

Triolein Extracted from Used Cooking Oil as Inhibitor for Corrosion Protection of Mild Steel in H₂SO₄

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Structured Abstract

Background: Used cooking oil (UCO) when wasted in a large volume will cause problem to the environment such as water pollution and clogging the municipal sewer. Triolein extracted from UCO was used as an inhibitor for corrosion protection is a promising solution to this problem.

Methods: In this study, UCO was purified. Then, a weight loss method was used where mild steel coupons were weighted by 4-decimal analytical balance and weight were recorded. Then, the mild steel coupons were immersed for 1 hour in a test tube containing 2 mL of different concentrations (0.01 M, 0.1 M, 0.5 M and 1.0 M) of H₂SO₄ acid solutions and containing 1 mL PCO inhibitors for each coupon. After 1 hour, the mild steel coupons were removed, dried and reweighted using the same 4-decimal analytical balance and weight was recorded. The same steps were done for 3 trials and the average weight loss for each mild steel specimen was calculated. The corrosion rate and IE was calculated. The same steps were repeated for UCO inhibitor.

Results: Corrosion rate increased as concentration of acid increase for untreated sample (blank) with 5.5796, 7.8115, 13.3911 and 23.4344 mm/year at 0.01, 0.1, 0.5 and 1.0 M respectively. Meanwhile, corrosion rate of mild steel in presence of UCO increased as concentration of acid increase with lower corrosion rate than untreated sample. The corrosion rate of UCO increased from 1.4879, 2.2318, 5.5796 and 10.4153 mm/year at 0.01, 0.1, 0.5 and 1.0 M respectively. The inhibition efficiency (IE) of UCO was decreasing with 73.33%, 71.43%, 58.33% and 55.56% at 0.01, 0.1, 0.5 and 1.0 respectively. Because, as acid concentration increases, the number of active hydrogen ions also increases.

Conclusion: In conclusion, the weight loss method was used to determine the corrosion rate and IE for the UCO inhibitor. From the results obtained, the optimum concentration of sulphuric acid, H₂SO₄ for the inhibition of UCO is at 0.01 M with corrosion rate of 1.4879 mm/year and IE at 73.33%. Suggestion to improve IE of UCO is using the UCO as starting material synthesis to a non-ionic surfactant as corrosion inhibitor.

Keywords: Used cooking oil, corrosion inhibitor

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