were accurate and precise. The methods were then successfully used to determine the presence of albendazole in tablets and liquids.

Discussion

For the analysis of various materials, such as ABZ, Ce4+ has been utilised as an efficient oxidising agent, producing a variety of oxidised compounds.While a known amount of the dye is being oxidised by the unreacted Ce4+, the remaining dye is being spectrophotometrically quantified at corresponding maximum wavelengths.Using 1 mL of ABZ (1 10-3 M), the effects of various volumes of Ce4+ in the presence of dye on the oxidation process were examined. It was discovered that the appropriate volume of Ce4+ for both dyes was 2 mL. The influence of various organic solvents, including propanol, ethanol, DMF, acetone, formaldehyde, and ethylene glycol, on the absorption spectra was investigated, and the absorbance was determined in comparison to the control solution. There were seven different ABZ concentrations recommended for linearity research. The calibration curves, which were created by plotting absorbance vs concentration, revealed linearity for both dyes in the concentration range of 1.23-7.95 g mL-1. Additionally, the approaches demonstrated significant sensitivity with regard to the limit of detection, which was reported to be as low as 0.24 and 0.35 g mL-1 for INC and ALR, respectively. Table 1 reports other metrics that show a high level of linearity, accuracy, and precision.

Conclusion

The oxidation of albendazole with ceric ammonium nitrate in the presence of indigo carmine or alizarin red dyes is the basis for the claimed simplicity, sensitivity, precision, and accuracy of the suggested procedures. Beer's law is followed for albendazole with both dyes having good molar absorptivities in the range of 1.23-7.95 g mL-1. Then, the techniques were used to determine albendazole in a variety of dosage forms, with good recoveries showing that the excepients don't interfere with the suggested techniques.

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