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A comparative study of inhibitive effects of some Schiff's Bases on Mild Steel in Acid media

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ABSTRACT

Mass Loss, Thermometric & Scanning Electron Microscopic (SEM) techniques have been employed to study the corrosion inhibitory effects of some newly synthesized Schiff's Bases viz. N-(furfurilidine)-4-methoxy aniline (SB_1), N-(furfurilidine)-4-methylaniline (SB_2), N-(Salicylidine)-4-Methoxyaniline(SB_3) , N-(Cinnamalidine)-4-methoxy aniline(SB_4) and N-(Cinnamalidine)-2-methylaniline (SB_5) for mild steel in HCl & H_2SO_4 solutions. Results of inhibition efficiencies from all the three techniques show that Schiff's Bases are good inhibitors in both the solutions. Inhibition efficiencies increase with the increase in the concentrations of acids as well as those of inhibitors. Maximum efficiency for H_2SO_4 was found 97.01 % whereas for HCl it was found 97.93 % . It was also found that all the three techniques show good agreement with each other.

Keywords: Corrosion, Schiff's bases, Corrosion rate, Reaction number, Surface coverage.

INTRODUCTION

Mild steel finds a variety of applications due to its excellent strength, workability and wide availability. It is used largely for mechanical and structural engineering purposes in bridge work, industrial parts, steam engine parts and automobiles etc. It is frequently used for ship hulls and off shore drilling platforms and other immersed structures.

Mild steel is resistant enough to attack by alkali because of its passivity towards alkali. However it is prone to corrosion in acidic media like H_2S0_4 and HCl solutions. These acids are generally used for drilling operations, pickling baths and in descaling processes.[1] Since these acids are widely used in many other operations therefore, their chances of contact with mild steel are quite frequent..

Corrosion of mild steel is very common and senous problem which causes considerable economic loss throughout the world. Although it is inevitable but proper maintenance, good design and effective inhibitors may control it. The role of alloying elements in the control of corrosion and application of film forming inhibitors are well known.[2] Corrosion of mild steel in sulphuric acid media has been investigated extensively.[3] Quarishi et.al.[4,5] have used substituted dithiobiurates for inhibition of mild steel in hydrochloric and sulphuric acids. Shibad[6] and Adhe have studied the effect of addition of small quantity of sulphuric acid to nitric acid on the corrosion of mild steel.

It has been established that the organic compounds having hetero atoms like N,O,S which have lone pair of electrons adsorb on the metal surface[7] and thus cause inhibition. Effect of N-and S- containing organic compounds such as substituted benzothiazoles and various organic S-containing compounds on the corrosion of iron and mild steel have been studied.[8-11]

In the present investigation inhibition efficiency of five newly synthesized Schiff's bases viz. N-(furfurilidine)-4-methoxy aniline (SB_1), N-(furfurilidine)-4-methylaniline (SB_2), N-(salicylidine)-4-methoxy aniline (SB_3), N-(cinnamalidine)-4-methoxy aniline (SB_4) and N-(cinnamalidine)-2-methylaniline (SB_5) have been studied for mild steel in hydrochloric and sulphuric acid solutions.

EXPERIMENTAL

Rectangular specimens of mild steel having dimension 2.5cmx2.0cmxO.05cm containing a small hole of about 0.02cm diameter near the upper edge were taken. The approximate chemical composition of the specimen was 99.9% Fe, 0.14%, Si, 0.12% C, 0.4% Mg and 0.04%S. Specimens were cut from a sheet and thoroughly cleaned by buffing to produce a spotless finish and then digreased. Finally each specimen was washed with acetone and dried. The solutions of hydrochloric and sulphuric acids were prepared using double distilled water. All chemicals used were of analytical reagent grade. All the Schiff's bases were

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Table 1. Mass loss ΔM and inhibition efficiency η for Mild Steel in HCl solutions with given inhibitor additions. Temperature 30±0.1 ˚C

Inhibitor Concentration	0.1 N HCl (48 hrs)		0.5 N HCl (48 hrs)		1.0 N HCl (18 hrs)		2.0 N HCl (24 hrs)	
	ΔM, mg	η%	ΔM, mg	η%	ΔM, mg	η%	ΔM, mg	η%
Uninhibited	70.0		77.0		34.0		145.0	
SB_1								
5ppm	34.3	51.00	31.5	59.02	12.2	61.76	60.9	58.00
10ppm	27.1	61.28	25.4	67.01	11.1	67.35	42.0	71.03
20ppm	23.1	67.00	23.0	70.12	8.5	75.00	29.0	80.00
40ppm	21.7	69.00	19.0	75.32	6.0	82.35	14.0	90.34
SB_2								
5ppm	35.4	49.28	33.0	57.14	16.0	52.94	65.3	54.90
10ppm	32.0	54.28	29.0	62.33	12.5	63.23	52.2	64.00
20ppm	27.7	60.42	26.1	66.10	10.8	68.23	37.0	74.48
40ppm	25.2	64.00	21.4	72.20	8.8	74.11	23.0	84.41
SB_3								
5ppm	32.6	53.42	29.0	63.33	12.0	64.70	39.1	73.03
10ppm	24.5	65.00	23.7	69.22	10.2	70.00	21.0	85.51
20ppm	22.2	68.28	20.7	73.11	7.4	78.23	8.0	94.48
40ppm	19.6	72.00	16.0	79.22	5.1	85.29	3.0	97.93
SB_4								
5ppm	33.6	52.00	29.9	61.7	12.2	64.11	43.5	70.00
10ppm	25.7	63.29	24.5	68.18	10.5	69.11	31.0	78.62
20ppm	23.8	66.00	22.2	71.16	8.0	76.47	24.0	83.45
40ppm	21.0	70.00	17.5	77.30	5.7	82.23	10.0	93,10
SB_5								
5ppm	36.8	41.42	38.0	50.64	16.6	51.17	68.0	53.10
10ppm	35.0	50.00	32.0	58.44	13.6	60.00	54.9	62.13
20ppm	28.7	59.00	27.4	64.40	11.5	66.17	40.6	72.00
40ppm	26.6	62.00	24.5	68.18	9.1	73.23	25.2	82.40

prepared by conventional method i.e. by refluxing equimolar quantities of respective aldehydes and amines.[14]

Each specimen was weighed accurately with a digital balance up to the accuracy of 0.1mg and then suspended in a borosilicate glass beaker of 50mL capacity containing test solution, by a V-shaped glass hook made by capillary tubes at room temperature. After the test, specimens were cleaned with running water and then dried with hot air dryer and then weighed again. The percentage inhibition efficiency (11%) was calculated as[12]:

$$\eta\% = ((\Delta M_u - \Delta M_i)/\Delta M_u) \times 100$$

where, ΔM_u = Mass loss of specimen in uninhibited solution.
ΔM_i = Mass loss of specimen in inhibited solution.

Corrosion rate in millimeter per year (mm/yr) was calculated as[13]:

Corrosion rate $\left(\frac{mm}{yr}\right) = \frac{87.6\,\Delta M}{TAD}$

Where *ΔM* = Mass loss in mg.
T = Time (in hours) of exposure of specimen in solution.
A = Exposed area of metal surface in cm^2,
D = Density of specimen in gcm^2.

Surface coverage *(B)* of metal specimen by inhibitor was calculated as:

$$\theta = \frac{\Delta M_u - \Delta M_i}{\Delta M_u}$$

where ΔM_u and ΔM_i have same significance as given In the formula of inhibition efficiency (η%).

Inhibition efficiencies were also determined by another technique i.e. thermometric method. This method involved the immersion of single specimen of same dimensions as were used in mass loss method in a thermal insulating reaction chamber having 50mL of test solution at an initial temperature *(T_i)*. Temperature changes were measured at regular intervals using a thermometer with a precision of 0.1ºC. The temperature increase was slow initially and then rapid and finally reached to maximum *(T_m)* and then started to decrease. Percentage inhibition efficiency (η%) was calculated as:

$$\eta\% = ((RN_f - RNM_i)/RN_f) \times 100$$

where RN_f = Reaction Number in free solution.
RN_i = Reaction Number in inhibited solution.
Reaction Number *RN* (*K* min^{-1}) is defined as:

$$RN = \frac{(T_m - T_i)}{t}$$

where T_m = Maximum temperature attained by solution.
T_i = Initial temperature of solution.
t = Time (in min.) required to attain maximum temperature.

Table 2. Mass loss ΔM and inhibition efficiency η for Mild Steel in H_2SO_4 solutions with given inhibitor additions, Temperature 30 ± 0.1˚C

Inhibitor Concentration	0.1 N H_2SO_4 (72 hrs)		0.5 N H_2SO_4 (24hrs)		1.0 N H_2SO_4 (12 hrs)		2.0 N H_2SO_4 (6hrs)	
	ΔM, mg	η%	ΔM, mg	η%	ΔM, mg	η%	ΔM, mg	η%
Uninhibited	224.0		127.0		201.0		161.0	
SB_1								
5ppm	108.0	51.79	54.2	57.32	80.4	60.00	56.3	65.03
10ppm	80.6	64.02	43.1	66.06	63.9	68.20	41.5	74.22
20ppm	65.0	70.98	33.0	74.02	47.8	76.21	23.9	85.15
40ppm	55.0	75.40	22.7	82.12	29.9	85.12	9.1	93.34
SB_2								
5ppm	120.9	46.02	61.0	51.96	88.0	56.21	59.0	63.35
10ppm	106.0	52.68	51.8	59.21	68.3	66.00	48.3	70.00
20ppm	87.0	61.11	42.0	66.93	50.2	75.02	32.0	80.12
40ppm	67.2	70.00	32.0	74.80	33.0	83.58	17.0	89.44
SB_3								
5ppm	94.0	57.27	49.5	61.03	72.0	64.18	51.0	68.32
10ppm	76.1	66.02	40.2	68.34	52.0	74.13	35.0	78.26
20ppm	60.4	73.03	30.3	76.14	35.0	82.58	16.1	90.00
40ppm	45.0	79.91	19.0	85.00	21.0	89.55	4.8	97.01
SB_4								
5ppm	100.8	55.00	52.0	59.05	75.9	62.23	54.1	66.39
10ppm	78.4	65.00	41.6	67.24	61.0	69.63	40.0	75.15
20ppm	62.7	72.01	31.3	75.35	44.2	78.01	20.9	87.39
40ppm	51.0	77.23	20.0	84.25	23.0	88.55	8.1	94.72
SB_5								
5ppm	125.4	44.04	62.0	51.18	91.8	55.32	64.4	59.87
10ppm	109.0	51.33	53.3	58.03	76.3	62.03	49.9	69.00
20ppm	93.0	58.48	44.0	65.35	56.2	72.13	33.8	79.00
40ppm	68.7	69.33	34.1	73.14	37.5	81.34	22.0	86.33

In the SEM technique, pure specimen of mild steel, specimen after exposure in 2N H_2SO_4 and specimen after exposure in 2N H_2SO_4 in presence of SB_3 at the concentration of 40ppm were analysed for SEM and the difference in the change of their surface structures were observed.[15]

RESULT AND DISCUSSION

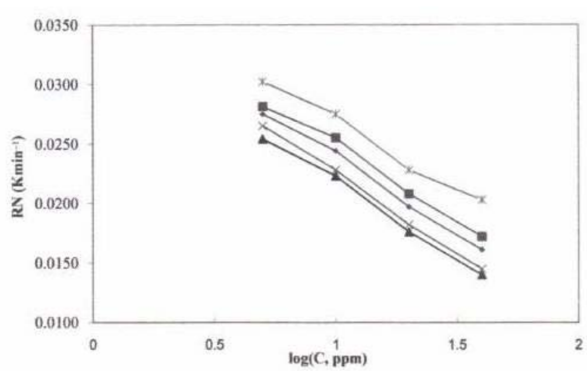

Fig-1 : Variation of RN ($Kmin^{-1}$) with log of inhibitor concentration (C, ppm) for Mild Steel in 1.0N HCl

Mass loss (ΔM) and percentage inhibition efficiencies *(η%)* for different concentrations of HCl and inhibitors are shown in Table-l and those of, for the H_2S0_4 are shown in Table-2. It is observed that percentage inhibition efficiency increases with the increase in the concentrations of both the acids and also with the increase in the concentrations of inhibitors. All the five Schiff's bases show maximum inhibition efficiency at highest concentration of both the acids i.e. 2N at their highest concentration i.e. 40ppm. The maximum efficiency was shown by N-(salicylidine)-4-methoxy aniline (SB_3) in HCl (97.93%) and in H_2S0_4 (97.01 %).

Corresponding corrosion rate (mm/yr) and surface coverage *(θ)* for HCl solutions are depicted in Table-3 whereas for H_2S0_4 they are shown in Table-4. It is observed from both the tables that corrosion rate of mild steel decreases with the increase in the concentrations of inhibitors whereas corrosion rate increases with the increase in the strength of HCl and H_2S0_4 solutions.

Corrosion rate of mild steel is much higher in H_2S0_4 than in HCl. It means H_2SO_4 has more adverse effect on mild steel in comparison to HCl. Values of surface coverage indicate that inhibitors are in general more effective in H_2SO_4 than in HCl. Surface coverage *(θ)* of metal specimen by inhibitors increases with the increase in the acid strength as well as with the increase in the concentration of inhibitors. Maximum surface coverage is observed at the highest concentration (2N) of acids at maximum concentration (40ppm) of inhibitors.

Table 3.Corrosion rate (mm/yr) and Surface coverage (θ) for Mild Steel in HCl solutions with given inhibitor additions. Effective area of specimen = 5.0 cm^2

Inhibitor Concentration	0.1 N HCl		0.5 N HCl		1.0 N HCl		2.0 N HCl	
	Corr. rate (mm/yr)	Surface Cover. (θ)	Corr. rate (mm/yr)	Surface Cover. (θ)	Corr. rate (mm/yr)	Surface Cover. (θ)	Corr. rate (mm/yr)	Surface Cover. (θ)
Uninhibited	14.36		15.79		18.59		59.47	
SB_1								
5ppm	7.06	0.51	6.61	0.59	7.15	0.62	24.97	0.58
10ppm	5.69	0.61	5.33	0.67	6.10	0.67	17.22	0.71
20ppm	4.96	0.67	4.83	0.70	4.67	0.75	11.89	0.80
40ppm	4.56	0.69	3.99	0.75	3.30	0.82	5.74	0.90
SB_2								
5ppm	7.43	0.49	6.93	0.57	8.80	0.53	24.60	0.55
10ppm	6.72	0.54	6.09	0.62	6.87	0.63	21.40	0.64
20ppm	5.81	0.60	5.48	0.66	5.94	0.68	15.17	0.74
40ppm	5.29	0.64	4.49	0.72	4.84	0.74	9.43	0.84
SB_3								
5ppm	6.85	0.53	6.09	0.63	6.60	0.65	16.03	0.73
10ppm	5.14	0.65	4.97	0.69	5.61	0.70	5.61	0.86
20ppm	4.66	0.68	4.35	0.73	4.07	0.78	3.28	0.94
40ppm	4.12	0.72	3.36	0.79	2.75	0.85	1.23	0.98
SB_4								
5ppm	7.14	0.52	6.28	0.61	6.65	0.64	17.84	0.70
10ppm	5.39	0.63	5.14	0.68	5.77	0.69	12.71	0.79
20ppm	4.83	0.66	4.67	0.71	4.40	0.76	9.84	0.83
40ppm	4.41	0.70	3.68	0.77	3.13	0.83	4.10	0.93
SB_5								
5ppm	7.73	0.47	7.98	0.51	9.13	0.51	27.88	0.53
10ppm	7.35	0.50	6.72	0.58	7.48	0.60	22.51	0.62
20ppm	6.03	0.59	5.75	0.64	6.32	0.66	16.65	0.72
40ppm	5.58	0.62	5.14	0.68	5.00	0.73	10.33	0.82

Inhibition efficiencies determined by thermometric method are shown in Table-5 for HCl and in Table-6 for H_2S0_4. Since no significant changes in temperature were recorded for lower concentrations of acids so observations were taken at higher concentrations i.e. 1.0 N, 2.0 N and 3.0 N for both the acids.

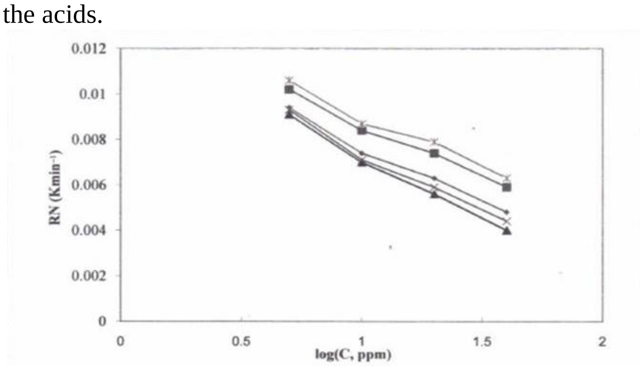

Fig-2 : Variation of RN ($Kmin^{-1}$) with log of inhibitor concentration (C, ppm) for Mild Steel in 1.0N H_2SO_4

The results shown by thermometric method have the same trends as were observed in mass loss method. In thermometric method also the inhibition efficiency increases with the increase in the concentrations of both acids and inhibitors.

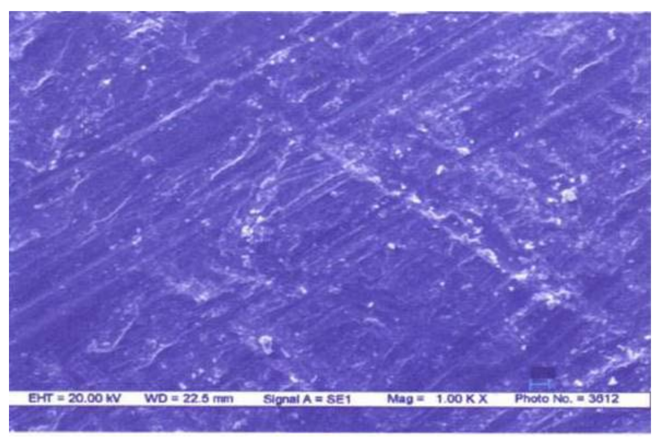

Figure 3. SEM of pure Mild Steel.

Here also the best results are shown by N-(salicylidine)-4-methoxy aniline (SB_3) in both the acids. The maximum efficiency is 84.01% in 3.0 N HCl at 40ppm concentration of SB_3 and in 3.0N H_2SO_4, the maximum efficiency is 85.03% at 40ppm concentration of SB3. It means both methods have good agreement with each other.

The variation of Reaction Number (RN) with inhibitor concentration is depicted graphically in Fig.-l for 1.0 N HCl and in Figure 2 for 1.0 N H_2SO_4. The plots for both the acids show almost linear behavior with negative slope. It means

Table 4. Corrosion rate (mm/yr) and Surface coverage (θ) for Mild Steel in H_2SO_4 solutions with given inhibitor additions. Effective area of specimen = 5.0 cm^2

Inhibitor concentration	0.1 N H_2SO_4		0.5 N H_2S0_4		1.0 N H_2SO_4		2.0 N H_2SO_4	
	Corr. rate (mm/yr)	Surface Cover. (θ)	Corr. rate (mm/yr)	Surface Cover. (θ)	Corr. rate (mm/yr)	Surface Cover. (θ)	Corr. rate (mm/yr)	Surface Cover. (θ)
Uninhibited	30.28		51.57		163.22		261.49	
SB_1								
5ppm	15.12	0.52	22.22	0.57	65.12	0.60	91.20	0.65
10ppm	11.28	0.64	17.67	0.66	51.75	0.68	67.23	0.74
20ppm	9.10	0.71	13.53	0.74	38.71	0.76	38.71	0.85
40ppm	7.70	0.75	9.30	0.82	24.22	0.85	14.74	0.94
SB_2								
5ppm	16.93	0.46	25.01	0.52	71.28	0.56	95.58	0.63
10ppm	14.84	0.53	21.24	0.59	55.35	0.66	78.25	0.70
20ppm	12.18	0.61	17.22	0.67	40.66	0.75	51.84	0.80
40ppm	9.41	0.70	13.12	0.75	26.73	0.84	27.54	0.89
SB_3								
5ppm	13.16	0.57	20.29	0.61	58.32	0.64	82.62	0.68
10ppm	10.65	0.66	16.48	0.68	42.18	0.74	56.70	0.78
20ppm	8.45	0.73	12.42	0.76	28.35	0.83	26.08	0.90
40ppm	6.30	0.80	7.81	0.85	17.01	0.90	7.78	0.97
SB_4								
5ppm	14.11	0.55	21.32	0.59	61.47	0.62	87.64	0.66
10ppm	10.98	0.65	17.06	0.67	49.41	0.70	64.80	0.75
20ppm	8.78	0.72	12.83	0.75	35.80	0.78	33.86	0.87
40ppm	7.14	0.77	8.20	0.84	18.63	0.89	13.12	0.95
SB_5								
5ppm	17.55	0.44	25.42	0.51	74.35	0.54	104.33	0.60
10ppm	15.26	0.51	21.85	0.58	61.80	0.62	80.84	0.69
20ppm	13.02	0.58	18.04	0.65	45.52	0.72	54.75	0.79
40ppm	9.62	0.69	13.98	0.73	30.37	0.81	35.64	0.86

Table 5. Reaction Number (RN) and inhibition efficiency (η) for Mild Steel in HCl solutions with given inhibitor additions

Inhibitor concentration	1.0 N HCL		2.0 N HCL		3.0 N HCL	
	RN (K $min^{-1)}$	η%	RN (K min-1)	η%	RN (K min-1)	η%
Uninhibited	0.0520		0.0692		0.0982	
SB_1						
5ppm	0.0275	47.11	0.0332	52.02	0.0427	57.03
10ppm	0.0244	53.07	0.0290	58.09	0.0333	66.09
20ppm	0.0197	62.11	0.0249	64.01	0.0235	76.06
40ppm	0.0161	69.04	0.0179	74.13	0.0196	80.04
SB_2						
5ppm	0.0281	45.96	0.0346	50.00	0.0441	55.09
10ppm	0.0255	50.96	0.0304	56.06	0.0354	63.95
20ppm	0.0208	60.00	0.0262	62.13	0.0265	73.01
40ppm	0.0172	66.92	0.0207	70.08	0.0216	78.00
SB_3						
5ppm	0.0254	51.15	0.0311	55.05	0.0354	62.02
10ppm	0.0223	57.12	0.0249	64.02	0.0295	69.95
20ppm	0.0176	66.15	0.0208	69.94	0.0186	81.05
40ppm	0.0140	73.08	0.0131	81.07	0.0157	84.01
SB_4						
5ppm	0.0265	49.03	0.0312	54.91	0.0383	60.99
10ppm	0.0228	56.15	0.0269	61.12	0.0312	68.02
20ppm	0.0182	65.00	0.0235	66.04	0.0196	80.04
40ppm	0.0145	72.18	0.0152	78.03	0.0167	82.99
SB_5						
5ppm	0.0302	41.92	0.0359	48.12	0.0461	53.05
10ppm	0.0275	47.11	0.0318	54.04	0.0392	60.08
20ppm	0.0228	56.15	0.0277	59.97	0.0294	70.06
40ppm	0.0203	60.96	0.0235	66.04	0.0245	75.05

reaction number decreases with increasing concentration of inhibitors. Scanning Electron Microscope (SEM) analysis of mild steel sample have been performed by ZEISS EVO 50 four quadrant back scattered electron detector type 603KE microscope with Mag =1.00 KX. Fig.-3 shows the surface of pure mild steel whereas Fig.-4 shows the structural changes in the surface of mild steel after exposure in 2N H_2S0_4. The surface shows the enormous corrosion and roughness.

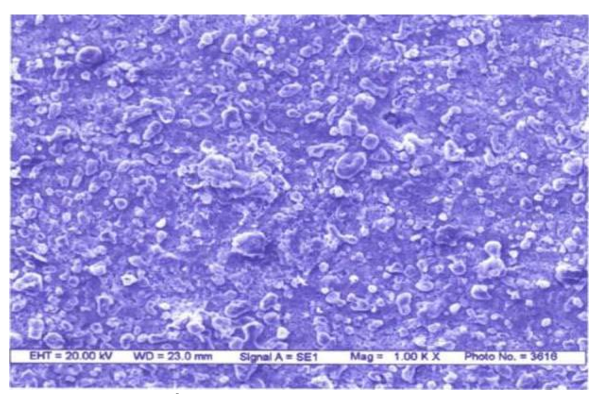

Figure 4. SEM of Mild Steel in 2N H_2SO_4.

It is evident from Figure 5 that roughness of the surface has significantly reduced in presence of inhibitor. It shows the efficiency of inhibitor.

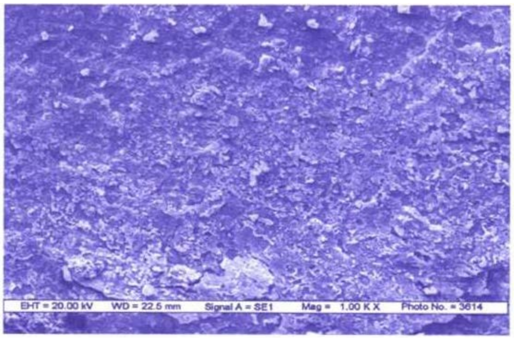

Figure 5. shows the surface of mild steel after exposure in 2N H_2SO_4 in presence of SB_3.

Table 6. Reaction Number (RN) and inhibition efficiency (η) for Mild Steel in H_2SO_4 solutions with given inhibitor additions

Inhibitor concentration	1.0 N H_2SO_4		2.0 N H_2SO_4		3.0 N H_2SO_4	
	RN ($Kmin^{-1}$)	η%	RN ($Kmin^{-1}$)	η%	RN ($Kmin^{-1}$)	η%
Uninhibited	0.0186		0.0362		0.0628	
SB_1						
5ppm	0.0094	49.46	0.0162	55.24	0.0238	62.10
10ppm	0.0074	60.21	0.0144	60.22	0.0219	65.12
20ppm	0.0063	66.13	0.0101	72.08	0.0160	74.52
40ppm	0.0048	74.19	0.0083	77.07	0.0126	79.93
SB_2						
5ppm	0.0102	45.16	0.0163	54.97	0.0262	58.28
10ppm	0.0084	54.16	0.0152	58.01	0.0231	63.06
20ppm	0.0074	60.22	0.0115	68.23	0.0169	73.09
40ppm	0.0059	68.28	0.0091	74.86	0.0144	77.07
SB_3						
5ppm	0.0091	51.08	0.0145	59.94	0.0219	65.00
10ppm	0.0070	62.37	0.0127	64.92	0.0200	69.10
20ppm	0.0056	69.89	0.0094	74.03	0.0106	78.98
40ppm	0.0040	78.49	0.0065	82.04	0.0100	85.03
SB_4						
5ppm	0.0093	50.00	0.0159	56.67	0.0232	63.05
10ppm	0.0071	61.83	0.0134	62.98	0.0201	67.99
20ppm	0.0059	68.28	0.0097	73.20	0.0150	76.27
40ppm	0.0044	76.34	0.0076	79.00	0.0106	83.12
SB_5						
5ppm	0.0106	43.01	0.0171	52.76	0.0276	56.05
10ppm	0.0087	53.22	0.0156	56.90	0.0243	61.30
20ppm	0.0079	57.53	0.0119	67.12	0.0182	71.01
40ppm	0.0063	66.13	0.0097	73.20	0.0163	74.04

Generally the organic molecules containing hetero-atoms like oxygen, sulphur and nitrogen cause blockage of active sites on the metallic surface, thus resulting in the decrease in corrosion rate. Nitrogen atom present in Schiff's bases has lone pair of electrons and thus Schiff's base forms a monolayer on the metallic surface. The presence of -OCH3 and -OH groups in Schiff's base (SB_3) further increases the electron .density and thus increases the inhibition efficiency of inhibitor. It has been observed that inhibition efficiency is higher in higher concentrations of acids. This may be due to the fact that in strong acidic conditions ionization of Schiff's base increases which favours the adsorption strongly and thus further reduces the exposed area of metal which results further increase in inhibition efficiency.

CONCLUSIONS

A study of five synthesized bases has shown them effective corrosion inhibitors for mild steel in HCl and H_2SO_4 acids solutions. Both, mass loss and thermometric methods have shown that efficiencies of inhibitors increase with increases in the concentrations of acids as well as those of inhibitors.

Among the five Schiff's bases under study, maximum inhibition efficiency was shown by N-(salicylidine)-4-methoxy aniline (SB_3) in both the acid solutions at 40ppm concentration at the highest (2N) acid strength.

It has been observed that corrosion rate of mild steel is much higher in H_2SO_4 than in HCI which gives the conclusion that H_2SO_4 is much more corrosive for mild steel than HCl. Results of surface coverage indicate that synthesized Schiff's bases are more effective in H_2SO_4 than in HCl. SEM of three specimens also indicates that corrosion of mild steel in acid media decreases significantly in presence of inhibitor.

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