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Investigation of the Inhibition Effect of Python Oil on Mildsteel Corrosion

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Abstract: *This research work was centered on the Investigation of the Inhibition Effect of Python Oil on Mildsteel Corrosion. The python oil has, in the past, been utilized for several useful purposes (especially for its medicinal values), but not necessarily for corrosion inhibition/control purposes; also, the need to get the real oil from python meat is another source of worry, as so many marketers deceive buyers of the oil in this regard. The python oil was collected from the extraction point at Umunnochi in Isukwuato L.G.A. of Abia State of Nigeria, where the dealers employed smoking techniques to separate the oil from the already-dead python meat. The oil was subjected to centrifugation, to remove inherent particulate matters. Corrosion inhibition effect of the oil on mildsteel was studied at varying medium concentrations and time at 65^0C, using weight loss technique. The results indicate that increase in concentration and time increases the rate of corrosion of mildsteel. It was also observed that addition of the python oil to the medium lowered the weight loss, indicating that the oil has the capacity to mitigate mildsteel corrosion. The results further demonstrated that there was adsorption of the acid medium (and other solutions) on the metal during the process, indicating physical adsorption at all concentrations in both the blank and presence of the inhibitor, at the reaction temperature.*

Keyword: *Investigation, Inhibition Effect, Python Oil, Mildsteel*

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I. Introduction

Corrosion of metals is an unavoidable but controllable process. In many industries, corrosion costs billions of dollars each year for prevention, replacement and maintenance (Okafor *et al*, 2004). Acid solutions (especially hydrochloric and sulphric acids) are widely used in acid-picklying and industrial cleanings, and many a time, they end up causing metal corrosion (El-Abd, 2008; Ita and Effiong, 2000). To avoid unwarranted attack of the metal by the acid, inhibitors are usually added. Mildsteel is one of the major construction materials, which is extremely used in chemical and allied industries for the handling of acid, alkali and salt solutions (Onen *et al*, 2011). The metal structures are often subjected to cleaning, descaling and pickling by acids which are normally accompanied by considerable dissolution of metals, as well as consumption of the acid, where inhibitors can generally play vital roles in the control/abatement.

On the other hand, Python oil is one of the varieties of snake oil derived from species of snake called 'the python'. The python belongs to the snake family called *'pythonidae'* (very large snakes). Python is commonly found in Asian region, and also in Australia and Africa; it is among the largest snakes species.

Snake oils are of immense health benefits, which are yet to be discovered by many people either because of their phobia for snakes and/or the likes. Slashinski *et al* (2012) revealed that snake can provide remedies to many health problems such as cardiovascular health issues, depression, blood pressure extremism, arthritis, triglyceride level control, skin (fungi) infections and so on. The omega-3 fatty acid found in python oil is effective for the prevention of hair loss and provision of nutrients to the scalp by improving the health of hair follicles. In other words, conditions like hair loss, dandruff and hair could be prevented through the application of python oil. More recently, Offurum *et al* (2019) reported that python oils contain prominent levels of phythochemical characteristics, such as flavonoid, terpenoid, cardiac glycocides, steroid and alkaloids that are biogenic/defensive compounds, which can serve efficient lubricating functions. However, there are many negative reputations about python oil. In addition to the ill-feeling about the snake and its derivatives, many sales agents of the oil are dishonest, and as such sell fake python oil because indeed, as it very difficult (or even impossible) to identify the real python oil in its concentrated nature. So the best option still remains to collect the oil from its source of extraction. It is important to note that allergic reactions (such as swelling of skin, itchy skin and rotten-smell) are likely after using the oil on the skin.

This research work, therefore, is centered on the assessment of the assessment of python oil for mildsteel corrosion inhibition.

II. Materials And Methods

The python oil was collected at the point of extraction from the dealers at Umunnochi in Isukwuato L.G.A. of Abia State of Nigeria. It was, later on, subjected to other methods as required of the study.

2.1 Centrifugation

The oil sample was inoculated in different test tubes, each containing 15ml of the sample. 0.5g of prepared activated carbon was added to each of the test tubes and placed safely in the centrifuge. The centrifuge (already connected to a power source) was switched on, and set at 100rpm. After 10minutes of the revolution, the samples were removed and filtered into the beaker, by means of filter paper. The filtrate, which is cleaner and purer form of the oil was collected and stored in sterile container for the study.

2.2 Corrosion inhibition Study

Gravimetric study was conducted on the sample using six different beakers (of 250ml each). The beakers contain different concentrations of the medium namely: 0.2M, 0.4M, 0.6M, 0.8M and 1.0M respectively. The sulphuric acid medium was maintained at 65^0C, using the water bath. The mildsteel coupons were weighed, and the initial weights were noted and recorded. They were then suspended in the beakers accordingly, with the help of glass rods and glass hooks. The coupons were retrieved from the corrosive solutions after 1hour, washed gently with distilled water, oven-dried and reweighed. The difference in weight was obtained as the weight loss. The experiment was repeated and an average weight loss was obtained and recorded. The same procedure was followed to obtain the weight for 2, 3 4 and 5hours respectively for both blank conditions and in the presence of inhibitor, and the results were documented accordingly.

III. Results And Discussion

The results of the mildsteel corrosion inhibition study at varying concentrations of the acid medium, using python oil as inhibitor, are presented in Tables 1 and 2 for blank conditions and in the presence of the inhibitor respectively.

Table 1: Weight loss (g) in the Absence of Inhibitor

Time	WEIGHT LOSSES AT DIFFERENT MEDIUM CONCENTRATIONS (g)				
	0.2M	**0.4M**	**0.6M**	**0.8M**	**1.0M**
1	0.1889	0.2326	0.2734	0.3018	0.3393
2	0.2762	0.2880	0.3945	0.4372	0.5347
3	0.3712	0.3910	0.4872	0.5052	0.7354
4	0.4518	0.5096	0.6163	0.6623	0.8369
5	0.5108	0.5108	0.7323	0.8142	0.9432

Table 2: Weight loss (g) in the Presence of inhibitor

TIME(hr)	WEIGHT LOSSES AT DIFFERENT MEDIUM CONCENTRATIONS (g)				
	0.2M	**0.4M**	**0.6M**	**0.8M**	**1.0M**
1	0.1295	0.2014	0.2905	0.3949	0.3972
2	0.1465	0.2419	0.3731	0.4017	0.4294
3	0.1614	0.2762	0.4259	0.4587	0.5832
4	0.1639	0.3051	0.4879	0.5134	0.7432
5	0.1692	0.3267	0.5191	0.5422	0.8861

From the results presented in the tables above, it would be observed that weight loss increases down the tables, as well as from left to right of the table, indicating a proportional relationship with corrosion reaction time and concentration of corrosive medium at reaction temperature of 65^0C. This implies that, increase in concentration and time increases the rate of corrosion of the mildsteel, this is in agreement with the documentations of Udiandeye et al (2011) and Swathi et al (2017), where 'ethyl esters of castor and rubber seed oils', as well as 'fatty acid derivatives' were respectively studied as inhibitors for mildsteel corrosion. However, the values of weight loss at blank conditions (table 1) appear higher than those in the presence of the inhibitor (table 2), some of which recorded as much as 77% percentage rate of reduction in weight loss. This demonstrates that the python oil has the capacity to mitigate mildsteel corrosion caused by acidic medium.

Also, the adsorption of the acid medium (and other solutions) on mildsteel, at all concentrations, in both blank conditions and presence of inhibitor during the process, indicate the occurrence of physical adsorption at the reaction temperature (Solomon, 2004).

IV. Conclusion

The present study has shown that python oil has the capacity of controlling/abating mildsteel corrosion in acidic medium, as the corrosion rate reduced prominently on the addition of the oil. The study also showed that increase in medium concentration and corrosion reaction time increase the corrosion rate, and as such lowers the inhibition efficiency. The study indicated the occurrence of physical adsorption on the adsorptive layer, as the solution systematically adhered to the metal surface during the process. However, python oil is recommended for advanced corrosion inhibition applications, since it has proven worthy of the purpose; further subjection of the oil to advanced processes, such as esterification, would improve its performance in corrosion control and abatement.

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