CORROSION INHIBITION AND ANTIMICROBIAL ACTIVITY OF SOME NATURAL DYES

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Abstract:—

The present work was taken up as an exploratory study to test the corrosion inhibition efficiency and antimicrobial activity of natural dyes extracted from Turmeric root, Onion skin, Hibiscus flower, Teak bark, Beetroot. The corrosion inhibition study of the extracted dyes was carried out against sulphuric acid and hydrochloric acid. The extracted dyes were tested against common pathogens *Staphylococcus aureus, Pseudomonas aeruginosa* are used to do antimicrobial activity.

Key words: Natural dye, Corrosion inhibition, Antimicrobial activity, *Staphylococcus aureus, Pseudomonas aeruginosa*

I. INTRODUCTION

Environmental Standards in effluent disposal and allergic reactions associated with several synthetic dyes has necessitated the replacement of them with natural dyes. Synthetic dyes are toxic and several investigations have reported that they release harmful chemicals that are carcinogenic and detrimental to human health. Natural dyed textiles are non-toxic , environmentally benign. Plant based natural dyes have intense antimicrobial properties and are highly indispensable. Natural dye coating on fabric and related studies has gained considerable importance..

II. MATERIALS AND METHODS

5N Hydrochloric acid and 5N Sulphuric acid was prepared from AR Hydrochloric acid and AR Sulphuric acid, Inhibitors – prepared from natural dyes with double distilled water and acetone.

A. Weight loss measurement

Copper plate has been used. It was a polished using emery papers and washed with distilled water and finally degreased with the organic solvent acetone. The specimens were weighed. After weighing the specimens were immersed in 1N hydrochloric acid with (different concentrations) and without inhibitors. After 3 hours , the specimens were washed with distilled water , dried and again weighed. The weight loss was noted. From this weight loss value inhibitor efficiency were determined. The same procedure was repeated with 0.2N, .1N Hydrochloric acid with 0.2mm,0.4mm,0.6mm,0.8mm inhibitor solutions of natural dyes.The same procedure was repeated with the Sulphuric acid.

B. Inhibitor efficiency

Inhibitor efficiency has been determined by using following relationship.

$I.E = W_o – W_i / W_o * 100$

Where W_o = Weight loss without inhibitor

W_i = Weight loss with inhibitor.

C. Measurement of surface coverage(Θ)

The surface coverage(Θ) is calculated using the formula.

surface coverage(Θ)$E = W_b – W_i / W_b$

Where W_b and W_i are the Weight losses per unit area per unit time without and with inhibitor respectively

III. RESULT AND DISCUSSION

The following tables 1 & 2 indicate corrosion inhibition on HCl and H_2SO_4.The Hibiscus and Onion dyes are used for corrosion inhibition. Hibiscus dye shows HCL medium is high corrosion inhibition effect. Then onion dye shows equal effect on both HCl and H_2SO_4 medium.

A. Anti microbial studies of the extracted dyes:

Table3 detected the antimicrobial activity of selected natural dyes. Here used organisms of *Pseudomonas aeruginosa* and *Staphylococcus aureus.* Comparing all dyes Turmeric dye shows better result against organisms

Table 1 Corrosion inhibition on HCl and H_2SO_4 with hibiscus

DYE: HIBISCUS METAL: Zn TIME: 3 HOURS MEDIUM: HCL H_2SO_4

S.NO	BEFORE METAL WEIGHT(gm)		AFTERMETAL WEIGHT(gm)		WEIGHT(gm)		EFFICIENCY %	
	HCL	H_2SO_4	HCL	H_2SO_4	HCL	H_2SO_4	HCL	H_2SO_4
1	5.210	5.218	5.194	5.193	.016	.025	_	_
2	2.114	2.119	2.110	2.104	.004	.015	12	40
3	2.591	2.590	2.586	2.580	.005	.010	11	60
4	5.377	5.379	5.374	5.372	.003	.007	13	72
5	3.415	3.421	3.414	3.418	.001	.003	15	88

Table 2 Corrosion inhibition on HCl and H_2SO_4 with onion

DYE: ONION METAL: Zn TIME: 3 HOURS MEDIUM: HCL H_2SO_4

S.NO	BEFORE METAL WEIGHT(gm)		AFTERMETAL WEIGHT(gm)		WEIGHT(gm)		EFFICIENCY %	
	HCL	H_2SO_4	HCL	H_2SO_4	HCL	H_2SO_4	HCL	H_2SO_4
1	4.207	4.197	4.188	4.126	.019	.071	_	_
2	4.375	4.360	4.428	4.330	.015	.030	21	41
3	4.436	4.428	4.428	4.339	.008	.03	57	41
4	4.235	4.231	4.230	4.223	.005	.008	73	63
5	4.088	3.895	4.084	3.893	.004	.002	78	69

Table 3 Anti microbial studies of the extracted dyes:

S.No	Organisms	Media	Zone of inhibition in mm					
			Amikacin	Hibiscus	Beet root	Onion	Teak bark	Turmeric
1.	Pseudomonas aeruginosa	Muller Hinton Agar	20.0	10	13	12	14.5	16.5
2.	Staphylococcus aureus		21.5	10.5	12.5	11	13.5	17.5

IV. CONCLUSION

Based on the comparison of the results obtained from this study and the observations made, the following conclusions can be made on effect the two different plant extracts on metals HCl medium and H_2SO_4 medium, and the inhibitive effect dyes of Onion, Hibiscus. HCl medium is best comparing to H_2SO_4 medium. In this HCl medium Hibiscus, onion shows corrosion inhibitive effect . In this study we have detected the antimicrobial activity of selected natural dyes. Here used organisms of Pseudomonas aeruginosa and Staphylococcus aureus. Turmeric dye shows better result against organisms.

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