Experiment No.10 Effect of temperature on rate of corrosion

I Practical Significance

Corrosion is the major industrial issue affecting the different industrial processes and products, need to be addressed. Diploma engineers have to work with various metal equipments while working under different atmospheric conditions in different industries. Determination of effect of temperature on rate of corrosion enable diploma engineers to identify relevant working conditions equipments and probable quality of product which may help them to solve the broad based engineering problems.

II Relevant Program Outcomes (POs)

PO3 Experiments and practices

PO6 Environment and sustainable development

PO10 Life-long learning

III Relevant Course Outcomes

d) Use corrosion preventive measures in industry.

IV Practical Learning Outcome

Determine the rate of corrosion on different temperatures for Aluminum.

V Practical Skills

1. Measurement skill
2. Weighing

VI Relevant Affective domain related Outcomes

1. Follow safety practices.
2. Practice good housekeeping.

VII Minimum Theoretical Background

When metal comes in the contact with atmospheric gases or liquid medium, it undergoes decay and destruction. Moisture and impurities present in the surrounding environment affects the rate of corrosion. Depending on surrounding medium corrosion are of two types, atmospheric corrosion and immersed corrosion.

VIII Circuit diagram / Experimental set-up / Work Situation

NA

IX Resources required

Sr. No.	Resources	Specifications	Quantity	Remark
1.	Beakers	Capacity -250 ml	4 per group	
2.	Pair of tongs	Made up of Steel	1 per group	
3.	Electronic balance	L.C.= 0.001 mg		
4.	Water bath	With temperature controller		
5.	Thermometer	$0 - 110^0C$		
6.	Electric oven	Range up to 250^0C		
7.	Sample material /chemicals	Aluminium strips, acids	As per requirement	

X Procedure

1. Immerse accurately weighed aluminum strip in the given acids / base at room temperature for 5-6 minutes.
2. Wash it, dry it and weigh aluminium strip accurately on electronic balance.
3. Take acids/base prepared from experiment number 4 and keep on water bath.
4. Adjust temperature of water bath at required temperature (eg.50^0C)
5. Dip the weighed aluminium strip in acids/base and wait for 5-6 minutes.
6. Remove the strip using pair of tongs.
7. Wash it, dry it and weigh aluminium strips accurately on electronic balance.
8. Find decrease in weight of aluminium strips.

XI Precautions

1 Handle acid carefully.
2 Clean aluminium strips properly.

XII Actual procedure followed

Immersed accurately weighed aluminium strip in the given base at room temp. for 5-6 min.

XIII Resources used (with major specifications)

Beaker, pair of tongs, Electronic balance, water bath, thermometer, Electric oven, sample material, chemicals.

XIV Precautions followed

1. Handle acid carefully
2. Clean Aluminium strip properly

XV Observations and Calculations

(A) Observation table for loss in weight at room temperature = ...°C

Sr. No.	Solution taken	Weight of strip in mg		Change in weight of strip in mg (W_3)=(W1)-(W2)
		Before dipping W_1	After dipping W_2	
1.	Hydrochloric acid	1.010	1060	30
2.	Sulphuric acid	910	8.090	20
3.	Nitric acid	720	710	10
4.	Sodium Hydroxide	890	870	20

(B) Observation table for loss in weight at increased temperature = ...°C

Sr. No.	Solution taken	Weight of strip in mg		Change in weight of strip in mg (W_6)=(W4)-(W5)
		Before dipping W_4	After dipping W_5	
1.	Hydrochloric acid	770	700	70
2.	Sulphuric acid	1.020	1000	20
3.	Nitric acid	800	840	20
4.	Sodium Hydroxide	930	915	15

XVI Results:

1. Change in weight of aluminium in hydrochloric acid at room temperature 30.gms. and change in weight of aluminium in hydrochloric acid at temperature ...45.....°C is ...70.....gms.
2. Change in weight of aluminium in sulphuric acid at room temperature .20 gms and change in weight of aluminium in sulphuric acid at temperature ..45.....°C is.....20...gms.
3. Change in weight of aluminium in nitric acid at room temperature ..10.....gms and change in weight of aluminium in nitric acid at temperature .....45....°C is ..20.....gms.
4. Change in weight of aluminium in Sodium Hydroxide is at room temperature ..20gms and change in weight of aluminium in Sodium Hydroxide is at Temperature ...45.....°C is ....15..... gms.

XVII Interpretation of results

Maximum change in weight of aluminium is observed at .....45..... temperature in ...HCl..... .....Acid.

XVIII Conclusions and Recommendations (if any)

Hydrochloric acid metal acidic medium

XIX Practical Related Questions

1. State the acid when maximum change in weight is observed.
2. Name the gas liberated when aluminium is dipped in hydrochloric acid.
3. Which compound is formed when aluminium reacts with hydrochloric acid.
4. Which type of film formed after dipping metal in hydrochloric acid.
5. Describe observation when aluminium reacts with acid.

XX References / Suggestions for further Reading

Sr. No.	Title of Book	Author	Publication
1.	Experiments in general chemistry Principles and modern applications	Thomas G. Greco; Lyman H. Richard; Gerald S. Weiss	Pearson, 2011, ISBN-13:978-0131493919
2.	Applied Chemistry :Theory and practice	O.P.Vermani,A.K.Narula	New age International Publication New Delhi 2005 ISBN : 8122408141
.	Experiments and calculations in engineering chemistry	Dr.Dara, S. S.	S.Chand. Publication, New Delhi, 2011, ISBN:8121908647
4.	Practical chemistry	Dr. N.K. Varma	Laxmi Publication New Delhi ISBN:8170085942

XXI Assessment Scheme

Process related assessment scheme

Sr. No.	Process related	Weightage (60%)
1.	Observed change in weight in hydrochloric acid	15%
2.	Observed change in weight in sulphuric acid	15%
3.	Observed change in weight in nitric acid	15%
4.	Observed change in weight in acetic acid	15%

Product related assessment scheme

Sr. No.	Process related	Weightage (40%)
1.	Accurate interpretation of final result	20 %
2.	Answer to sample questions	10%
3.	Submission of report in time	10%

List of Student Team Members

1. .....
2. .....
3. .....
4. .....

Marks Obtained			Dated Signature of Teacher
Process Related (15)	Product Related (10)	Total (25)	
14	09	23	

[Space to Write Answers]

Q.1 ——— ?

State the acid maxium temprature is a 5-6 minutes and maximum weight is an a electric balance or HCl Acid and observed 45° temprature.

Q 2 ——— ?

~~Whit~~ When aluminium dipped in HCl the hydrogen gas is liberated.

Q 3 ———?

When aluminium is reacted with HCl. It produced Aluminium chloride and hydrogen gas

$$2Al + 6HCl \longrightarrow 2AlCl_3 + 3$$

Q4 ——— ?
When magnesium is in contact with HCl then magnesium chloride ilm is form when iron react with HCl gerrous chlorine flims form

Q5 ——— ?
Where Aluminium reacts with HCl ~~bubb~~ between are formed