DEPARTMENT OF CHEMISTRY

LOVELY PROFESSIONAL UNIVERSITY

PHAGWARA, PUNJAB

"Corrosion inhibition nature of medicinal plants – populous deltoids and Mimosa pudica"

By

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To

Department of Chemistry

In partial fulfillment for the award of degree of

Masters of Science in Chemistry

At

Lovely Professional University, Phagwara

Under the supervision

Of

Dr. Dwarika Prasad

CERTIFICATE

This is to certify that **Amanpreet Kaur** has completed the dissertation report entitled, **"Corrosion inhibition nature of medicinal plants – populous deltoids and Mimosa pudica"** under my guidance supervision. To the best of my knowledge, the present work is the result of his original investigation and study.

DATE:-

Signature of Supervisor

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ACKNOWLEDGEMENT

This piece of work will never be accomplished without god almighty with his blessings and power that work within me.

I thankful to the conducted environment provided by Lovely Professional University during the time period of my course.

First of all, I would like to give my sincere thanks to my supervisor, Dr. Dwarika Prasad, Associate Professor, Department of Chemistry. He is kind, generous, optimistic and knowledgeable. He provides me abundant guidance, freedom and support. He is a great advisor that every student would ask for. He has always been there for me when I need suggestions. Without his unconditional support my M.Sc. project could not have been completed.

I also like to acknowledge **Dr. Ramesh Chand Thakur (HOD**), Dr. Harpreet (HOL) & Dr. Rekha, faculty of chemistry department.

DECLARATION

I hereby declare that the dissertation entitled "**Corrosion inhibition nature of medicinal plants – populous deltoids and Mimosa pudica**" is my own work conducted under the supervision of Dr. Dwarika Prasad at the Department of Chemistry, Lovely Professional University, Phagwara, Punjab, India approved committee. It is entirely Original work ideas and references are dully acknowledged. The dissertation has not been formed the basis for the award of any other degree.

Amanpreet Kaur

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ABSTRACT

The extract of plants *Mimosa podica, Populus deltoids, Pfaffia paniculata, Senegalia catechu, Momordica charantia, Alkanna tincotoria, Eucalptus globulas, Ficus religiosa, Tabernae montana* and *Soleanum surattense* in were taken and we have used 8 % H_2SO_4 for evaluation as corrosion inhibitor for mild steel. The plant extracts have been studied as corrosion inhibitors by using weight loss study, UV spectroscopy and IR spectroscopy.

TABLE OF CONTENTS

INTRODUCTION:

Corrosion will be characterized the ruinous and unintentional debasement of an material brought about by its nature's domain.[1] This will be a exchange of electrons starting with one metal to another so it is a redox reaction. Corrosion of metal is a process by which the metal will be oxidized. Corrosion may be frequently connected of the debasement of plastics, cement, wood but mostly with the metals.[2]

TYPES:

- **Galvanic corrosion:** When two distinctive metals are joined together and exposed,the more sensitive of the two metals get consumed and the other will be ensured.[3]
- **Pitting corrosion:** It is confined kind of attack, for those rate of corrosion is more at few territories than the others and characterized by formation of irregularly shaped cavities on the surface of the metal.[4]
- **Uniform corrosion:** This is produced by direct chemical attack and is common form of corrosion. Firstly dulling of surface takes place and then if it continue, it will lead to roughness of the surface.[5]
- **Stress corrosion cracking:** It is the development of cracks over a destructive surroundings. It could result into unpredictable sudden failure for typically flexible metals subjected with an tensile strength, particularly at raised temperature. It is usually seen in alloys over immaculate metals.[6]

METHODS TO PREVENT CORROSION: -

- **Surface treatment:** Surface medicines are used to prevent corrosion, but there should be complete coverage without any holes or cracks. For example: painting, electroplating, warm showering.[7]
- **Cathodic protection:** In this specific technique,corrosion may be regulated by making those surface concerning illustration a cathode and sacrificial metal's surface as anode for a electrochemical cell. So, conciliatory metal get consumed in the place of secured metal. Its main applications are: water heaters, fuel pipelines, boat hulls and seaward oil platforms.[8]
- **Anodic protection:** It is the strategy received to decrease the corrosion of the surface of a metal by connecting it as an anode with admiration to an inactive cathode in the cell structured because of an electrochemical response in the destructive environment, and ensuring that the cathode possibility may be controlled to keep the metal in passive state.[9]
- **Biofilm coating:** A layer of living microscopic organisms might ensure metal structures against corrosion and lessen the natural harm initiated by conventional protective coatings.[10]

GREEN CORROSION INHIBITORS: -

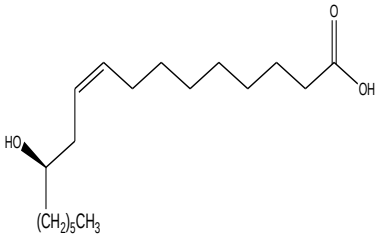
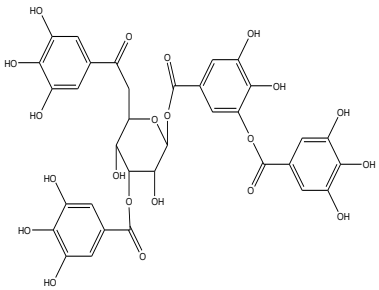
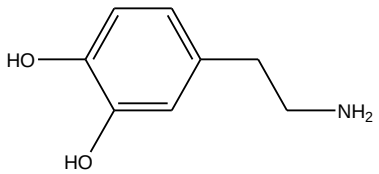
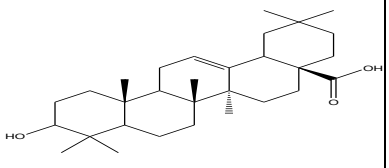
The use of inhibitors is the effective method of protecting metal against corrosion. Organic corrosion inhibitors toxics the natural environment so researchers tried to use GREEN INHIBITORS. They are biodegradable and eco-friendly in nature. They do not contain any heavy metal or toxic substances which effect the environment. Many research groups have reported the successful use of naturally occurring subbstances especially plants to control corrosion rate of metals n acidic and alkaline medium.[11]

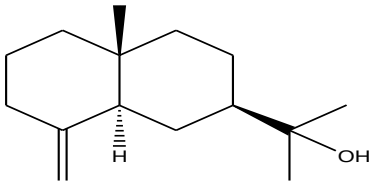
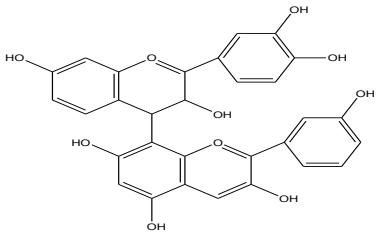
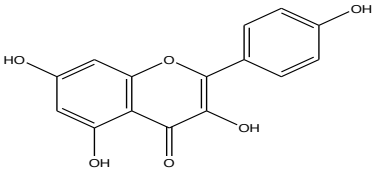
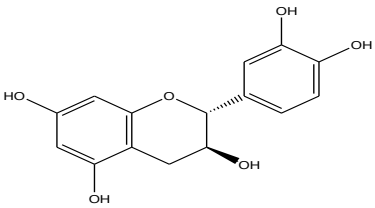
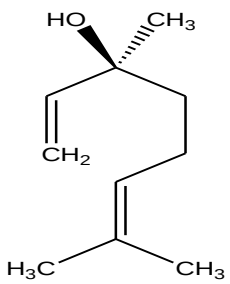
SELECTED PLANTS FOR THE STUDY: -

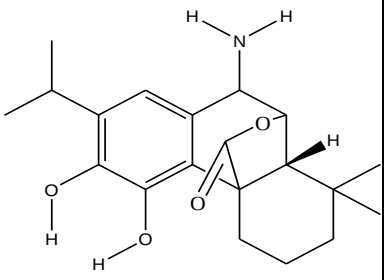
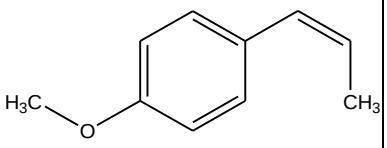
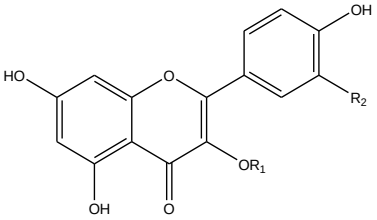
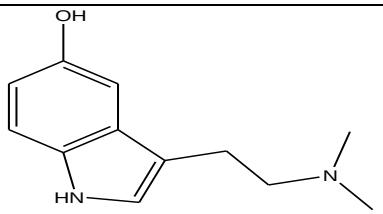
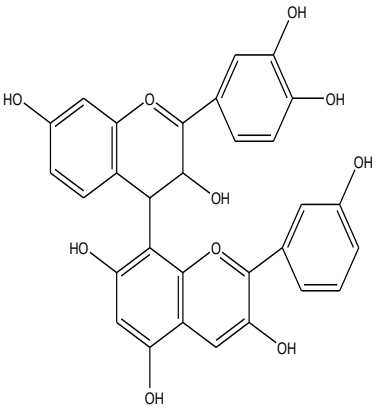
For controlling of corrosion rate, I selected some of the plants as following*:- Mimosa podica, Populus deltoids, Pfaffia paniculata, Sanegalia catachu, Momordica cacharantia, Eucalptus globulus, Ficus religiosa Tabernae montana and Soleanum Surattenses.*

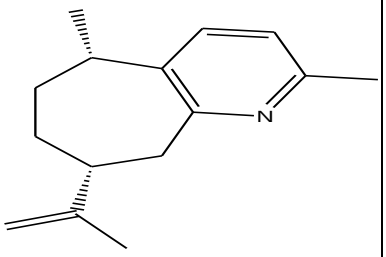
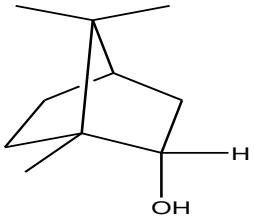
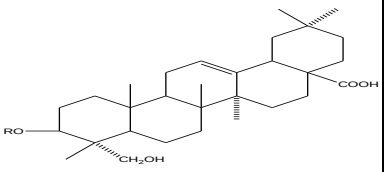
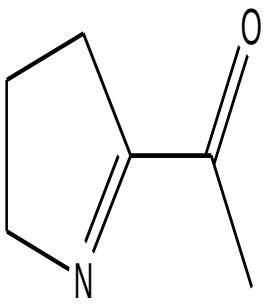
1. REVIEW OF LITERATURE

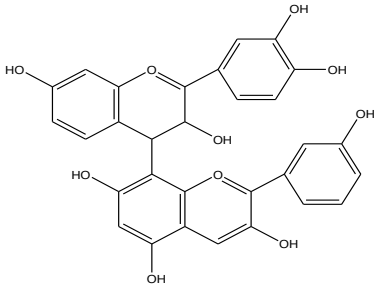
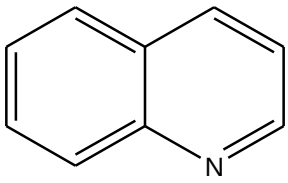
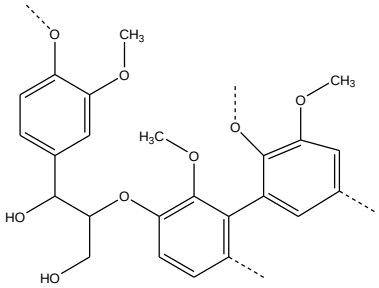
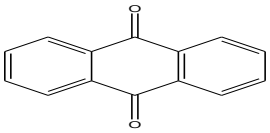
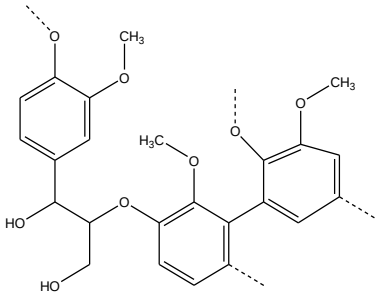
The literature study of some plants are given below: -

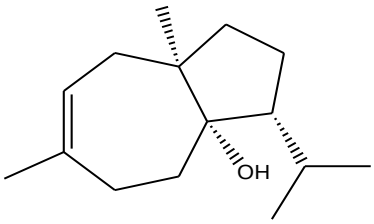
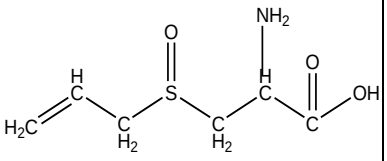
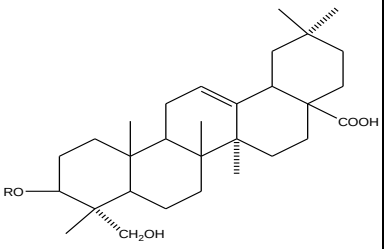
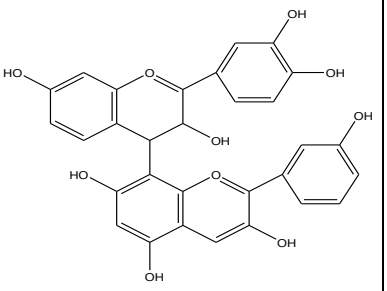
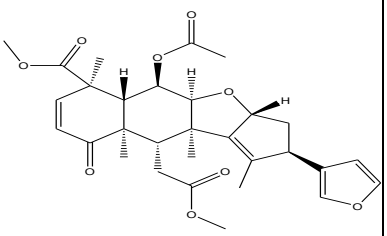
S. No.	Plant name	Chemical constituent	% Efficiency	
1.	Ricinus communis	Ricinic acid 	85	The extract of Ricinus communis shows 85% inhibition efficiency at 300 ppm inhibitor conc. in 0.1% NaCl.[12]
2.	Combretum bracteosum	Tannic acid 	88	The extract of Combretum bracteosum shows 88% inhibition efficiency at 400 ppm inhibitor conc. in 5 M H_2SO_4.[13]
3.	Musa sapientum	Dopamine 	71	The extracts of Musa sapientum shows 71% inhibition efficiency at 500 ppm inhibitor conc. in 2.5 M H_2SO_4.[14]
4.	Ocimumtenuiflorum	Oleanolic acid 	86	The extract of Ocimumtenuiflorum shows 86% inhibition efficiency at 600 ppm inhibitor conc. in 0.5 N HCl.[15]

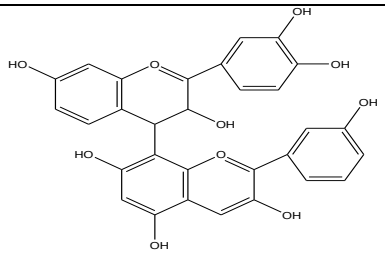
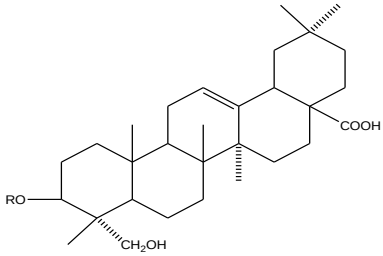
5.	Pavetta Indica	Eudesmol 	79	The extract of Pavetta Indica shows 79% inhibition efficiency at 500 ppm inhibitor conc. in 1 M HCl.[16]
6.	Emblica Officinalis	Tannis 	81	The extract of Emblica Officinalis shows 81% inhibition efficiency at 1000 ppm inhibitor conc. in 1 N HCl.[17]
7.	Gongronemalatifolium	Flavone 	90	The extract of GongronemaLatifolium shows 90% inhibition efficiency at 1000 ppm inhibitor conc. in 5.0 M H_2SO_4.[18]
8.	Green Tea	Catechin(C) 	80	The extract of Green tea shows 80% inhibition efficiency at 500 ppm inhibitor conc. in 1 M HCl.[19]
9.	Coriandrum sativum	Coriandrol 	72	The extract of Thymus Vulgarize shows 72% inhibition efficiency at 500 ppm inhibitor conc. in 1.0 M HNO_3.[20]

10.	Rosmarinus Officinalis	Rosmaricine 	84	The extract of Rosmarinus Officinalis shows 84% inhibition efficiency at 800 ppm inhibitor conc. in 0.5 M H_2SO_4.[21]
11.	Anise	Anethole 	91	The extract of Anise shows 91% inhibition efficiency at 300 ppm inhibitor conc. in 1 M HCl.[22]
12.	Ginkgo biloba	Flavonoid 	78	The extract of Ginko biloba shows 78% inhibition efficiency at 1000 ppm inhibitor conc. in 1 M HCl.[23]
13.	Ziziphusjujuba leaves	 Scutianine	75	The extract of Ziziphusjujuba leaves show 75% inhibition efficiency at 900 ppm inhibitor conc. in 1 N NaOH .[24]
14.	PistaciaLentiscus	Tannis 	85	The extract of PistaciaLentiscus shows 85% inhibition efficiency at 500 ppm inhibitor conc. in 1 M HCl.[25]

16.	ArtemesiaMesatlantica	Guaipyridine 	91	The extract of ArtemesiaMesatlantica shows 91% inhibition efficiency at 2000 ppm inhibitor conc. in 1 M HCl.[26]
17.	Salvia officinalis	Borneol 	85	The extract of Salvia officinalis shows 85% inhibition efficiency at 800 ppm inhibitor conc. in 1 M HCl.[27]
18.	ChlorophytumBorivilianum	Saponin 	91	The extract of Chlorophytumborivilianum shows 91% inhibition efficiency at 500 ppm inhibitor conc. in 0.5 M H_2SO_4.[28]
19.	Pandanus amaryllifolius	2-acetyl 1-pyrroline 	79	The extract of Pandanus amaryllifolius shows 79% inhibition efficiency at 1000 ppm inhibitor conc. in 1.0 N HCl.[29]
20.	Alchornealaxiflora	Rutinose	80	The extract of Alchornealaxiflora shows 80% inhibition efficiency at 600 ppm inhibitor conc. in 1.0 M HCl.[30]

21.	Cninodosculuschayamansa	Tannis 	58	The extract of Cninodosculuschayamansa shows 58% inhibition efficiency at 500 ppm inhibitor conc. in 1 M HCl.[31]
22.	Anthocleistadjalonensis	Quiniline 	80	The extract of Anthocleistadjalonensis shows 80% inhibition efficiency at 600 ppm inhibitor conc. 1 M HCl.[32]
23.	Cashew Waste	Lignin 	80	The extract of Cashew waste shows 80% inhibition efficiency at 800 ppm inhibitor conc. in 1 M HCl.[33]
24.	Mirabilis Jalapa	Anthraquinone 	92	The extract of Mirabilis Jalapa shows 92% inhibition efficiency at 500 ppm inhibitor conc. in 1 M HCl.[34]
25.	Aloe lateritia	Lignin 	70	The extract of Aloe Lateritia shows 77% inhibition efficiency at 600 ppm inhibitor conc. in 2.0 M H_2SO_4.[35]

26.	Daucuscarota	Carotol 	88	The extract of Daucuscarota shows 88% inhibition efficiency at 200 ppm inhibitor conc. in 1.0 N HCl.[36]
27.	Ampeloprasum	Garlic 	81	The extract of Ampeloprasum shows 81% inhibition efficiency at 450 ppm inhibitor conc. in 1.0 M HCl.[37]
28.	Sidaacuta	Saponins 	80	The extract of SidaAcuta shows 80% inhibition efficiency at 500 ppm inhibitor conc. in 1.0 M H_2SO_4.[38]
29.	Eucalyptus Camaldulenis	Tannis 	72	The extract of Eucalyptus Camaldulenis shows 72% inhibition efficiency at 1000 ppm inhibitor conc. in 2 M HCl.[39]
30.	CommiphoraCaudata	Nimbidin 	66	The extract of CommiphoraCaudata shows 66% inhibition efficiency at 700 ppm inhibitor conc. in 1 M HCl.[40]
31.	Juniperus	Tannis	85	The extract of Juniperus shows 85% inhibition

				efficiency at 300 ppm inhibitor conc. in 2.0 M H_2SO_4.[41]
32.	Cassia auriculate	Saponins 	81	The extract of Cassia auriculata shows 81% inhibition efficiency at 600 ppm inhibitor conc. in 1 M HCl.[42]

2.1 STUDY OF SOLANUM SURATTENSE

GENUS	Solanum
SPECIES	Surattense
FAMILY	Solanaceae
AREA	Saudi Arabia, Yemen, Afghanistan
COMMON NAME	Kantankattiri, Dorla, Nelabadane, Kantakari

INTRODUCTION: -Sulanum surattense commonly known as kantakari belongs to the family Solanaceae. The parts of this plant have various properties such as anti-inflammatory, antimicrobial and anti-oxidant.[43]

CHEMICAL CONSTITUENTS: - The phytochemical study of this plant discovered several types of compounds such as the purine-containingcompounds,alkaloids, sterols[2], saponin[3] and flavonoids and their glycosides.[44]

MEDICINAL USES:

- It is a very convinient Ayurvedic herb which is used commonly in the treatment of cough, cold, asthma and many other respiratory tract conditions.
- It is very much effective in Osteoarthritis.
- It is very much effective loss of digestive power.
- It is good for the people suffering from eczema.

2.2 STUDY OF CONVOLVULUS MICROPHYLLUS

GENUS	Convolvulus
SPECIES	Mlcrophyllus
FAMILY	Gentianaceae
AREA	India, Burma
COMMON NAME	Sankhpushpi, Shankhini

INTRODUCTION:-Convolvulus microphyllus belongs to the family Genitianaceae which is an important medicinal herb. It is commonly known as Shankhpushpi. It is mainly found throughout India and Burma.[45]

CHEMICAL CONSTITUENTS: - The parts of the plant are reported to have different chemical compounds such as glycosides, coumarins, flavonoids and alkaloids .[46]

MEDICINAL USES: - The plant possess various medicinal properties which are listed as follows: -

1- The plant is best for the hypertension.

2- The juice of this plant helps to decrease the cholesterol level in the blood.

3- The plant is one of the best natural medicine for improving memory.

4- The herb induce a feeling of calm, good sleep and relief in anxiety and mental fatigue.[3]

2.3 STUDY OF EUCALYPTUS

GENUS	Eucalyptus
SPECIES	E. globules
FAMILY	Myrtaceae
AREA	India, Australia, Zew Zealand
COMMON NAME	Eucalyptus

INTRODUCTION: Eucalyptus globules is a popular Indian medicinal plant common plant. There are over 500 species of eucalyptus there all over the world. A large number species of the class eucalyptus starting with myrtaceae family are utilized within many parts of world for medication of broad classes of diseases including microbial infections.

CHEMICAL CONSTITUENTS: - Eucalyptus globules reported to have the presence of flavonoids, alkaloids, tannins, propanoids and 1,8-Cineole .[47]

MEDICINAL USES: - The plant is used as an Ayurvedic medicine since Ancient time. The medicinal uses are listed below: -

1- Eucalyptus globulesexhibit various properties like anti-inflammatory, anticancer, antibacterial, antiseptic and astringent.

2- It is also used as a traditional treatment for diabetes .

3- This plant can be fight against *Staphylococcus aureus*Gram (+) and *Escherichia coli* Gram (-) bacteria.

2.4 STUDY OF FICUS RELIGIOSA

GENUS	Ficus
SPECIES	F. religiosa
FAMILY	Moraceae
AREA	India, South Africa, Florida
COMMON NAME	Peepal,Pipali

INTRODUCTION: - Ficusreligiosa called as Peepal of the family Moraceae. The plant also has many pharmacological properties such as antimicrobial & antioxidant activity. It is mainly found throughout in India.

CHEMICAL CONSTITUENTS: - The major components identified from study of tannins, saponins, flavonoids, steroids, terpenoids and cardiac glycosides.

MEDICINAL USES: - The plant is used for the treatment of various diseases as listed below:-

1- The different parts of Peepal are used in the treatment in diabetes, vomiting, burns, gynaecological problems, dysentery, diarrhea, nervous disorders, tonic and astringent.
2- It also has antimicrobial, analgesic and wound-healing activities.

3- The different parts of the plants such as bark, fruits, buds, latex are utilized for treatment of different diseases like dysentery, mumps, jaundice, heart diseases, constipation, skin diseases, etc.

2.5 STUDY OF MOMORDICA CHARANTIA

GENUS	Momordica
SPECIES	Charantia
FAMILY	Cucurbitaceae
AREA	Asia, Africa, and the Caribbean
COMMON NAME	Karela, bitter melon

INTRODUCTION: - Momordica charantia is ordinarily known is a multi-purpose herb. It is growed in diverse parts of the universe and may be typically utilized within conventional solution. It grows in the tropical range is prominently devoured similarly as vegetables and has secondary medicinal values.

CHEMICAL CONSTITUENTS: - Qualitative phytochemical analysis of Momordicacharantia confirms the presence of phytochemicals like flavanoids, saponins, terpenoids, coumarins, emodins, alkaloids, proteins, cardiac glycosides, anthraquinones, anthocyanins, steroids etc.

MEDICINAL USES:-

1- In turkey, it has been utilized as a society cure to an assortment of ailments, especially stomach complaints.
2- It is used for treatments for diabetes.
3- Momordica charantia has a numerous purported utilization including tumor prevention, medication of diabetes, fever, HIV and AIDS.

3. EXPERIMENTAL WORK

3.1 Collection of plant material:-The plants selected for extraction were collected from hilly area.

3.2 Apparatus required: - The apparatus that required during this research work are- Soxhlet apparatus, water bath, mild steel, beakers, heating mantle.

(a) **Soxhlet apparatus:-** A soxhlet extractor is a research center mechanical assembly invented in 1879 by Franzvon Soxhlet, needed for extracting constituent from solid. Normally a solid material holding a portion of the desired compound will be set inside a thimble made from thick filter paper, which is stacked into a main chamber of the soxhlet extractor. The soxhlet extractor will be placed into a flask containing solid material gradually fills with warm dissolvable. A percentage of the wanted compounds at that point broken down in the solvent. When the soxhlet chamber is nearly full, the chamber will be naturally exhausted toward a siphon side arm, for the dissolvable running down of the distillation flask. This cycle might make permitted with repeatable numerous times ceaselessly to something like 10-12 hours.

(b) **Water Bath**: - A water bath is laboratory equipment made with a holder filled with long duration. All water baths need a advanced or a simple interface on permit clients to set a fancied temperature. Utilizations incorporate warming of reagents, melting of substrates. It may be likewise utilized with empower certain synthetic reaction to happen at high temperature. Water shower is a favored high temperature source for warming combustible chemicals instead of an open flame to prevent ignition. Different kinds of water baths would utilized contingent upon requisition. To all water baths, it might be utilized up to 99.9^{o}C.

(c) **Mild Steel**: - Mild steel contains a small amount of carbon and is strong and can easily work but not readily tempered or hardened. Properties of mild steel are- it is malleable and ductile. This metal is cheap, versatile, strong and stiff. It can be used for varieties of purposes like bolt, nuts, chain and knives etc.

3.3 Extraction and isolation: - The air dried and coarsely powder of 40 g of different parts of plants was taken in a soxhlet with 250 ml of distilled water in a round bottom flask of 500 ml. Then refluxed it using heating mantle for about 10-12 hours. The aqueous solution then filtered and concentrated on a water bath till we got solid mass or jelly type substance. Then this solid mass is used to prepare solutions of different concentrations by dilution method.

3.4 Weight loss method: - Mild steel strips made of (wt%) Fe 99.30%, Co 0.076%, Si 0.025%, Mn 0.124%, P 0.012%, Cr 0.050%, Al 0.023% and Cu 0.135% were pre treated former of the test by grinding for emery paper (400,500). Weight loss estimations were performed at 308K to 3 hours by immersing the mild steel under corrosive (H2SO4) result from claiming 100 ml without and with different amounts of inhibitors. After 3 hours, those mild steels were taken out, washed for water and acetone. Dried in daylight and weighed faultlessly. Every examination were conducted in 8% H2SO4. All experiments were performed for 4-5 times and then average values were accounted for. Every one of concentration from claiming inhibitors for weight reduction were taken for ppm by weight. Those resistant effectiveness (E%) and surface scope (θ) might have been decided by utilizing the below written equation:-

$\theta = W_0\text{-}W_1/W_0$

$E\ (\%) = W_0\text{-}W_1/W_0 * 100$

Where W_0 also W_1 would the weight passing qualities in the nonvicinity and vicinity about inhibitor separately.

4. RESULT AND DISCUSSION

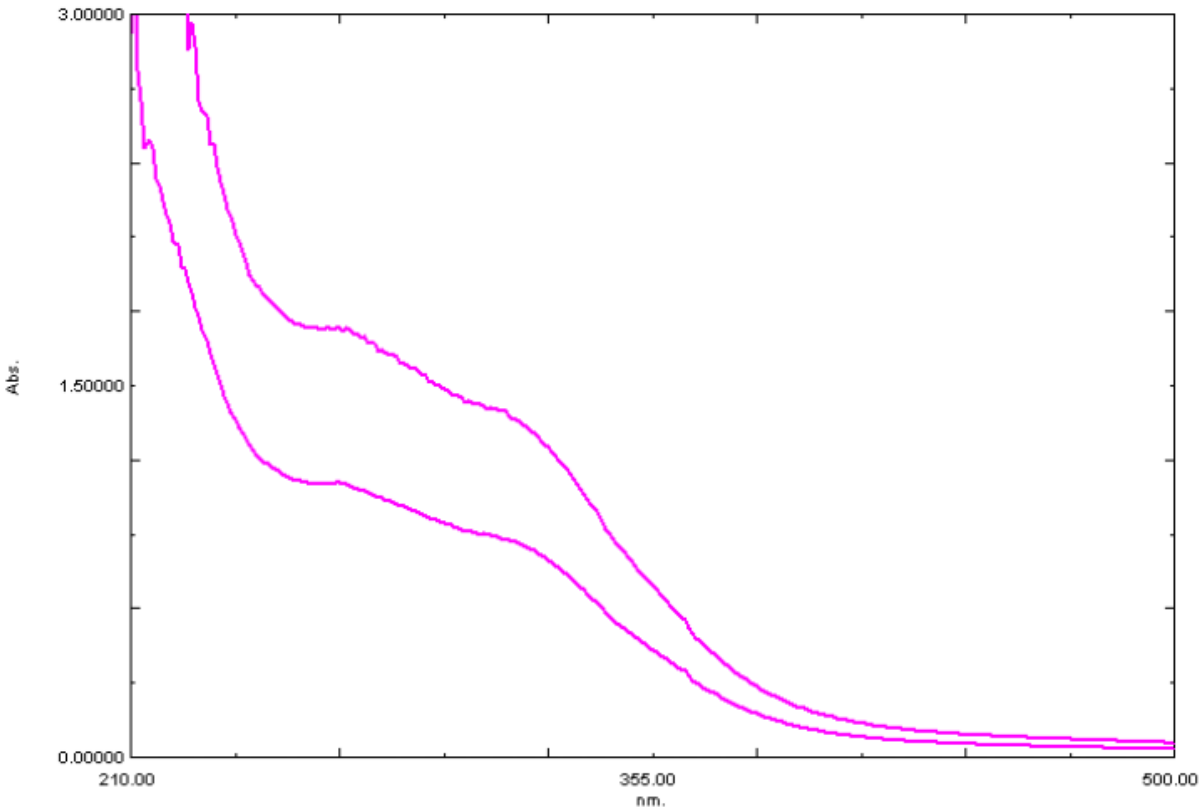
4.1 Solanum Surattense

The weight reduction effects to mild steel for 8% H2SO4 in the non attendance and vicinity about distinctive concentration of extract are indicated in the accompanying table-

Sr. no.	ppm	Initial weight	Final weight	Difference	Area	Weight loss	% Efficiency
1	Pure	8.010	7.466	0.544	9.61	0.05660	00
2	100	7.990	7.818	0.172	9.61	0.01789	68.39
3	200	5.600	5.530	0.070	7.84	0.00892	84.24
4	300	5.060	4.988	0.072	8.37	0.00860	84.80
5	400	3.930	3.875	0.055	7.20	0.00755	86.66
6	500	4.760	4.700	0.060	8.40	0.00714	87.38

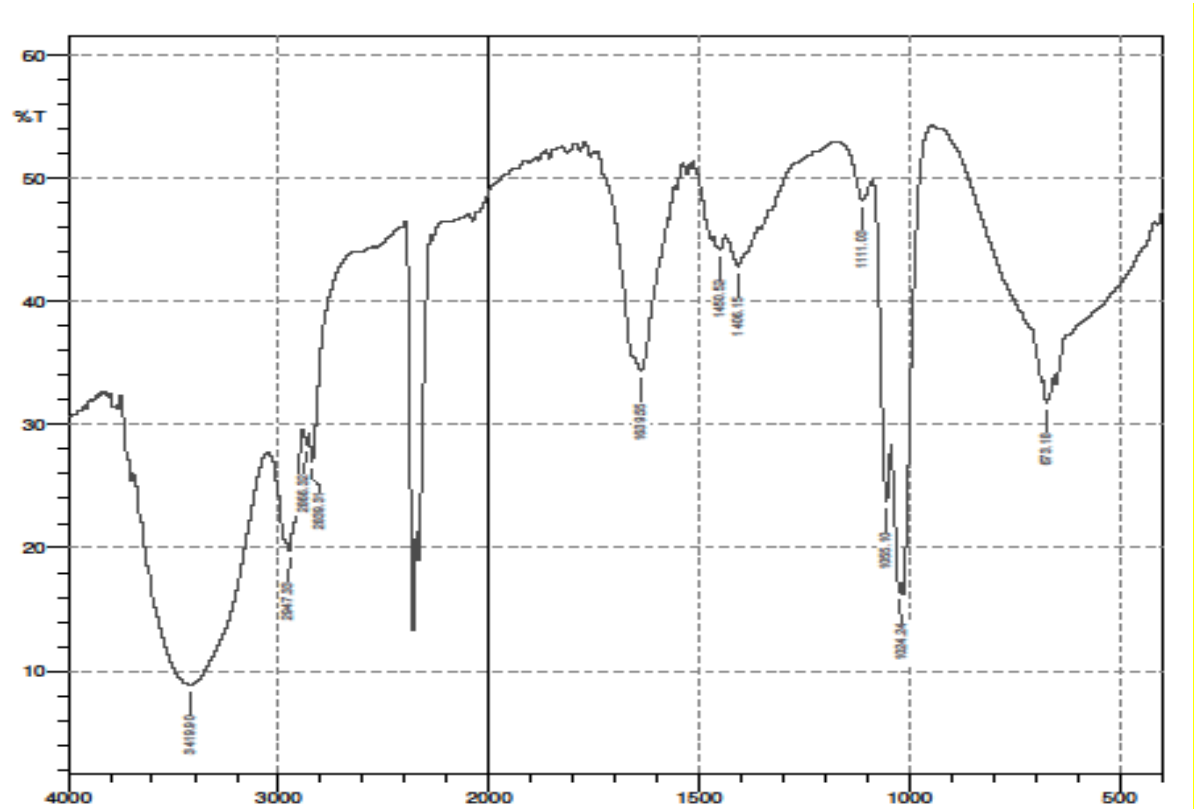
UV Spectroscopy: -

The UV spectra of extract before and after the application of mild steel are shown in below: -



Here, the upper curve shows the absorption peak before the immersion of mild steel in extract solution and lower curve shows the absorption peak after the immersion of mild steel in extract solution.

IR Spectroscopy: -



Here, the broad peak at 3410 cm^{-1} indicates O-H stretching of alcohol, broad peak at 1641 cm^{-1} indicates C=O stretching of carbonyl group.

4.2 Convolvulus microphyllus: -

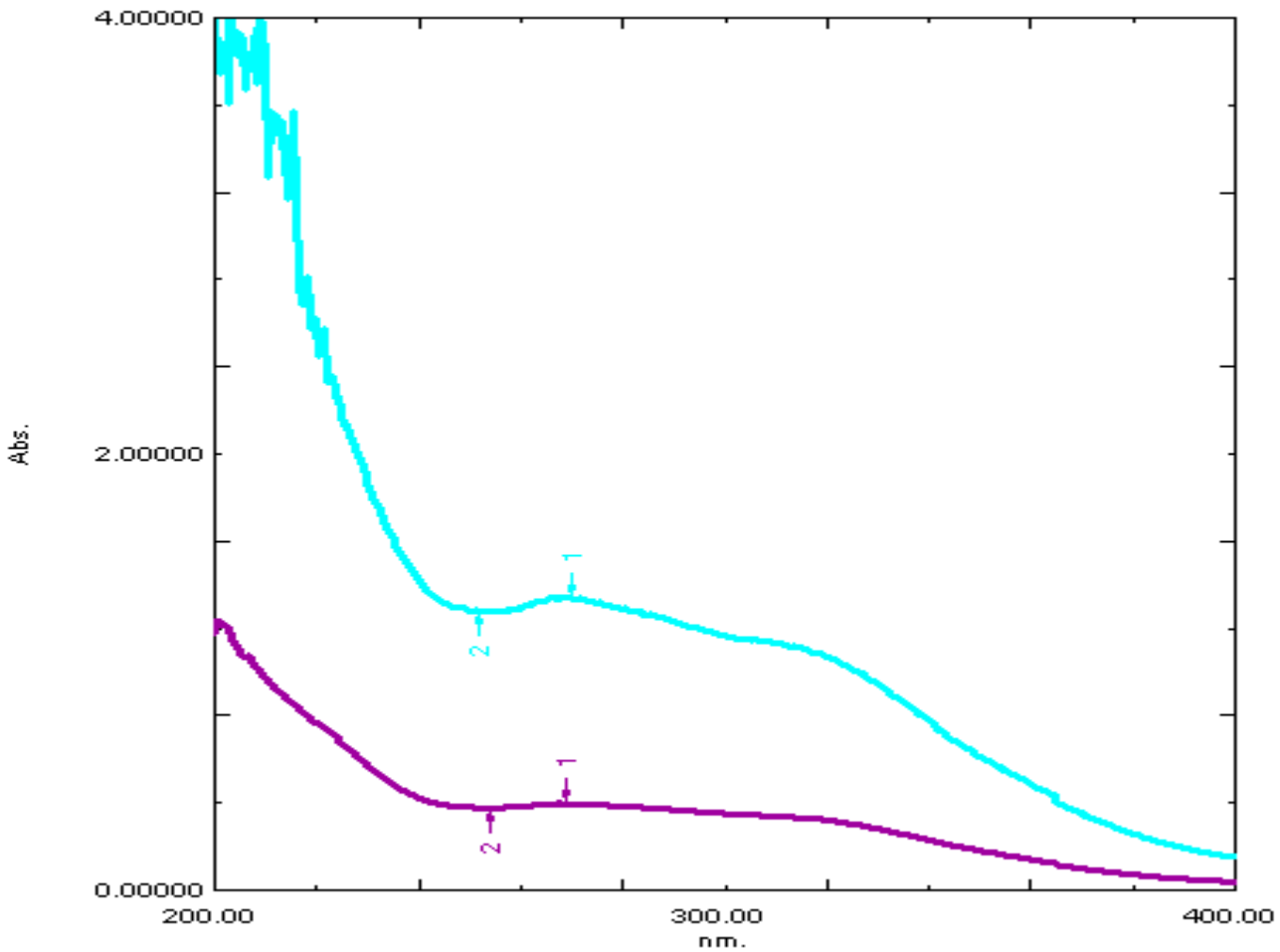
The weight loss results for mild steel in 8% H2SO4 in the absence and presence of different conc. of extract are shown in the following table-

S. no.	ppm	Initial weight	Final weight	Area	Difference	Weight loss	% Efficiency
1	Pure	4.85	4.66	7.75	0.19	0.02451	00
2	100	3.77	3.72	6.75	0.05	0.00740	83.10
3	200	4.34	4.30	8.12	0.04	0.00615	85.12
4	300	7.64	7.60	10.24	0.04	0.00390	89.17

5	400	7.34	7.30	9.9	0.04	0.00404	92.17
6	500	5.45	5.51	8.12	0.06	0.00738	99.72

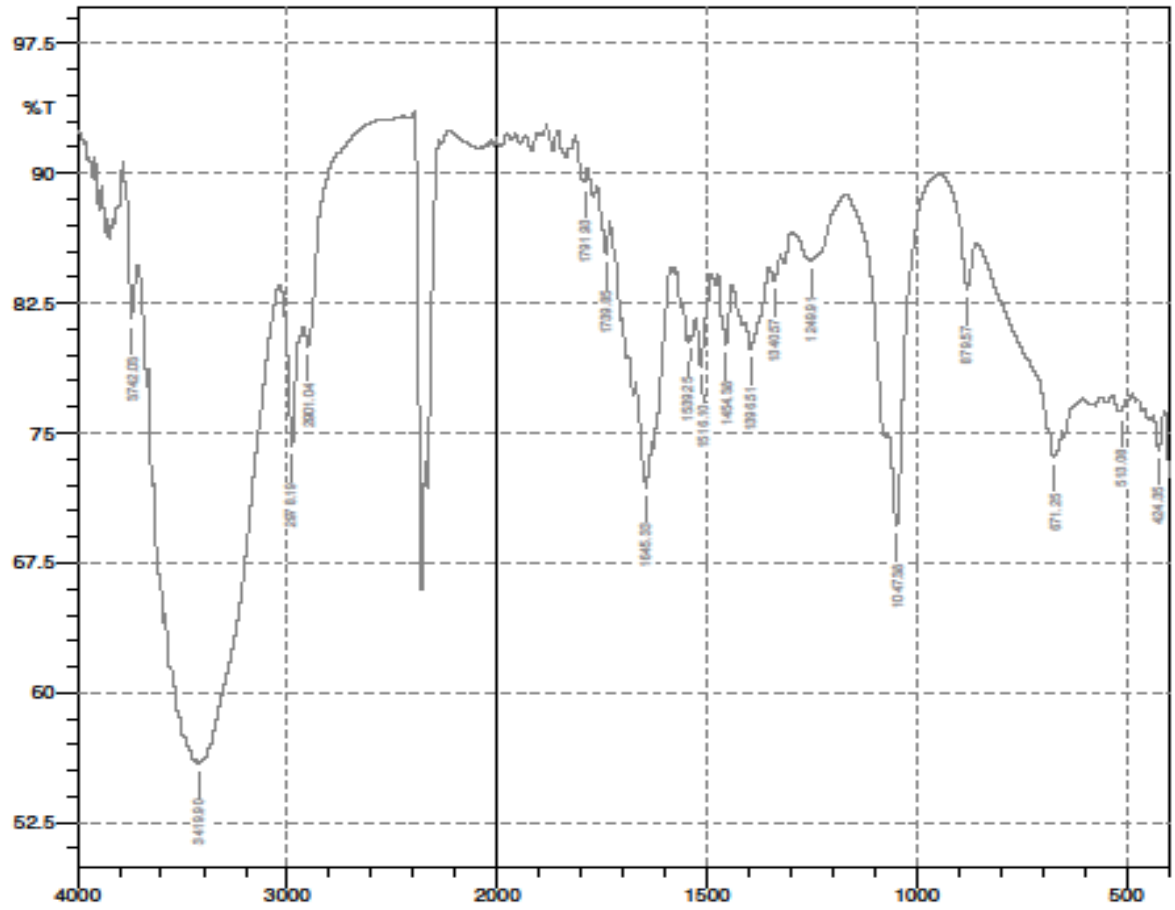
UV Spectroscopy:

UV spectra of extract before and after the immersion of mild steel are shown in below: -



Here, the green colour curve shows the absorption peak before the immersion of mild steel in extract solution and purple colour curve shows the absorption peak after the immersion of mild steel in extract solution.

IR Spectroscopy: -



Here , the peak at 3410 cm-1 indicates O-H stretching . The further peak at 1645 cm-1 indicates the C=O stretching of carbonyl group.

4.3 EUCALYPTUS: -

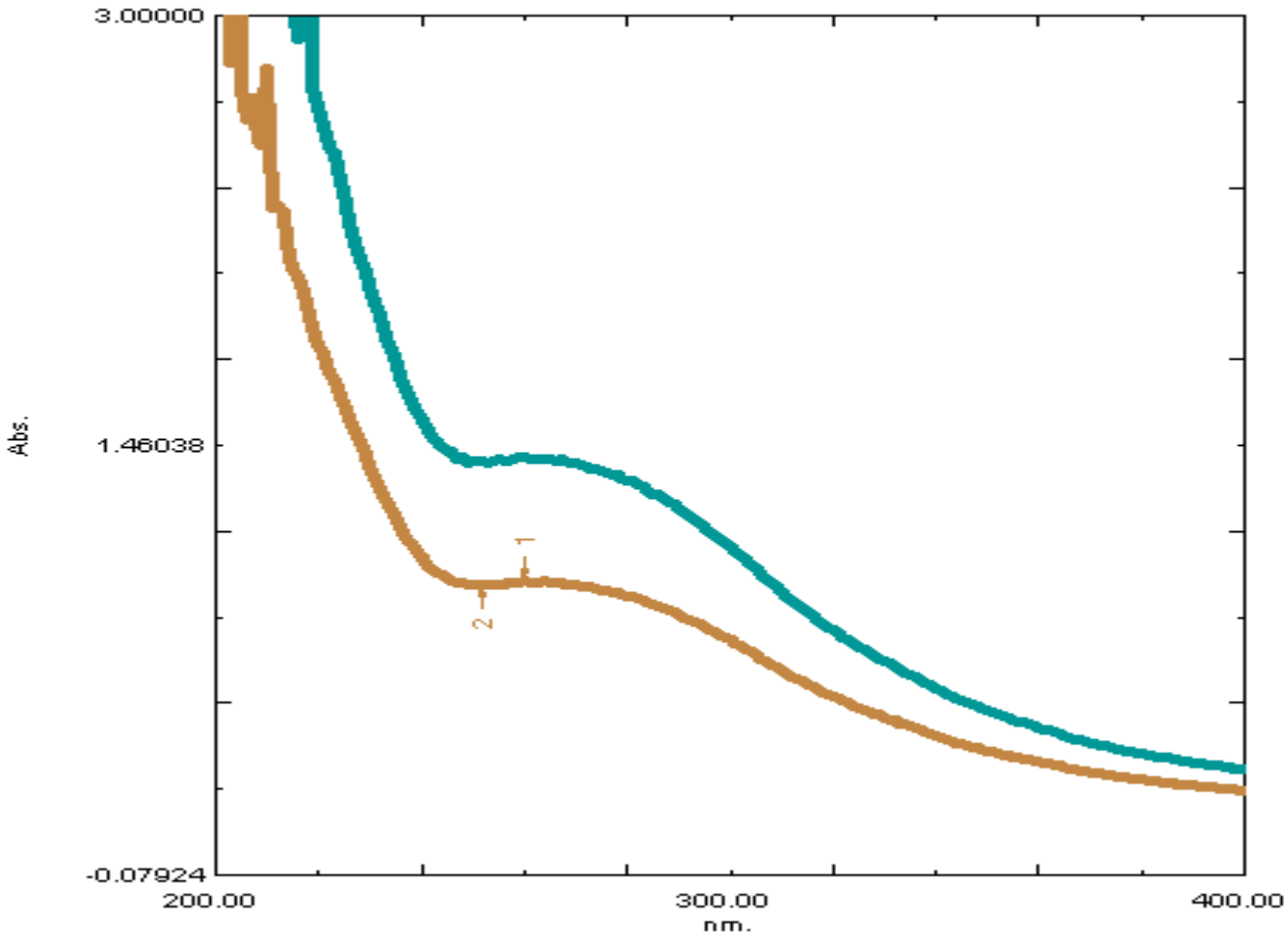
The weight loss results for mild steel in 8% H2SO4 in the absence and presence of different conc. of extract are shown in the following table-

S. no.	ppm	Initial weight	Final weight	Difference	Area	Weight loss	%Efficiency
1	Pure	4.85	4.66	0.19	7.75	0.02451	00
2	100	3.77	3.72	0.05	6.75	0.00390	15.05

3	200	4.34	4.30	0.04	8.12	0.00404	18.03
4	300	7.64	7.60	0.04	10.24	0.00615	25.06
5	400	3.34	7.30	0.04	9.90	0.00738	30.00
6	500	5.45	5.51	0.06	8.12	0.00740	30.16

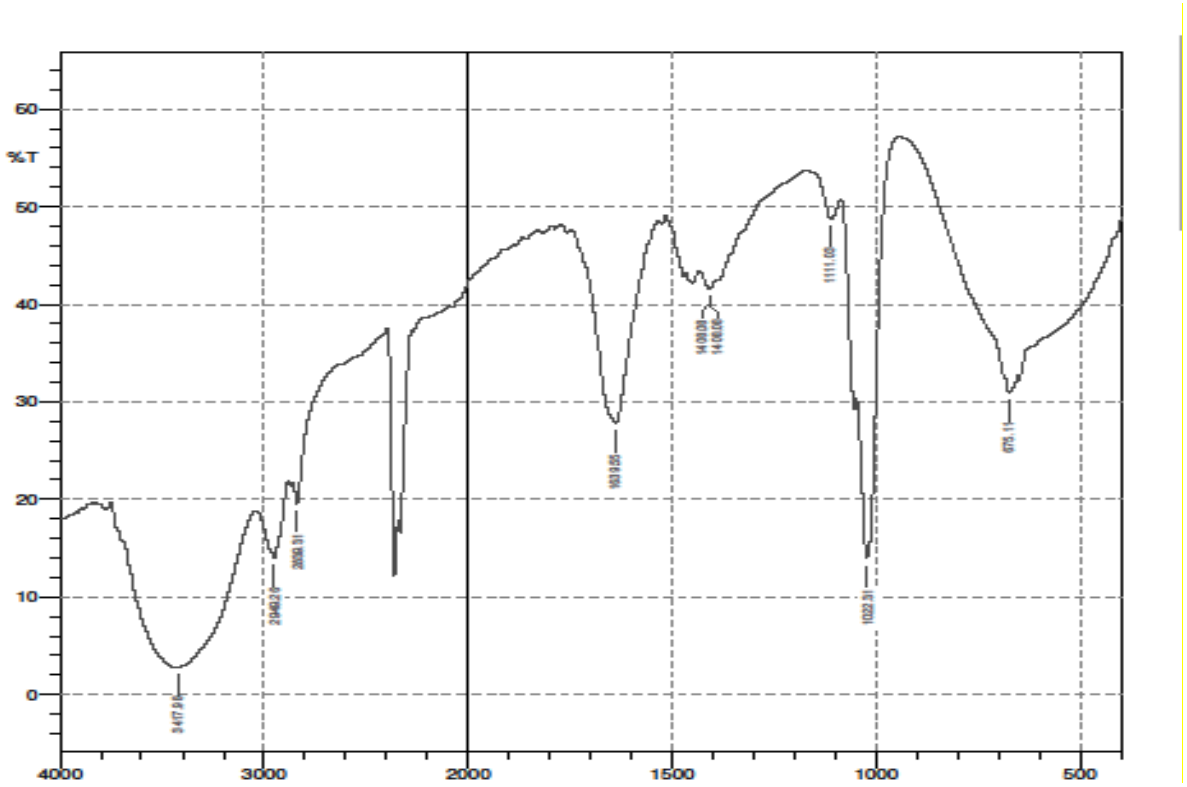
UV Spectroscopy: -

The UV spectra of extract before and after the immersion of mild steel are shown in below:-



Here, the green colour curve shows the absorption peak before 3 hours without immersion of mild steel in extract solution and brown colour curve shows the absorption peak after 3 hours of immersion of mild steel in extract solution.

IR Spectroscopy: -



Here, the peak at 3417 cm $^{-1}$ indicates the O-H stretching of alcohol. The further peak at 1519 cm^{-1} indicates the C=O stretching of carbonyl group.

4.4 FICUS RELIGIOSA: -

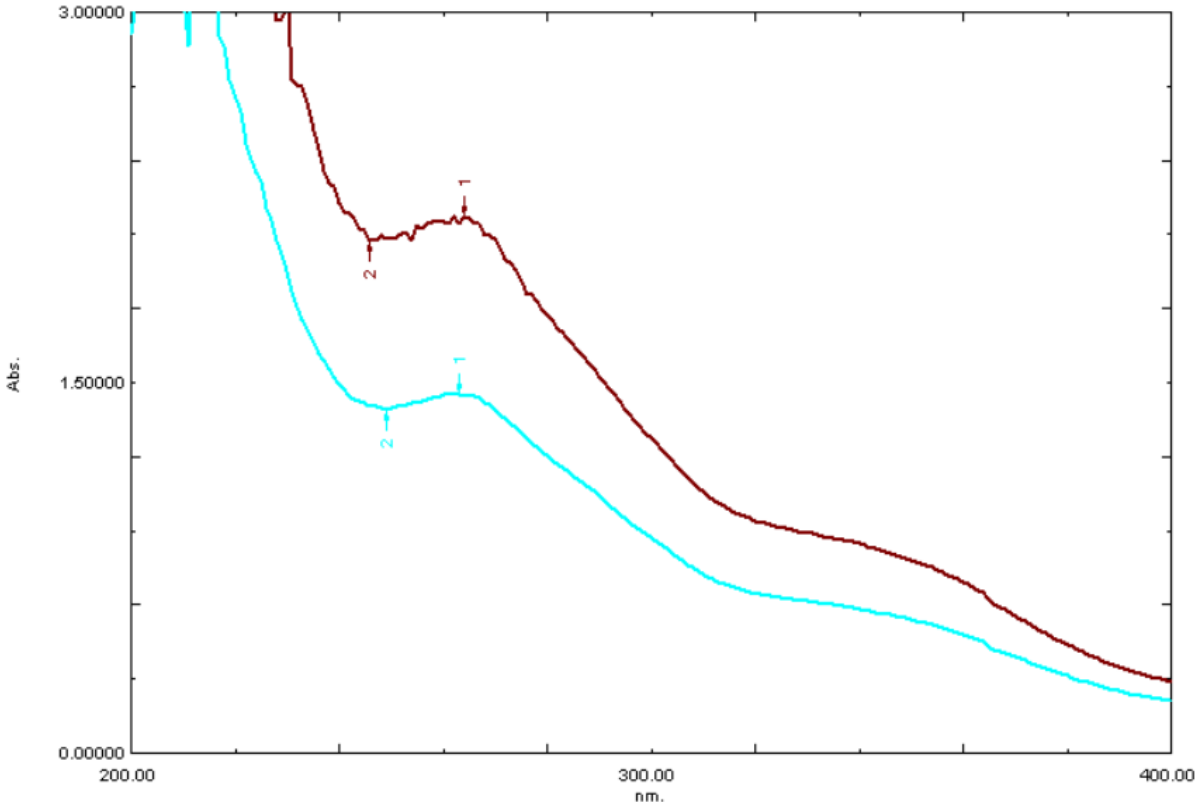
The weight loss results for mild steel in 8% H2SO4 in the absence and presence of different conc. of extract are shown in the following table-

S. no.	ppm	Initial weight	Final weight	Difference	Area	Weight loss	% Efficiency
1	Pure	4.275	4.019	0.256	6.25	0.0409	00
2	100	4.280	4.214	0.066	5.98	0.0110	73.10
3	200	4.885	4.832	0.053	6.50	0.0081	80.19
4	300	4.720	4.681	0.039	6.24	0.0062	84.84

5	400	4.010	3.982	0.029	6.00	0.0046	88.75
6	500	4.775	4.752	0.023	6.00	0.0038	90.70

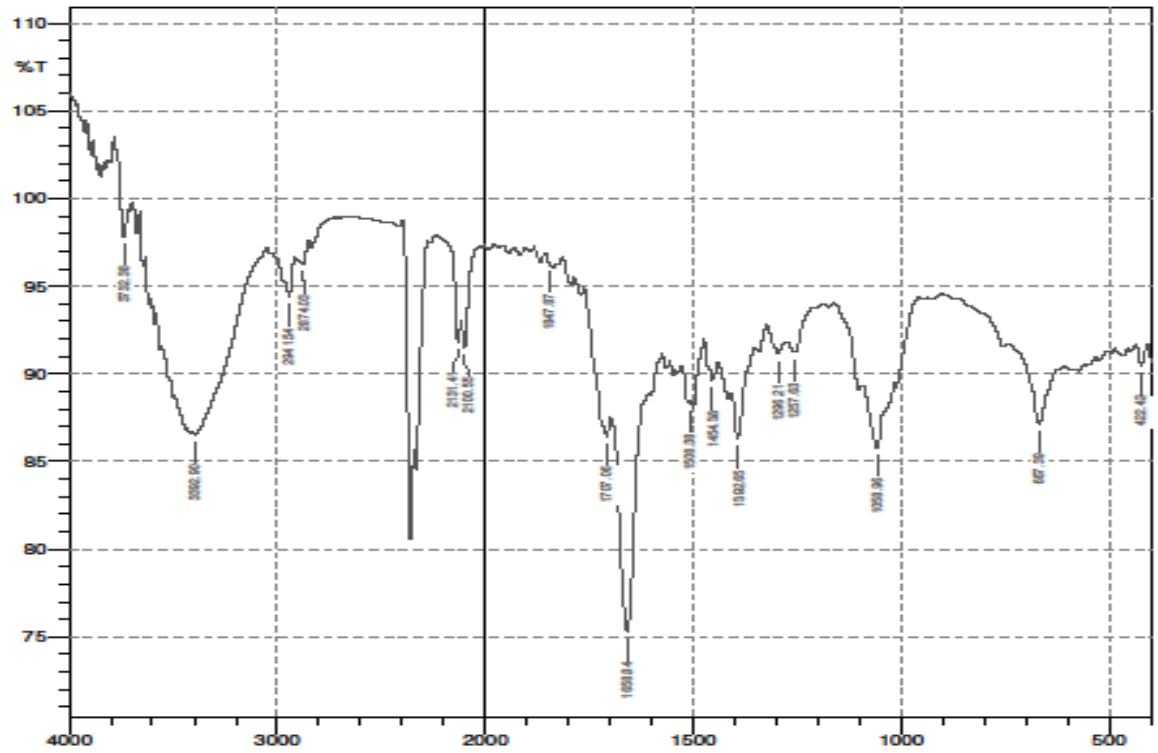
UV Spectroscopy: -

The UV spectra of extract before and after the immersion of mild steel are shown in below:-



Here, the brown colour curve shows the absorption peak before 3 hours without immersion of mild steel in extract solution and green colour curve shows the absorption peak after 3 hours of immersion of mild steel in extract solution.

IR spectroscopy: -



Here, the broad peak at 3300 cm^{-1} indicates O-H stretching of alcohol. The further peak at 1700 cm^{-1} indicates the C=O stretching of carbonyl group.

4.5 Momordica Charantia: -

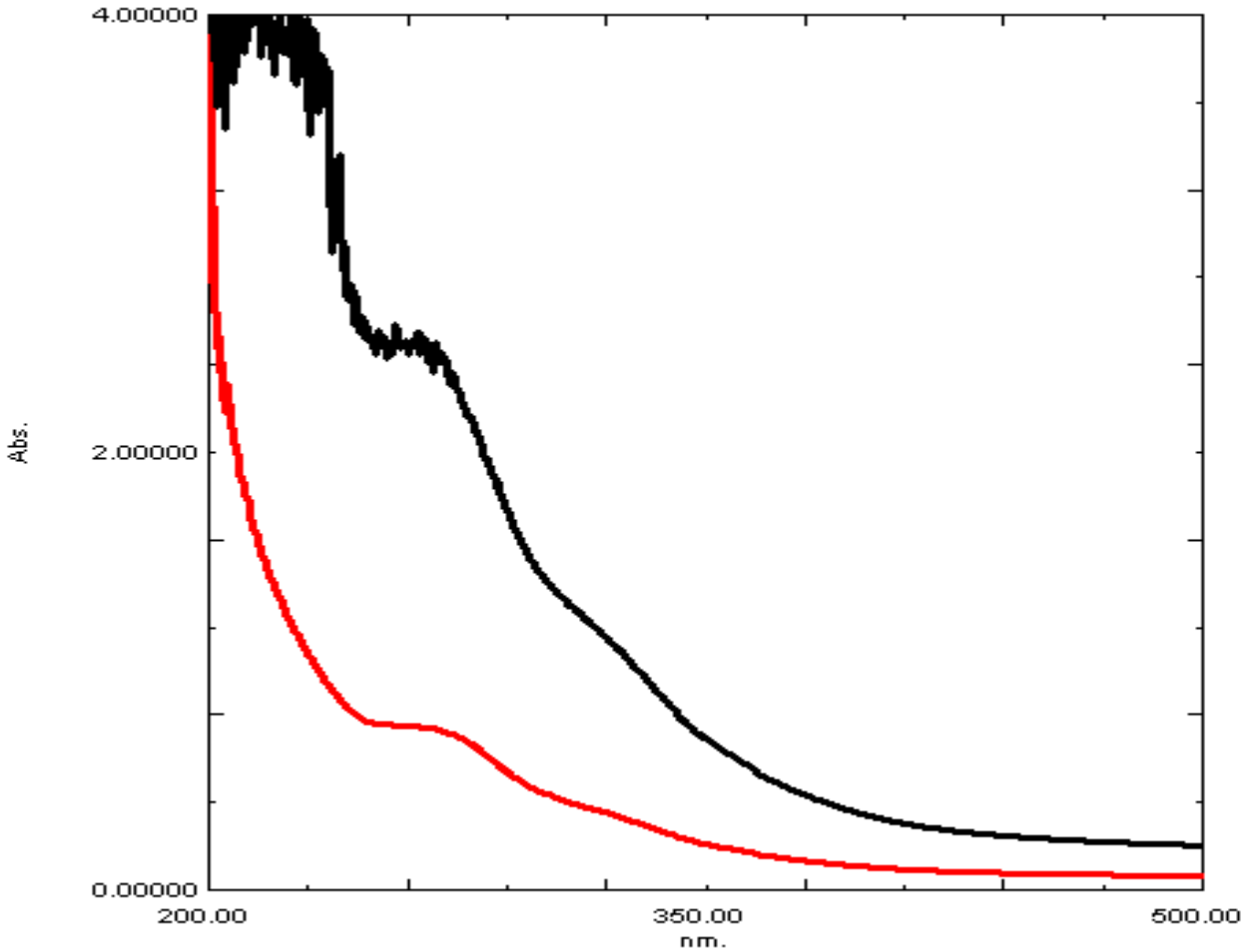
The weight loss results for mild steel in 8% H2SO4 in the absence and presence of different conc. of extract are shown in the following table-

S.no.	ppm	Initial weight	Final weight	Difference	Area	Weight loss	% Efficiency
1	Pure	4.69	4.36	0.33	8.37	0.03942	00
2	100	7.48	7.41	0.07	10.23	0.00684	82.64
3	200	5.53	5.48	0.05	7.30	0.00677	82.82
4	300	4.90	4.94	0.04	7.50	0.00533	86.47

5	400	3.87	3.84	0.03	6.25	0.00480	87.82
6	500	7.83	7.80	0.03	9.92	0.00302	92.33

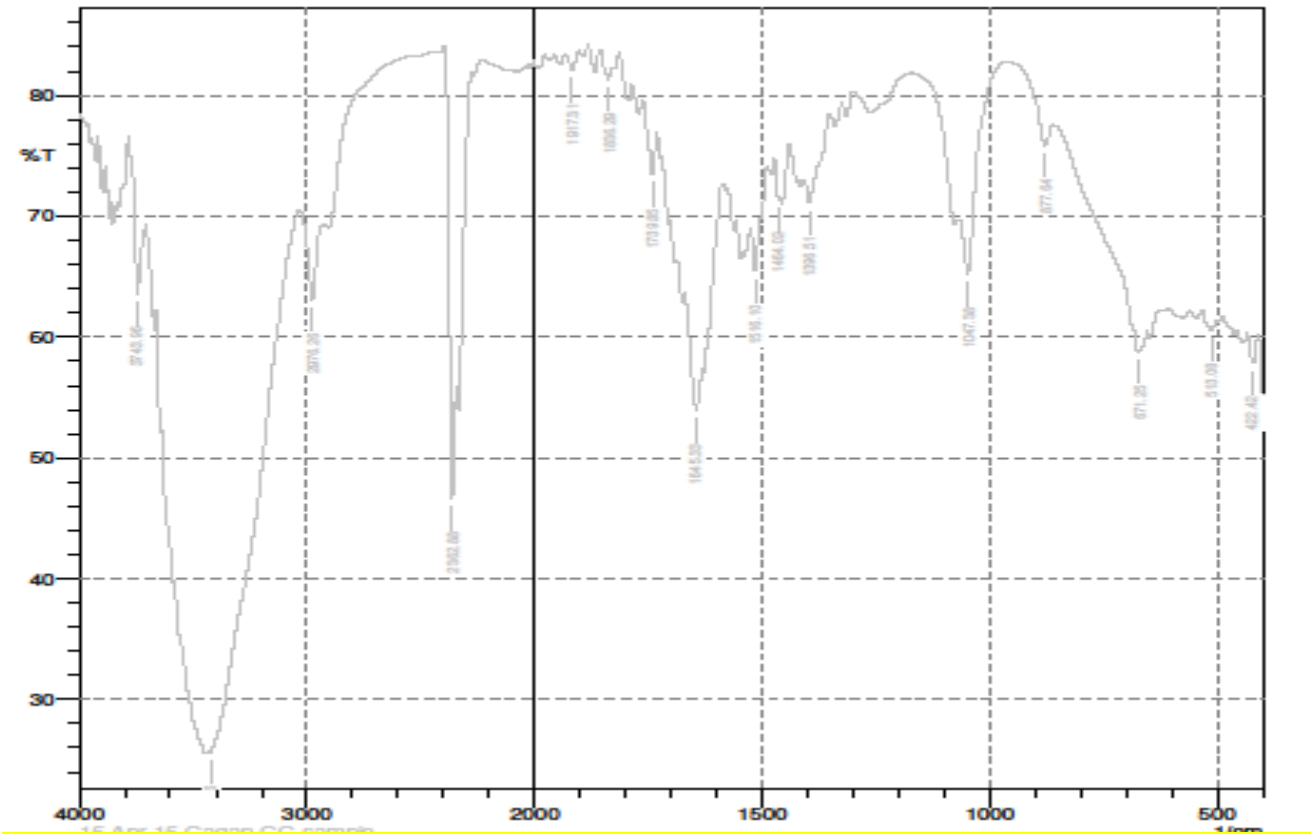
UV Spectroscopy: -

The UV spectra of extract before and after the immersion of mild steel are shown in below: -



Here, the black colour curve shows the absorption peak before 3 hours without immersion of mild steel in extract solution and red colour curve shows the absorption peak after 3 hours of immersion of mild steel in extract solution.

IR Spectroscopy: -



Here, the broad peak at 3417 cm^{-1} indicates O-H stretching of alcohol. The further peak at 1651 cm^{-1} indicates the C=O stretching of carbonyl group.

5. CONCLUSION

Following results have been concluded from the selected plants: -

(a) Solanum Surattenseshows maximum efficiency of 87% at 500 ppm inhibitor concentration at 298K.

(b) Convolvulus microphyllus shows maximum efficiency of 99% at 500 ppm inhibitor concentration at 298K.

(c) Eucalyptusglobulusshows maximum efficiency of 30% at 500 ppm inhibitor concentration at 298K.

(d) Ficusreligiosa shows maximum efficiency of 90% at 500 ppm inhibitor concentration at 298K.

(e) MomordicaCharantiashows maximum efficiency of 92% at 500 ppm inhibitor concentration at 298K.

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