

A colorimetric and fluorescent sensor based-azo dye to develop test strip for Cu^{2+} / CN^- detection in aqueous media

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1. Introduction

Because of the widespread application of Cu^{2+} and cyanide ions in chemistry, medicine and biotechnology ^{1,2}, they has become one of the most important pollutants in the environment. Therefore, the detection of these ions was considered as an important consideration. In this work, we report a selective fluorescent and colorimetric sensor based azo dye for cyanide and copper ion detection. The chromogenic and the fluorogenic behaviors toward various ions were investigated, the results showed an exclusive colorimetric and a fluorescence turn-on response for copper and cyanide ions in aqueous solution (figure1). The sensor was immobilized on cellulosic textile, in reason to elaborate a test strips based on textile, which could act as a convenient and efficient $\text{Cu}^{2+}/\text{CN}^-$ test kit.

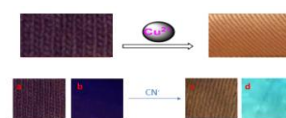


Figure 1. Color change of the elaborated test trips after immersion in Cu^{2+} and CN^- respectively

2. Experimental

The new chemosensor was synthesized and characterized by FT-IR and NMR spectroscopy. The ligand was prepared through a simple synthetic route according to two steps (diazotation and copulation), and the immobilization of this chemosensor was used according to the classical procedure of dying.

3. Results and Discussion

The results has showed that the azo dye has a high selectivity and sensitivity recognition toward Cu^{2+} and CN^- . Chemosensor showed an immediate color change from purple to orange for Cu^{2+} and gave also a response to the cyanide ion both by visible color changes as well as fluorescence turn-on response. The selectivity and sensitivity of the sensor toward Cu^{2+} and CN^- ions has been investigated by colorimetry and UV-Vis spectroscopy. Moreover, a test textile for high-selectivity detecting Cu^{2+} and CN^- ions in aqueous solution has been achieved using a new azo dye as chromogenic chemosensor molecule, and a solid cellulose textile, as a substrate. Depending on the amount of ions in contact with the detecting molecule a spectacular color change in the cellulose indicator was produced, which make it possible to determine the concentration of Cu^{2+} and CN^- ions either by naked eye or spectroscopically on aqueous media for real samples.

4. Conclusions - in this paper we have presented a chemosensor based azo dye for colorimetric detection Cu^{2+} and simultaneous colorimetric and fluorescent detection of CN^- . Chemosensor showed an immediate color change from purple to orange for Cu^{2+} . The chemosensor gives also a response to the cyanide ion both by visible color changes as well as fluorescence turn-on response. The detection of various ion in solution using 1 was found to be free of interference from any other ions. In addition, test strips based textile was elaborated by dying cotton fabrics with chemosensor, which also exhibited a

good selectivity to Cu^{2+} and CN^- in solution. We believe the test strips could act as a convenient and efficient test kit for Cu^{2+} and CN^- respectively.

5. References

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