UV-VIS SPECTROSCOPIC STUDY OF NATURAL DYES WITH ALUM AS A MORDANT

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Abstract

The formation of complexes between alum with morin and quercetin in aqueous solution with and without pH control have been studied by UV-visible spectroscopy. The stoichiometries of the complexes were evaluated using the molar ratio method. The association ratio of alum with morin and quercetin without pH control were 3 : 2 and 1 : 1, respectively. In the buffer system pH 4.5, the stoichiometry of alum with morin and quercetin were 1 : 1 and 1 : 1, respectively. The heats of formation of complex, obtained by semi-empirical PM3 method, indicated that the proposed complexes can be favorably formed.

Keywords: Morin, quercetin, spectroscopic, complexation, alum

Introduction

Flavonoids, polyphenolic pigments are widely present in plants. Morin (3,5,7,2', 4'-pentahydroxyflavone) and quercetin (3,3',4',5,7-pentahydroxyflavone) are phenolic compounds derived from hydroxyl substitutions on the flavone chromophore. Figures 1(a) and 1(b) show the chemical structure of morin and quercetin, respectively. The flavone-based compounds are known to form stable complexes with metal cations. Maclura cochinchinensis (Lour.) Corner is widely used by villagers, especially in the northeast of Thailand, for dyeing fibres which yield a beautiful yellow colour (Moeyes, 1993). The flavonoid yellow colouring substance in the wood is morin, which is a major component of the heartwood of this

Figure 1. Chemical structure of (a) morin and (b) quercetin