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Fluorescent hydronium ion sensor from *Garcinia mangostana*

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Garcinia mangostana (mangosteen) is a tropical fruit found in Asia. Xanthonoids and flavonoids are naturally occurring compounds in mangosteen fruit. The peel contains a juice that is purple in colour, mainly due to exocarp pigments including xanthonoids. The fluorescence emission peak intensity can be utilized to measure [H^+]. Additionally, this is an eco-friendly non-toxic substance extracted from plant material. Mangosteen peel (100 g) was separated from the fruit, crushed and extracted with 250 ml of acetone using a soxhlet extractor and concentrated. Solutions of different concentrations of H^+ were prepared by diluting a stock solution of 0.1 mol dm^{-3} HCl - 0.00, 0.002, 0.004, 0.006, 0.008 and 0.010 mol dm^{-3}. Mangosteen peel extract (5.00 ml) and 10.00 ml of acetone was placed in each 25.00 ml volumetric flask, the required amount of 0.10 mol dm^{-3} added and the total volume was made up to 25.00 ml with distilled water. Absorbance was measured for each sample at 406 nm. Fluorescence emission spectra were obtained by exciting each sample at 406 nm and the fluorescent emission was scanned in the wavelength range of 425 nm to 570 nm using a Hitachi F-2700 fluorescence spectrophotometer. Maximum emission for each of the samples was observed at 467nm. A Stern-Volmer plot was constructed using the emission of each sample.

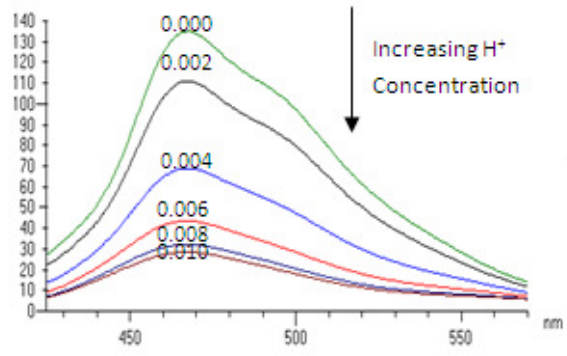

Fig. 1 Emission spectra as a function of [H^+]

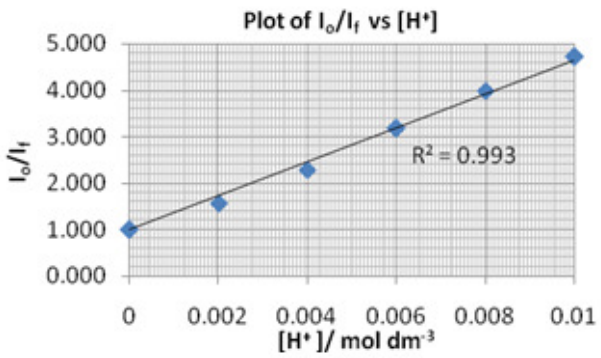

Fig.2 Plot of I_o/I_f vs [H^+]

The linearity of the Stern-Volmer plot shows that [H^+] is proportional to the fluorescence emission intensity. Formation of a precipitate during addition of H^+ could be overcome by adding a constant volume of acetone to each sample. Therefore [H^+] can be determined quantitatively using this method.

Acetone extract of Mangosteen peel can be used as a fluorescent indicator for the determination of [H^+]. This is a relatively inexpensive substance, and the method is user friendly and easy to carry out. It has applications in quantitative analysis and in industry.

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