

(Al – 2Cu – 2Mg)

/ /

: _____

(1M NaCl) (Al-2Cu-2Mg)
(600X)

(170°C)

.(27hr)

(0%,15%,19%)

(19%) (15%)
(0.000051g/cm².hr) (0.00013g/cm².hr.)

Study The Effect of Heat Treatments and Cold Work on the Corrosion Erosion Behavior of (Al-2Cu-2Mg) Alloy.

Abstract:

This study deals with the effect of heat treatment and cold work on the corrosion erosion behavior of (Al-2Cu-2Mg) alloy in salt solution (1M NaCl) at room temperature. The weight change method and microscopic examination are used in this study. Alloy without treatment, solution treated, Artificial aged and cold working at different ratios with artificial aged are used to complete this study.

The result of effects of heat treatment on the corrosion erosion behavior of alloy in salt solution showed different corrosion behavior for the same alloy under the same conditions but different heat treatment . Solution heat-treated alloy have the lowest losing weight levels and corrosion erosion rate compared with the other states untreated and artificial aged alloys which showed convergence in the value of weight loss and corrosion rate at the final stages of the test .On the other hand to study the effect of the cold work on the corrosion erosion behavior of alloy the cold working at different ratios used (0%,15%,19%) . The results showed that an increase in cold work , cause to increase weight loss and corrosion erosion rate, the result showed the rate of corrosion of the alloy at (15%) cold working ratio reached (0.000051 g/cm².hr) and increased to reach (0.00013 g/cm².hr) at (19%) cold working ratio .

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. (Vanhile P. and Tosto S,1992)

. (M.G.Fontana 1988, W. Bolten1998, P.R. Roberge1999)

. (P.R. Roberge 1999)

.(T.K. Namboodhiri & Deonath1989)

.)

.(

(D.A.Little and J. R. Scully 2001, Eiji Akiyama, K. Asami 2001, H. Bohni and T. Suter 2002)

(N. Le Bozec, D. Persson 2002,

H.N .Mcmurray, G. Williams and S. O. Driscoll 2002, N. Missert, R. G. Copeland 2002),

(D.Bengtsson Blucher, J.E.Svensson and L. G. Johansson 2002, Ingrid Rink and D. Martin Knotter 2003, R.G.Buchheit, R.K.Boger, M.W.Donohue 2001, R.G.Buchheit, R.K.Boger 2002)

(Al-2Cu-2Mg)

(1M NaCl)

(Al-2Cu-2Mg)

(1)

2002

2000

)

(2004

(Heater)

(RT-1000°C)

(20 mm)

(300-400°C)

(Sola Basic S.B Lindberg)

(500°C)

(Max.1200°C)

(2)

)

.(

: _____

(45min)

(500°C)

(3)

: _____

Al-2Cu-

-

-

(2Mg

:

. (45 min.)

(500 C)

-

-

. (3hr.)

(MLW)

(170°C)

-

(4)

: _____

-

(Cold work)

-

(Al-2Cu-2Mg)

:

. (45 min.)

(500 C)

-

-

-

(PHYWE)

. (15%,19%)

. (3 hr.)

(170 C°)

-

(5)

(HERGON-mp200V)

: _____

1000

550

(36*36*49) cm

(1M NaCl)

)

. (

.(±0.0001)

(Sartorius)

(ΔW/A)

: _____

(union ME-3154)

(600 X)

: _____

(1)

(2)

-

(2)

-

(1)

(1)

(Wear)

(Incubation Period)

(Fatigue)

(Accelerated Period)

(Strain Hardening)

(Deceleration Period)

(Steady Period)

(3)

(2)

(

-

27 hr)

(4) .
(5)
(5)

(4)
(15 hr)

(α_{ss})

(6)
(27 hr) -

. (α_{ss})

(8) (3hr) (7) (170C°)
(8) (12hr)

(7)

.(1M)
(Al2CuMg) (S) (170C° 3hr)

(1M)
(Al2CuMg) (S)

- (9) (27 hr) . (α) -
(1M NaCl)

(1M NaCl) -
(10)

(27hr) - (11)
(0.000055 g/cm²hr)

(12) .(0.00013 g/cm²hr) ; (0.00012 g/cm²hr) (27hr)
)
(13) (170 C° 15%
- (13)

(12) (15%)
(1M)

)
- (170 C° 15%
- (14) (27 hr)

(16) (19%) (15)

(12 hr) (15)

(17) .
(27hr) (19%)

(18) (170 C°)
(0% ,15% ,19%)

			(19)
			(19)
. (0.00013 g/cm ² .hr)	(0.000051g/cm ² .hr)	(19%)	(15%)
	–	(19)	
(2.5)		(19%)	(15%)

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(1)

Al		Cu		Mg	
Wt%	At%	Wt%	at%	wt%	at%
96	96.9	2	0.86	2	2.24

(2)

	d(mm)	t(mm)	D(mm)	
3% NaCl	2	3	15	
3% NaCl	2	3	15	
3% NaCl	2	2.6	16.1	C.W=19%
3% NaCl	2	2.3	17.1	C.W=15%

(3)

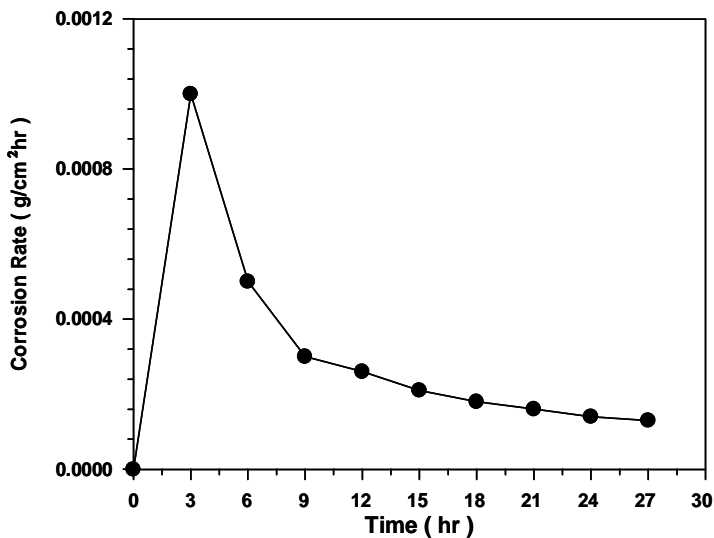
Treatment	Condition
Solution Heat Treatment	Homogenizing Treatment at 500 C° for 3 hrs. + Cooling to Room Temperature + Solution Heat Treatment at 500 C° for 45 min..

(4)

Treatment	Condition
Artificial Ageing Treatment	Homogenizing Treatment at 500 C° for 3 hrs. + Cooling to Room Temperature + Solution Heat Treatment at 500 C° for 45 min. + Water Quenching + Artificial Ageing at 170 C° for 3 hr.

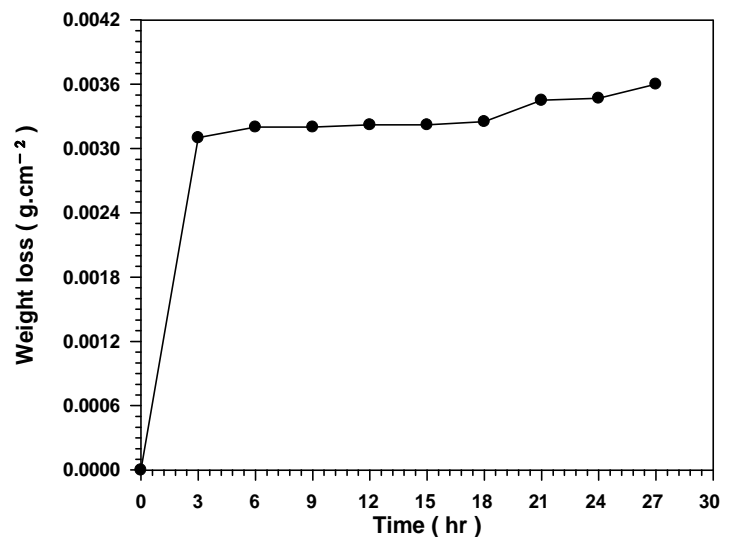
(5)

Treatment	Condition
Thermo Mechanical Treatment	Homogenizing Treatment at 500 C° for 3 hrs. + Cooling to Room Temperature + Solution Heat Treatment at 500 C° for 45 min. + Water Quenching + Cold Work (0%,15%,19%) + Artificial Ageing at 170 C° for 3hr .



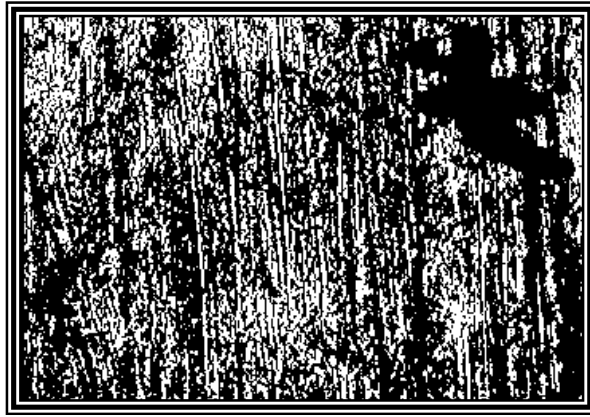
(1M)

(2)



(1M)

(1)

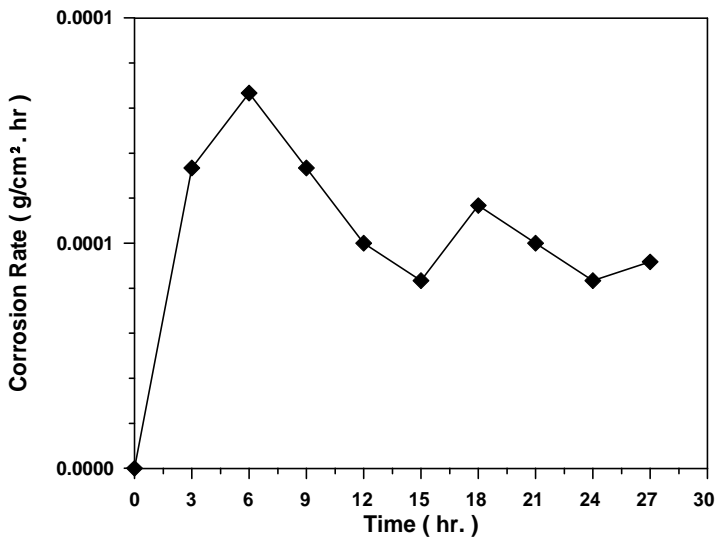


(3)

(1M NaCl)

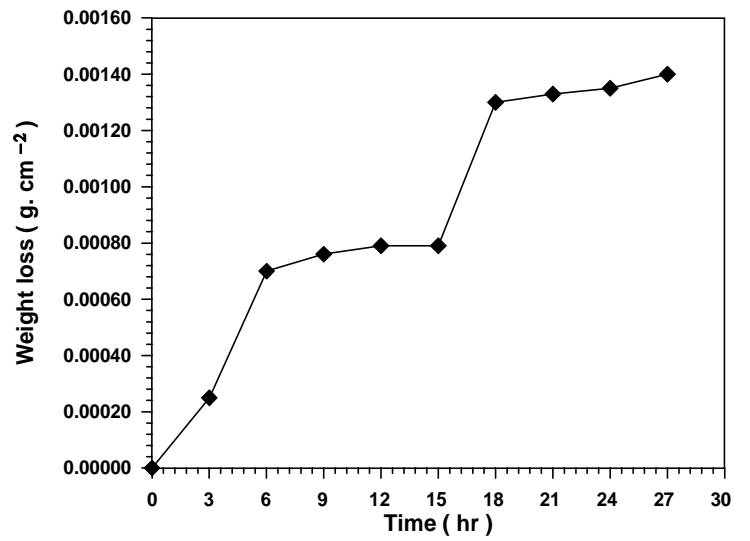
(600X)

(27 hr)



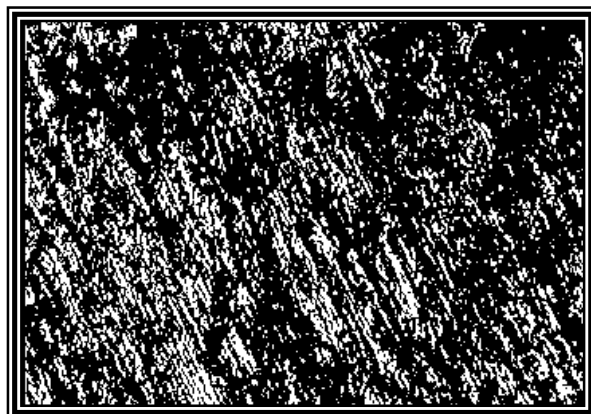
(1M)

(5)



(1M)

(4)

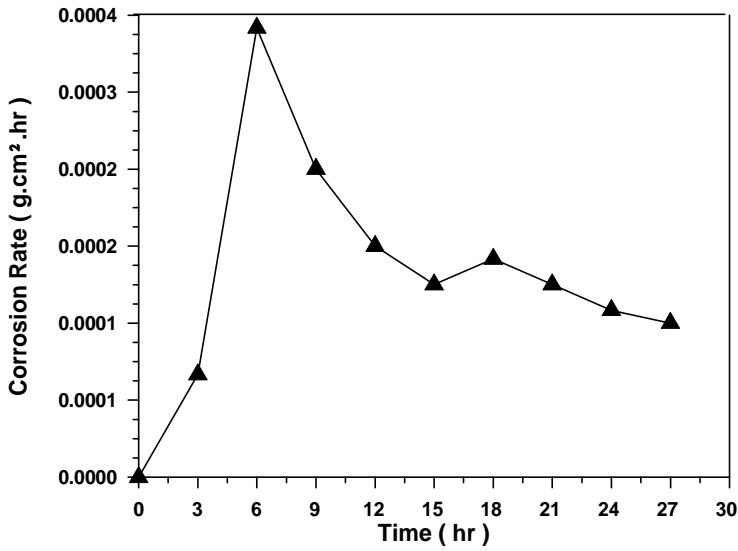


(500C°)

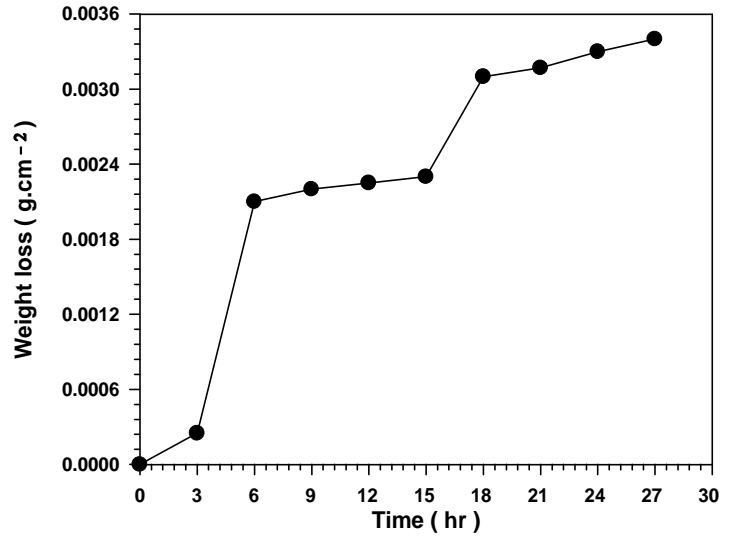
(27hr)

(6)

(600X)



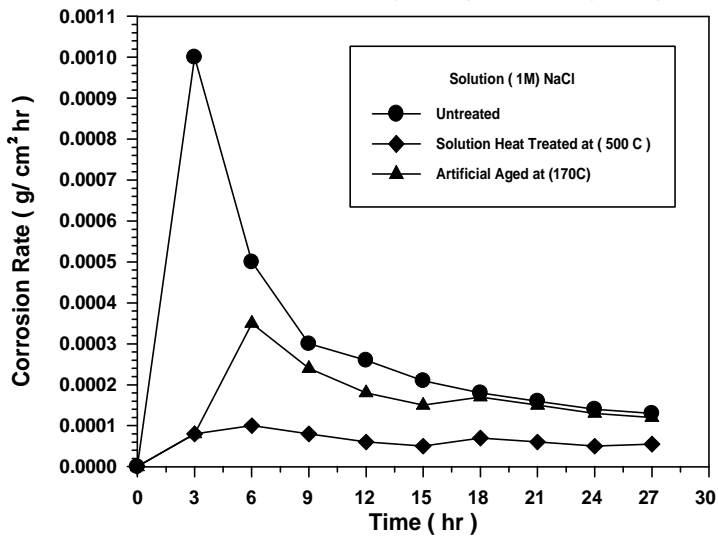
(1M) (8)



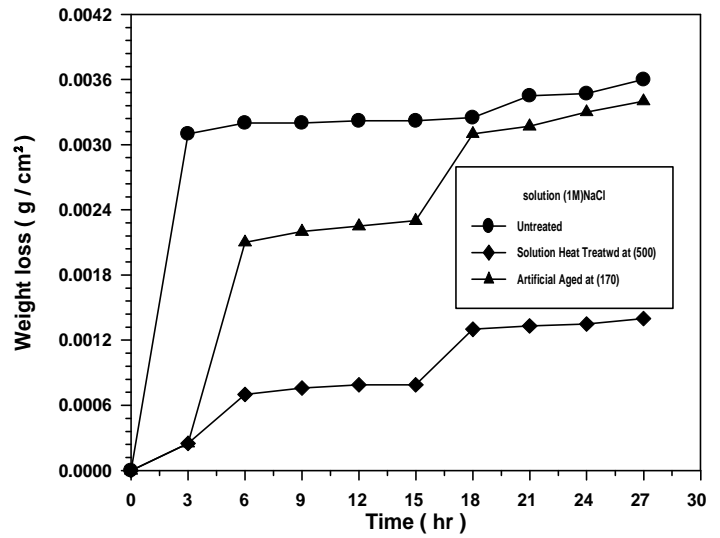
(1M) (7)



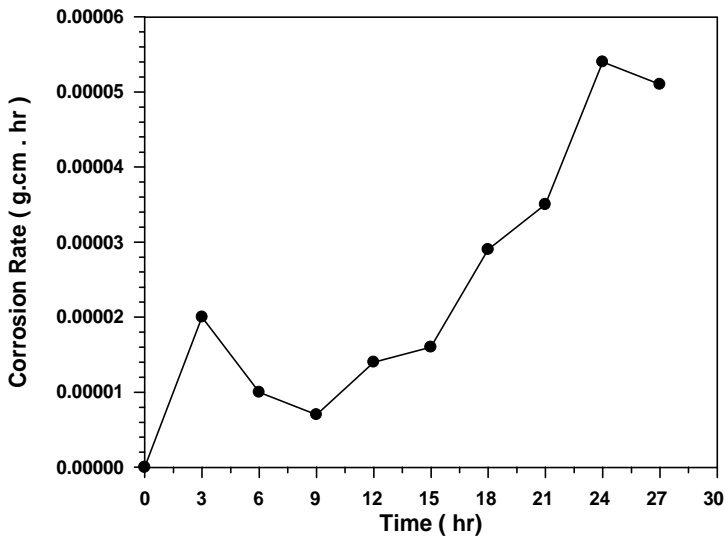
(170C°) (9)
(600X) (27hr)



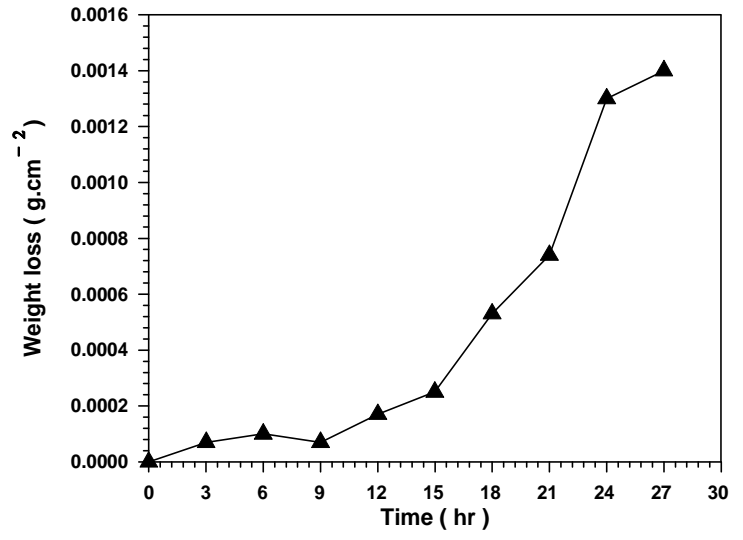
(1M) (11)



(1M) (10)



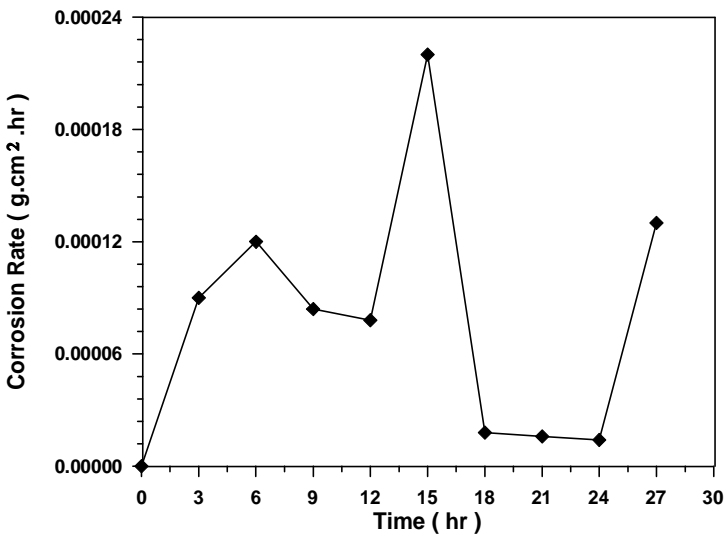
(1M) (13)
(15%)



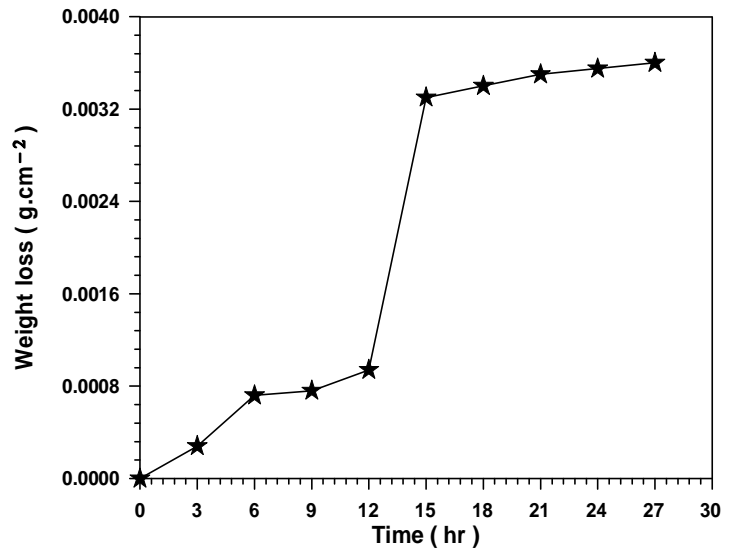
(1M) (12)
(15%)



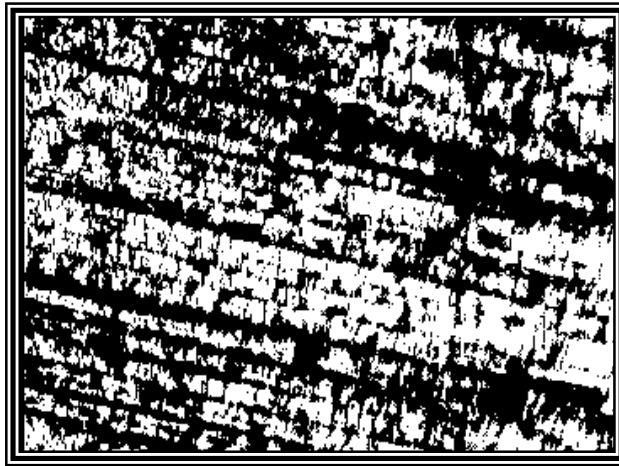
(15%) (14)
(600X)



(1M) (16)
(19%)



(1M) (15)
(19%)

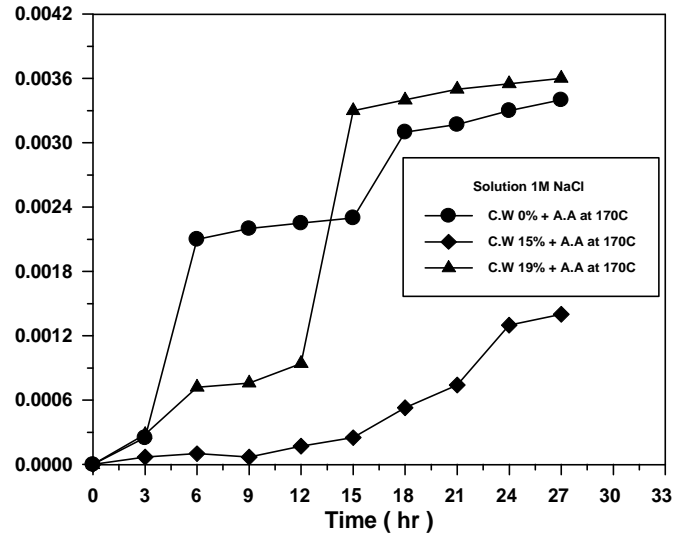
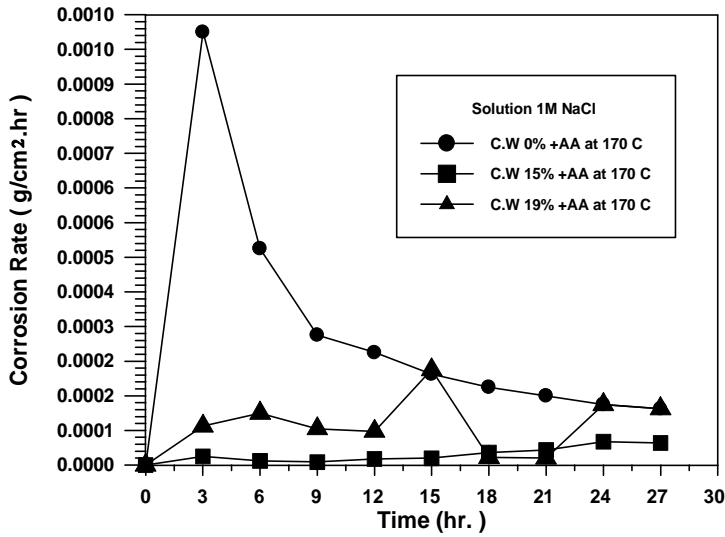


(19%)

(17)

(600X)

(1M NaCl)



(1M) (19)
(0%,15%,19%)

(1M) (18)
(0%,15%,19%)