

Experiment No. 09 Preparation of Corrosive Medium

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 and they have to observe the effect of surrounding environment on metal. Preparation of corrosive medium and determination of effect of temperature on rate of corrosion due to different corrosive medium 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

- PO1 Basic knowledge
- PO3 Experiments and practice
- PO4 Engineering tools
- PO6 Environment and sustainability.
- PO8 Individual and team work
- PO9 Communication
- PO10 Life-long learning

III Relevant Course Outcomes

- e) Use corrosion preventive measures in industry.

IV Practical Learning Outcome

Prepare the corrosive acidic / basic medium for aluminium.

V Practical Skills

1. Measurement skill
2. Preparation of solutions
3. Weighing skill

VI Relevant Affective domain related Outcomes

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

VII Minimum Theoretical Background

Corrosion is destruction of metal due to action of surrounding gases or solution. When metal comes in the contact with atmospheric gases or liquid medium, it undergoes decay and destruction. Moisture, impurities present in the surrounding environment affects the rate of corrosion. Surrounding medium may be either acidic, alkaline or neutral which has different effect. Depending on surrounding medium, corrosion is either dry or wet 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.	Sample material / chemicals	Aluminium strips, acids	As per requirement	

X Procedure

1. Prepare normal solution (eg. 1N) of four different acids/base such as Hydrochloric acid, Sulphuric acid, Nitric acid, Sodium Hydroxide from concentrated acid of specified normality.
2. Using normality formula, calculate the quantity of concentrated acid/base required for preparation of desired acid / base as a corrosive medium.
3. This Corrosive medium is used to carry out experiment no. 21.

XI Precautions

1. Handle acid / base carefully.
2. Add acid slowly to water with constant stirring.

XII Actual procedure followed

- (1). Procedure followed as given in experiment No. 9 that is HCl acid.
- (2). Procedure followed as given in experiment No. 9 i.e. H_2SO_4 acid.
- (3). Procedure followed as given in experiment No. 9 i.e. HNO_3 acid.
- (4). Procedure followed as given in experiment No. 9 i.e. NaOH.

XIII Resources used (with major specifications)

Beakers, pair of tongs, Electronic balance, water both sample material.

XIV Precautions followed

Handle acid carefully add acid slowly to water with constant stirring.

XV Observations and Calculations

Sr. No.	Name of acid	Concentration of available acid (N ₁)	Concentration of acid to be prepared (N ₂)	Volume of acid /base required to be prepare (V ₂)	Volume of acid /base to be used for Preparation of (N ₂)normal acid (V ₁)
1.	HCl	1N	0.5N	500 ml	250 ml
2.	H ₂ SO ₄	1N	0.5N	500 ml	250 ml
3.	HNO ₃	1N	0.5N	500 ml	250 ml
4.	NaOH	1N	0.5N	500 ml	250 ml

Calculations

$$N_1 V_1 = N_2 V_2$$

$$V_1 = \frac{N_2 \times V_2}{N_1}$$

N₁ = Normality of available acid/base. = 1N
 V₁ = Volume of available acid/base. = 250
 N₂ = Normality of acid/base required. (eg. 1N) = 0.5N
 V₂ = Volume of acid/base required (eg. 100 ml) = 500

XVI Results

- Volume of available hydrochloric acid required for preparation of 0.5 N HCl = 500 ml.
- Volume of available sulphuric acid required for preparation of 0.5N H₂SO₄ = 500 ml.
- Volume of available nitric acid required for preparation of 0.5 N HNO₃ = 500 ml.
- Volume of available sodium hydroxide required for preparation of 0.5 NaOH = 500 ml.

XVII Interpretation of results

Acids of required normality are prepared.

XVIII Conclusions and Recommendations

Corrosive medium for aluminium is prepared.

XIX Practical Related Questions

1. Mention the type of corrosion takes place when metal comes in contact with acids/base.
2. State the precaution taken for preparation of dilute acids/base.
3. Prepare 250ml of 5N HCl from the given 12N HCl.

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
3.	Experiments and calculations in engineering chemistry	Dr. Dara, S. S.	S. Chand. Publication, New Delhi, 2011, ISBN:8121908647
	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.	Process for preparation of hydrochloric acid	15%
2.	Process for preparation of sulphuric acid	15%
3.	Process for preparation of nitric acid	15%
4.	Process for preparation of sodium hydroxide	15%

Product related assessment scheme

Sr. No.	Product related	Weightage (40%)
1.	Calculation of volume for hydrochloric acid using normality formula	5%
2.	Calculation of volume for sulphuric acid using normality formula	5%
3.	Calculation of volume for nitric acid using normality formula	5%
4.	Calculation of volume for sodium hydroxide using normality formula	5%
5.	Answer to sample questions	10%
6.	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]

Q1 — ?

When metal comes in contact with acid following are types of corrosion, occurs.

1. Wet corrosion :-

- a. Evaluation of hydrogen
- b. Absorption of oxygen

Q.2 — ?

- i) Pour acid into water if we pour water into acid to hit as reaction will cause explosion into steam and will be splatter.
- ii) Handle acid carefully.
- iii) Add acid slowly to water with constant stirring.
- iv) Wear hand gloves and apron.

$$N_1 V_1 = N_2 V_2$$

N_1 → Normality of HCl used

V_1 → Volume of HCl to be used for

N_2 → Requested availability of HCl

V_2 → Final value of HCl

N_1 → 12, V_1 = volume of conc requested

N_2 → 5M, V_2 = 250 ml

$$N_1 \times V_1 = N_2 \times V_2$$

$$12 \times V_1 = 5 \times 250$$

$$V_1 = \frac{5 \times 250}{12}$$

$$V_1 = \frac{1250}{12}$$

$$V_1 = 104.16$$

Final