



Simple and Selective Naked-Eye Detection of Cu²⁺ and Al³⁺ Using *Hibiscus rosa-sinensis* Linn Flower Extract

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ABSTRACT

A simple and selectively visual detection of Cu²⁺ and Al³⁺ using *Hibiscus rosa-sinensis* Linn extract in aqueous solution was investigated for the first time. It was found that positive visual detections of Cu²⁺ and Al³⁺ gave their color change at pH 7. The selectivity of this method was examined using two masking agents, sodium fluoride (NaF) and dimethylglyoxime (DMG). The method exhibits good selectivity when NaF and DMG were used for the determination of Cu²⁺ and Al³⁺, respectively. The flower extract could be employed for Cu²⁺ and Al³⁺ detection at the lowest concentration of 0.5 mg/L and 1.0 mg/L, respectively. The results from naked-eye detection were also evaluated by comparing with those of using inductively coupled plasma - atomic emission spectrometry (ICP-AES), and there was no significant difference noticed. Moreover, the proposed method could be potentially applied for real water samples with visual detection of Cu²⁺ and Al³⁺, which was rapid, convenient, low-cost and environmental friendly.


Keywords: Naked-eye detection, Aluminum, Copper, *Hibiscus rosa-sinensis* Linn.

INTRODUCTION

Copper ion (Cu²⁺) plays important roles in various biological systems and the environment. It is well known that copper is an essential trace element for humans and other animals. However, its high concentration in domestic water and groundwater becomes a serious threat to human health. The U.S. Environmental Protection Agency

(EPA) has set the maximum allowable level of copper in drinking water at 1.3 mg/L (~20 μM). Cu²⁺ had highly toxic to humans at high concentrations¹⁻³. People who were exposed to excess uptake Cu²⁺ tend to experience some diseases such as liver or kidney damage, neurodegenerative disease, gastrointestinal disturbance⁴⁻⁷. In addition, aluminum ion (Al³⁺) is found abundantly in nature, such as in drinking water contamination, and can



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