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Antoxidative Effect of 2-[(4-Bromo-2,6-dichlorophenylimino)methyl]-4,6-diiodophenol (BDPDP) and its Inner Transition Metal Complexes

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Abstract

The present work deals with the corrosion behavior of mild steel in acidic medium. The inhibitive effect of 2-[(4-Bromo-2,6-dichlorophenylimino)methyl]-4,6-diiodophenol lanthanide complexes on the corrosion of mild steel in 0.2 M HNO_3 has been studied by weight loss and thermodynamic methods. The thermodynamic parameters for mild steel in acidic medium with and without inhibitor were calculated. The effect of concentration, temperature on the corrosion rate were calculated

Keywords: Corrosion, Inhibition, (BDPDP) Complexes.

1. Introduction

Most large structures in industries are made by mild steel owing to it's cheapness, availability and strength. In corrosive attack and the losses incurred due to corrosion rate estimated to be about 36000 crores in India (NACE International India section, Mumbai, 2007). HCl and H_2SO_4 are mainly employed for pilling, descaling, acidizing in mining and oil wells wherein mild steel suffers severe corrosion. Thus uninhibited acid solutions may be useless causing unnecessary dissolution of base metal.

Corrosion inhibitors are used in acid treatment solutions to significantly reduce the over all and local pilling attack and the hydrogen absorption of steel. It has been speculated that organic inhibitors are more effective and specially polar organic compounds containing sulphur and nitrogen are good corrosion inhibitors for the acidic dissolution of methods. The high electron density on the S and N atoms in these organic molecules help to get chemisorbed on the metal surface. In the present work a study has been made on the effectiveness of 2-[(4-Bromo-2,6-dichlorophenylimino)methyl]-4,6-diiodophenol (BDPDP) Lanthanide complexes on corrosion of mild steel in 0.2 M HNO_3 medium.

2. Experimental

Mild steel wire from local manufacturer with 4mm length and 0.095 cm in diameter were used

for corrosion study. The specimen wire was first of all cleaned with dil. hydrochloric acid and then by sand paper followed by distilled water wash. After, it was dried by keeping in oven at 120^0C for 1 hr.

In the first beaker 50 ml 0.2 N nitric acid was taken and labeled as 1 for control system. Beaker no. 2 along with 50 ml 0.2 N nitric acid, 50 mg 2-[(4-Bromo-2,6-dichlorophenylimino)methyl]-4,6-

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diiodophenol (BDPDP) was added. In labeled beakers 3,4,5,6 and 7 50 ml of 0.2 N nitric acid along with 50 mg of La, Pr, Nd, Sm, Tb ligand complexes were added respectively. The previously weighed steel wire was dipped for 48 hr.

At the end wire pieces were taken out from the beaker, washed with distilled water and dried. The weight of each wire was recorded by using electronic balance in grams up to three digits and is presented in Table1.

3. Results and discussion

Weight Loss Measurement:

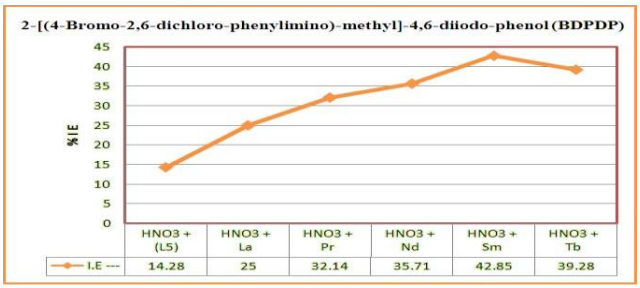
Weight of metal wire pieces before and after dipping in corrosion solution, loss in wt, % loss in weight was calculated by usual method. The % Inhibition Efficiencies were calculated by using following formula,

$$P = \left(\frac{Wu - Wi}{Wu}\right) x100$$

Beaker No	Compounds	Initial Weight	Final Weight	Loss in weight	% Loss in weight	I.E
1	Control (HNO_3)	0.580	0.300	0.280	48.27	---
2	HNO_3 + (L_5)	0.510	0.270	0.240	47.05	14.28
3	HNO_3 + La Complex	0.560	0.350	0.210	37.50	25.00
4	HNO_3 + Pr Complex	0.540	0.350	0.190	35.18	32.14
5	HNO_3 + Nd Complex	0.520	0.340	0.180	34.61	35.71
6	HNO_3 + Sm Complex	0.530	0.370	0.160	30.18	42.85
7	HNO_3 + Tb Complex	0.540	0.370	0.170	31.48	39.28

From data it can be seen that, the Nd, Sm and Tb complexes have maximum inhibition efficiencies than La and Pr complexes. The ligand shows the least inhibitor efficiency.

Table No.1 Effect of 2-[(4-Bromo-2,6-dichlorophenylimino)methyl]-4,6-diiodophenol (BDPDP) L and Effect of their metal complexes on corrosion.



Graph No.01

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4. Conclusion:

From study it reviles that the % I.E has more values for the metal complexes than that of free ligand. The Sm complex has maximum efficiency while Lanthum complex has the least efficiency of inhibition. Thus Sm Complexes of these ligand can be efficiently employed as potential corrosion inhibitor

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