

Organic compounds containing-NH₂, -OH groups as corrosion inhibitors

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ABSTRACT

Oxidation of metal is a corrosion, it's a slow process. In various medium, the corrosion of metal takes place. Certain organic compounds act as the corrosion inhibitors. Various experiments were conducted to study the inhibition efficiency of different compounds like p-nitroaniline, m-nitroaniline, p-toluidine and Resocino, β -Naphthol, catechol. The values of inhibition of corrosion action of the organic compounds.

Key words: Study of inhibition efficiency of organic compounds containing-NH₂, -OH functional group.

INTRODUCTION

The references indicate that organic compounds containing -NH₂, -OH groups retard the corrosion action of metal. This may be due to the formation of surface layer, also may be due to retardation of oxidation.

The various organic compounds containing -NH₂, and -OH group are used to study the inhibition efficiency of organic compounds. The results are very interesting.

EXPERIMENTAL

To study the inhibition efficiency of organic compounds. The simple experiments were carried out. In this experiment the beakers were labeled from 1-12 and in beakers having labeled 1,2,3,4, 25ml 0.5N HNO₃, and in beakers 5,6,7,8 0.5N HCl and in beaker number 9,10,11,12, 0.5N H₂SO₄ were added. In each beaker the different organic compound like p-nitroaniline, m-nitroaniline, p-toluidine and acids Resocino, β -Naphthol and catechol each were added. The temp. were recorded.

The binding wire were cleaned first by regal paper and wash with water and its weight were determined on analytical balance. The loss in mass were determined using the relation.

$$I.E. = \frac{W_u - W_i}{W_u} \times 100$$

Where

IE= Inhibition efficiency,

W_i= Weight loss of metal in inhibitor solution

W_u= Weight loss of metal in uninhibited solution (control) relation.

Inhibition efficiency were determined. The inhibition efficiency of organic compound in different oxidizing medium were used for comparisons.

RESULTS AND DISCUSSION

Regarding organic bases-refer table No.1

Inhibition efficiency figures indicate that all organic acid acting as inhibitors, Inhibition efficiency of all organic bases are not same but the inhibition action remains in the same proportion.

Table 1: Effect of organic bases on corrosion of steel in 0.5 N Nitric acid media

Beaker No	Organic Compound	Initial weight	Final weight	Loss in Weight	% loss in weight	Inhibition efficiency
1	Control	1.358	1.134	0.224	16.5	0
2	P-Nitroaniline	1.37	1.181	0.189	13.8	15.63
3	m-Nitroaniline	1.371	1.201	0.17	23.6	24.11
4	p-toludine	1.098	1.063	0.035	3.5	84.38

Effect of organic bases on corrosion of steel in 0.5 N sulphuric acid media

Beaker No	Organic Compound	Initial weight	Final weight	Loss in Weight	% loss in weight	Inhibition efficiency
5	Control	1.115	0.939	0.176	15.7	-
6	P-Nitroaniline	1.120	0.952	0.168	15.0	4.50
7	m-Nitroaniline	1.084	0.924	0.160	14.7	9.09
8	p-toludine	1.144	1.018	0.126	10.8	28.41

Effect of organic bases on corrosion of steel in 0.5 N Hydrochloric acid media

Beaker No	Organic Compound	Initial weight	Final weight	Loss in Weight	% loss in weight	Inhibition efficiency
9	Control	1.171	1.013	0.158	13.5	-
10	P-Nitroaniline	1.047	0.917	0.130	12.4	17.72
11	m-Nitroaniline	1.099	0.979	0.120	10.9	24.05
12	p-toludine	1.166	1.069	0.104	8.9	34.18

Effect of Phenol on corrosion of steel in 0.5 N sulphuric acid media

Organic compound	Initial weight	Final weigh	Loss in weight	% loss in weight	Inhibition efficiency
Control	1.050	0.970	0.08	7.619	-
Resorcinol	1.080	1.060	0.02	1.852	75.00
β -Naphthol	1.140	1.120	0.02	1.754	75.00
Catechol	1.100	1.090	0.01	0.909	87.50

Effect of phenol on corrosion of steel in 0.5 N Nitric acid media

Organic compound	Initial weight	Final weigh	Loss in weight	% loss in weight	Inhibition efficiency
Control	1.110	0.916	0.194	17.5	-
Resorcinol	1.060	1.008	0.052	4.906	73.19
β -Naphthol	1.110	1.080	0.03	2.702	84.53
Catechol	1.070	1.070	0.0	0.000	100.00

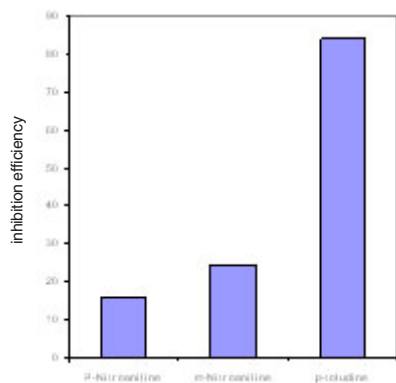


Fig. 1: Effect of organic bases on corrosion of steel in 0.5 N Nitric acid media

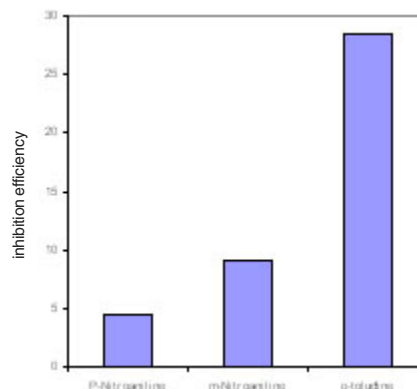


Fig. 2: Effect of organic bases on corrosion of steel in 0.5 N Sulphuric acid media

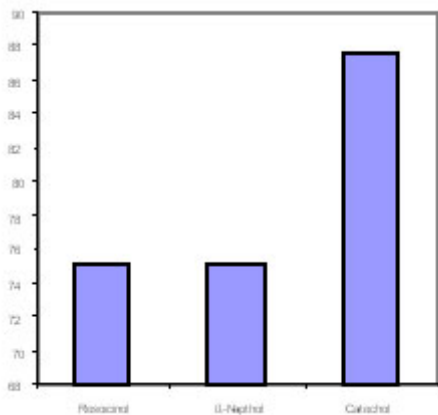


Fig. 3: Effect of different bases on metal corrosion in HNO₃ media

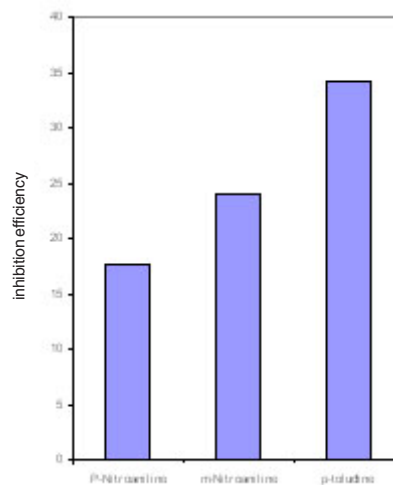


Fig. 4: Effect of organic bases corrosion of steel in 0.5 N Hydrochloric acid media

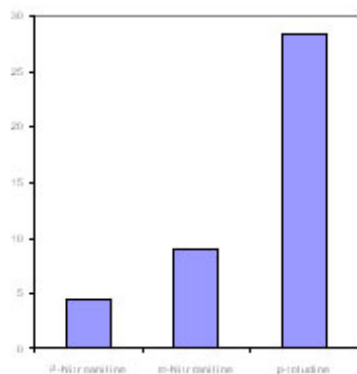


Fig. 5: Effect of different bases on metal corrosion in acid media

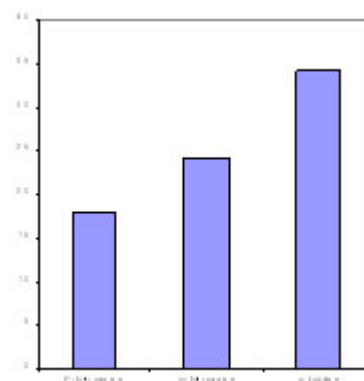


Fig. 6: Effect of bases on metal corrosion in acid media

Effect of phenol on corrosion of steel in 0.5 N hydrochloric acid media

Organic compound	Initial weight	Final weigh	Loss in weight	% loss in weight	Inhibition efficiency
Control	1.090	0.940	0.15	13.761	-
Resorcinol	1.080	0.960	0.12	11.11	20
β -Naphthol	1.050	0.925	0.125	11.905	16
Catechol	1.120	1.116	0.004	0.375	97

Inhibition efficiency table indicates that the p-Toluidien is good corrosion inhibitor. It is inhibition efficiency values in Nitric acid medium is 84.38 . Inhibition efficiency value in HCl medium 34.18 and in H_2SO_4 medium its inhibition efficiency 28.41.

Inhibition efficiency value of p-nitroaniline is weak as compared to m-nitroaniline and p-toluidien . The ingibition efficiency of organic base containing the nitro group is less as compared to organic bases containing methyl radical. The organic bases containing nitro group having electron density towards itself there by they decreases the basic nature $-NH_2$ group present in the compound. The position of nitro group also affect inhibition efficiency of organic compound.

Regarding organic acids refer table no.2

To study inhibition efficiency of different phenols are used . Their inhibition efficiencies are different . the result indicate that inhibition efficiency of catechol in HNO_3 ,HCL, H_2SO_4 is very high . The inhibition efficiency of Resorcinol is low compare to catechol . The figures indicate that the inhibition efficiency also depend upon the nature of oxidizing medium . If comparision is made between the inhibition efficiency of different bases and phenols in oxidizing agent it is found that the phenol s are more inhibitor towards corrosion as compared to organi compound containing -OH oup.

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