Extraction of Tannin from Oil Palm Empty Fruit Bunch as a Rust Deactivator

M. N. Mohamad Ibrahim[1], M. Y. Nor Nadiah[1] and A. A. Amirul[2]

[1]*School of Chemical Sciences, Universiti Sains Malaysia, 11800 Minden, Pulau Pinang.*

[2]*School of Biological Sciences, Universiti Sains Malaysia, 11800 Minden, Pulau Pinang.*

Corresponding Author: M. N. Mohamad Ibrahim

Telephone: (604)-6533554; Facsimile: (604)-6574854

E-mail: mnm@usm.my

Abstract

The purpose of this research is to investigate the effect of reaction between rust and rust deactivator obtained from oil palm empty fruit bunch (EFB) powder. The extraction of tannin using 65% (v/v), 70% (v/v) and 75% (v/v) acetone gave 4.23%, 4.54% and 4.46% of tannin respectively. From the result of FTIR spectroscopy, the typical absorption peaks of tannin have been observed. In the corrosion tests, two methods were used to certify the reaction between tannin and rust i.e. FTIR method and plate observation technique. The spectrum of FTIR showed that ferric phosphate was formed but ferric tannate had not been formed a week after the mixture of tannin and phosphoric acid was applied to the rusty plate, while in the plate observation method, a thin layer of tannin was found to deactivate the rusting process. The UV-VIS spectroscopy showed that the tannin samples were not pure and contained some impurities due to different spectrum observed from pure tannin sample.

Keywords

tannin, rust deactivator, oil palm empty fruit bunch

Introduction

Malaysia produces an abundant supply of palm-press fibres and oil palm empty fruit bunches (EFB) which are regarded as wastes and have not been utilized satisfactorily [1]. About 7.3 million tones of EFB are generated annually [2]. Studies have shown that the EFB fibre could be used as raw material for papermaking [3].

In the recent study, the optimum acetone concentration for extraction of tannins from EFB was determined. Tannins are generally defined as naturally occurring polyphenolic compound of high enough molecular weight in the range between 500 to 3000 Dalton (Da) and compounds that dissolve in water [2]. Tannin formed complex when reacted with protein, alkaloid, mercury chloride and other heavy metals [4, 5]. Tannins with high molecular weight (eg. 20,000 Da) have ability to form complex with certain polysaccharides [6]. This makes tannin compounds isolated from other polyphenolic groups.

Characterization of the compound using FTIR and UV-VIS was also performed. The tannins were then collected and tested on mild steel plate using two different methods. The study shows that tannins from the oil palm EFB have a potential to be used as an alternative rust deactivator.

Materials and Methods

Materials

The oil palm empty fruit bunch (EFB) in a powder form was obtained from the Sabutek Sdn. Bhd., Teluk Intan, Malaysia. The EFB fibre was dried in a rotating oven with air circulation at 60°C before it was ground to pass a <1.0 mm screen.