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THE EFFECT OF SPIRULINA SP AS GREEN CORROSION INHIBITORS ON MILD STEEL IN 0.2M SULPHURIC ACID SOLUTION.

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ABSTRACT

Nowadays, extensive and persistent corrosion has serious financial and social consequences. As a result, greater effort must be put into preventing corrosion. Corrosion is typically stopped or slowed with the help of inorganic and synthetic metal corrosion inhibitors; however, these compounds are extremely dangerous. An obvious answer to this problem could be found in green corrosion inhibitors, which are both cheap and gentle on the planet. The ability of the green microalgae Spirulina sp. to prevent mild steel from corroding in sulphuric acid (H_2SO_4) was investigated in this study. Furthermore, the effectiveness of Spirulina sp. as a corrosion inhibitor was investigated using the gravimetric method and thermodynamic analysis. The results showed that the maximum inhibition efficiency (IE%) was achieved when 0.1gL of the Spirulina sp. biomass was used to treat mild steel corrosion. However, performance of Spirulina sp. and Chlorella sp. were contrasted. As a result, Chlorella sp. more performed than Spirulina sp. Interestingly, the value of IE has increased with the corrosion rate as a result of temperature rise. Adsorption thermodynamic parameters, including activation energy (Ea), enthalpy (H°), and entropy (S°), were also computed and found to be in good agreement with experimental data. Different mechanisms are at work, as evidenced by the fact that the Ea value varies between Chlorella sp. and Spirulina sp. Evidence of endothermic and spontaneous in the reaction was provided by the positive H° and S° values. The research concluded that both green microalgae were a promising option for corrosion prevention due to their high inhibitory efficiency.

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CHAPTER ONE
BACKGROUND

1.1 Introduction

Mild steel is a type of carbon steel with low amount of carbon. It is also known as "low carbon steel". Mild steel contains 0.05% to 0.25% of carbon and it does not contain large amount of other elements beside iron. Other than that, the demand of the mild steel is high due to the weld ability and also machineability among other qualities. Mild steel is widely used because of its low cost and versatile metal qualities, which make it suitable for a variety of applications. Mild steel easily reacts to acidic medium like sulphuric acid or hydrochloric acid in which normally used in the industry for de-scaling of metal and pickling.

Corrosion, which is the degradation of a material brought on by its interaction with its environment, can happen at any stage or time throughout the production of petroleum and natural gas. After that, corrosion processes alter a metal's or metal alloy's physical characteristics and mechanical behaviours in addition to their chemical properties. In industrial procedures such as pickling, when the metal alloy comes into contact with concentrated acids to remove incrustations in the system, corrosion issues emerge as a result of the interaction of concentrated acids and carbon steel.

In this study, *Spirulina sp.* was used for natural corrosion inhibition of mild steel in 0.2M sulphuric acid solution. *Spirulina sp.* is suitable to be a natural corrosion inhibitor because it is renewable resource and readily available in the market. Thus, the purpose of this study is to explore the potentiality of *Spirulina sp.* becoming a natural corrosion inhibitor based on parameter of concentration of inhibitor and temperature of acid medium.

Nowadays, environmental issues have increased interest in developing more environmentally friendly solutions, such as corrosion inhibitors with reduced environmental impact. Not just that, it is also cheap to produce and also made from renewable resources such as algae and etc. Our focus using this natural corrosion inhibitor are to avoid any possibility pollution that can occur in the next future.