Corrosion and Inhibition of Copper, Brass and Aluminium in Nitric Acid, Sulphuric Acid and Trichloroacetic Acid

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A number of workers have studied corrosion of copper, brass and aluminium in acid, alkali and neutral solutions; various organic and inorganic substances have also been investigated as inhibitors. In the present paper corrosion of brass, copper and aluminium in acid media and the inhibition by diphenyl thiourea and dithioglycolic acid are studied.

EXPERIMENTAL

The metals and alloy employed had the following composition:-

Copper sheets (26 SWG) : Cu 99.6%
Fe & other metals 0.4%

Brass sheets (26 SWG) : Cu 63.3% and
Zn 36.7%.

Aluminium sheets (26 SWG) : Mn 1-1.5%, Cu 0.15%
Fe 0.75% Si 0.6% and
rest Al.

The specimens were 3 x 6 cm. They were cleaned and polished in the manner described by Prajapati, et.al(1). The specimens were immersed in 250 ml of the corroding medium. The experiments were carried out at 30 + 2°C and the duration was 2 days. The results are given in Table 1.

TABLE 1

* 1	2	Copper 3	4	Brass 5	6	Aluminium 7	8
1N H_2SO_4	Diphenyl thiourea						
	00	135.6	-	79.4	-	105.5	-
	10	43.0	68	44.4	44	46.9	56
	20	38.0	72	41.4	48	45.5	56
	40	35.5	74	31.1	61	46.1	56
	100	35.0	75	27.8	65	46.3	56
	200	29.4	78	27.8	65	46.4	56
-do-	Dithioglycollic acid.						
	00	130.6	-	79.4	-	105.5	-
	10	46.1	66	41.1	48	31.9	70
	20	45.5	67	46.6	41	44.4	58
	40	45.3	67	46.4	42	46.1	56
	100	45.3	67	45.0	43	45.8	57
	200	43.3	68	46.9	41	45.8	57
1N HNO_3	Diphenylthiourea.						
	00	5470	-	4332	-	274.9	-
	10	55.5	99	483	89	100.6	64
	20	177	97	790	82	88.5	68
	40	219	96	1170	73	86.7	69
	100	1330	76	2770	36	80.8	71
	200	925	83	1660	62	78.3	72
-do-	Dithioglycollic acid.						
	00	5470	-	4332	-	274.9	-
	10	49.4	99	52.5	99	62.8	78
	20	45.3	99	43.6	99	61.1	78
	40	42.8	99	43.3	99	61.1	78
	100	40.0	99	39.4	99	66.9	76
	200	42.8	99	43.0	99	71.7	75
0.1 N Trichloroacetic acid	Diphenyl thiourea						
	00	477.6	-	527.7	-	1944	-
	10	143.8	70	133.6	75	55.5	97
	20	267.5	44	185.3	65	34.2	98
	40	164.4	66	205.8	61	42.7	98
	100	199.1	58	180.3	66	31.7	98
	200	200.6	58	227.2	57	31.1	98
	Dithioglycollic acid						
	00	477.6	-	527.7	-	1944	-
	10	94.4	80	105.5	80	26.4	99
	20	75.0	84	90.8	83	20.4	99
	40	79.2	83	80.5	85	19.4	99
	100	73.3	85	71.9	86	19.2	99
	200	70.8	85	65.3	88	20.3	99

*
Column 1. Corroding medium
Column 2. Inhibitor and concentration in ppm
Column 3. Loss mdd
Column 4. Inhibition %
Column 5. Loss mdd
Column 6. Inhibition
Column 7. Loss mdd
Column 8. Inhibition

CONCLUSIONS

Dithioglycollic acid appears to be an excellent inhibitor for copper brass and aluminium when HNO_3 and trichloroacetic acid are the corroding media. Diphenylthiourea offers various percentages of inhibition, when nitric acid and trichloroacetic acid are the corroding solutions. The percentage inhibition is mostly found to be of the order of 60. With copper or brass and diphenyl thiourea it is observed that increase in concentration of the inhibitor, the inhibition decreases. This is quite surprising.

When sulphuric acid is used as the corroding medium, the inhibition offered by diphenylthiour— as well as dithioglycollic acid is about 60 70%. In the case of brass and aluminium it still less. It may therefore be concluded that sulphuric acid medium, inhibitor is not ve— effective.

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REFERENCE

1. S.N. Prajapati, K.P. Soni and A.N. Trivedi Indian Jour. of Technology 10 (1972) 73.