



Government of India

Ministry of Human Resource Development

Department of Higher Education

Statistics Division

New Delhi

# Certificate



**Reference No. C-17456-2016**

This is to certify that N SHANKARESH of Sri Adichunchanagiri First Grade College, Chennarayapatna has successfully uploaded the data of All India Survey on Higher Education (AISHE) 2016-2017.

( B N Tiwari )

Deputy Director General

**Dated: 15/06/2017**



3-13

Diary No.

6137

MRP(S)-0560/13-14/KAMY045/UGC-SWRO  
The Accounts OfficerSouth Western Regional Office  
University Grants Commission  
P.K. Block, Palace Road  
Gandhinagar, Bangalore

Sub: Release of Grants-in-aid to SRI ADICHUNCHANAGIRI FIRST GRADE COLLEGE, CHANNARAYAPATNA, HASSAN DIST. for the year 2013-2014 under MRP(S) (Plan) entitled MODIFICATION OF INDUSTRIALLY IMPORTANT METAL SURFACE TO CONTROL CORROSION BY SOME ORGANIC MOLECULES

Sir/Madam,

I am directed to convey the sanction of the University Grants Commission for payment of grant of Rs.150000/- as first installment for the year 2013-2014 to SRI ADICHUNCHANAGIRI FIRST GRADE COLLEGE, CHANNARAYAPATNA, HASSAN DIST. under Minor Research Project (Plan) to Principal Investigator N SHANKARESHA expenditure to be incurred during 2013-2014.

Items	Amount Allocated Rs.	HEAD OF ACCOUNT	Grant now being Sactioned	Grant already Sactioned	Total Grant	Balance
<b>Non-Recurring:</b>						
Books and Journals	10000/-	5(viii)	10000/-	0	10000/-	0
Equipment	100000/-		100000/-	0	100000/-	0
<b>Recurring :</b>						
Contingency including special needs	15000/-		7500/-	0	7500/-	7500/-
Chemicals and Glassware	50000/-		25000/-	0	25000/-	25000/-
Fieldwork and Travel	15000/-		7500/-	0	7500/-	7500/-
<b>Total :</b>	<b>190000/-</b>		<b>150000</b>	<b>0</b>	<b>150000</b>	<b>40000/-</b>

2. The sanctioned amount is debitable to 5(viii) and is valid for payment during the financial year 2013-2014 only.

3. The amount of the Grant shall be drawn by the Accounts Officer/Drawing and Disbursing Officer, South Western Regional Office, UGC, Bangalore on the Grants-in-aid bill and shall be disbursed to and credited to the Principal of the College through Electronic mode as per the following details:

- Details (Name & Address) of Account Holder: SRI ADICHUNCHANAGIRI FIRST GRADE COLLEGE, CHANNARAYAPATNA, HASSAN DIST.
- Account No: 0767101029168
- Name & adress of Bank branch: CANARA BANK, CHANNARAYAPATNA BRANCH,
- MICR Code: 573015052
- IFSC Code: CNRB0000767
- Type of Account: SB

- The grant is subject to the adjustment on the basis of utilisation certificate in the prescribed proforma submitted by the College.
- The college shall maintain proper accounts of the expenditure out of the grants which shall be utilised only on approved items of expenditure.
- The College may follow the General Financial Rules, 2005 and take urgent necessary action to amend their manuals of financial procedures to bring them in conformity with GFRs, 2005 and those don't have their own approved manuals on financial procedures may adopt the provisions of GFRs, 2005 and instructions/guideline there under from time to time.
- The Utilization Certificate to the effect that the grant has been utilized for the purpose for which it has been sanctioned shall be furnished to UGC as early as possible after the close of current financial year.

Contd.2



**“Modification of Industrially Important Metal Surface to Control Corrosion by Organic Molecules”.**

**Principal Investigator**

**Dr. N.Shankaresha**



**Final report**  
**Of**  
**UGC sponsored minor research project**  
**under XII plan period**



**Submitted to**

University Grants Commission,  
South Western Regional Office,  
Bangalore-560001.

**Principal Investigator**

**Dr. N.Shankarsha, M.Sc., Ph.D.**  
Associate Professor in Chemistry,  
Sri. Adichunchanagiri First Grade College,  
Channarayana,  
Hassan Dist.-573201  
Karnataka

## ACKNOWLEDGEMENT



It gives me a great pleasure to express my gratitude to the authorities of UGC, south western regional office, Bangalore, for sanctioning me the project and providing the financial support to carry out this minor research work.

I also express my thanks to our Principals Prof. K.S. Devaraj, who encouraged and extended all co-operation to complete this project.

I thank, Prof. S.H.Gangegowda, Principal Government Science College for providing laboratories facility.

I would be failed if I am not thank **Dr. I. Mallikarjuna**, Assistant Professor of Chemistry, Department of post Graduation Chemistry, Government Science College, Hassan-573201 for the inspiration, support and valuable guidance.

I extend my sincere gratitude to Dr.M.Abdul Rahiman, Head and Coordinator, Post Graduation Department of Chemistry, Government Science college, Hassan-573201

I thank all my colleagues and my family members who have co-operated with me for the completion of this project.

**Dr.N.Shankaresha**



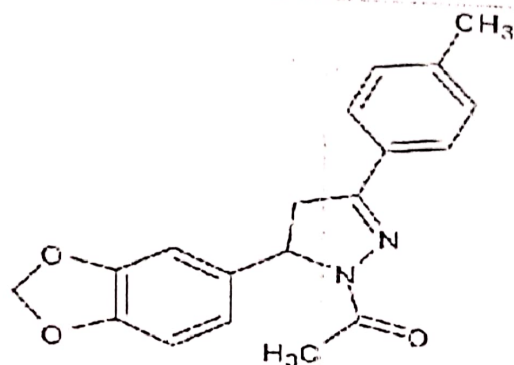
### CONTRIBUTION TO THE SOCIETY

The minor research project carried out has contributes to the welfare of society. Chemistry is an integral part of the science which deals with the study of interaction of chemical substances. Electrochemistry is a branch of chemistry which plays a significant role in the study of Corrsion rate and its mechanism.

1-[5-(1,3-benzodioxol-5-yl)-3-(4-methylphenyl)-4,5-dihydro-1H-pyrazol-1-yl]ethanon ). This compound would contribute more effectively towards inhibition of corrosion of mild steel in acid medium.

This study of [5-(1,3-benzodioxol-5-yl)-3-(4-methylphenyl)-4,5-dihydro-1H-pyrazol-1-yl]ethanone (BMDPE) as an effective inhibitor of mild steel corrosion in HCl Medium. The inhibition property of the compound and protection efficiency were calculated. With the help of this investigation kinetic and mechanistic aspects were studied.

## Characterization:



1-[5-(1,3-benzodioxol-5-yl)-3-(4-methylphenyl)-4,5-dihydro-1H-pyrazol-1-yl]ethanone  
Molecular Formula = C<sub>19</sub>H<sub>18</sub>N<sub>2</sub>O<sub>3</sub>  
Formula Weight = 322.35782  
Composition = C(70.79%) H(5.63%)

<sup>1</sup>H-NMR(500 MHz); Solvent CDCl<sub>3</sub>

δ, 2.422 (s, 3H, methyl protons of tolyl moiety), δ, 2.434 (s, 3H, methyl protons of acetyl moiety), δ, 3.122 and δ, 3.710 (two doublets, 2H, pyrazoline -CH<sub>2</sub>-protons), δ, 5.494-5.526 (m, 1H, pyrazoline-5H), δ, 5.926 (s, 2H, methylenedioxy protons of piperonal moiety); δ, 6.758(s, 1H, piperonal- 2H), δ, 5.494-5.526(m, 2H, piperonal-5H & 6H); δ, 7.252(d, 2H, ortho protons of p-tolyl) and δ, 7.652 (d, 2H meta protons of p-tolyl).

## Corrosion measurement:

The tafel experimental results obtained for the corrosion of mild steel with and without inhibitors are summarized in the tables. The results indicate that the mild steel in the absence of inhibitor corrodes severely in 2 M HCl, while the corrosion rate is slightly less in 1 M HCl. Increase in temperature increases the corrosion rate. Presence of inhibitor brings down the corrosion rate considerably; the effect is being more at high concentration of the inhibitor. In acid solutions the anodic process of corrosion is the passage of metal ions from metal surface into the solution, and the principal cathodic process is the discharge of hydrogen ions to produce hydrogen gas or reduction of oxygen. The inhibitor may affect either of them or both anodic and processes.

The surface coverage  $\theta$  is calculated as

$$\theta = \frac{[i_{\text{corr}}(\text{with}) - i_{\text{corr}}(\text{inh})]}{i_{\text{corr}}(\text{with})}$$

Therefore percentage protection efficiency

$$\% PE = \theta \times 100$$

Table. 1 The percentage protection efficiency,  $i_{corr}$  and  $E_{corr}$  of 1 M HCl with different concentration of inhibitor at 25 degree Celsius is as shown in the table.

Con in ppm	HCL	20ppm	40ppm	60ppm	100ppm	200ppm	300ppm	400ppm	500ppm
I corr	5.425	5.4	5.375	5.325	3.72	3.58	3.16	2.8	2.13
PE		0.4	0.92	1.8	31	34	41	48	60
E corr	-650	-590	-560	-540	-520	-550	-490	-560	-590

Table.2 The percentage protection efficiency,  $i_{corr}$  and  $E_{corr}$  of 1 M HCl with different concentration of inhibitor at 35 degree Celsius is as shown in the table.

Con in ppm	HCL	20ppm	40ppm	60ppm	100ppm	200ppm	300ppm	400ppm	500ppm
I corr	5.921	5.9012	5.846	5.812	3.96	3.89	3.83	3.80	2.98
PE		0.3	0.13	1.6	33	32	35	36.8	49
E corr	-550	-560	-550	-580	-510	-520	-550	-550	-520



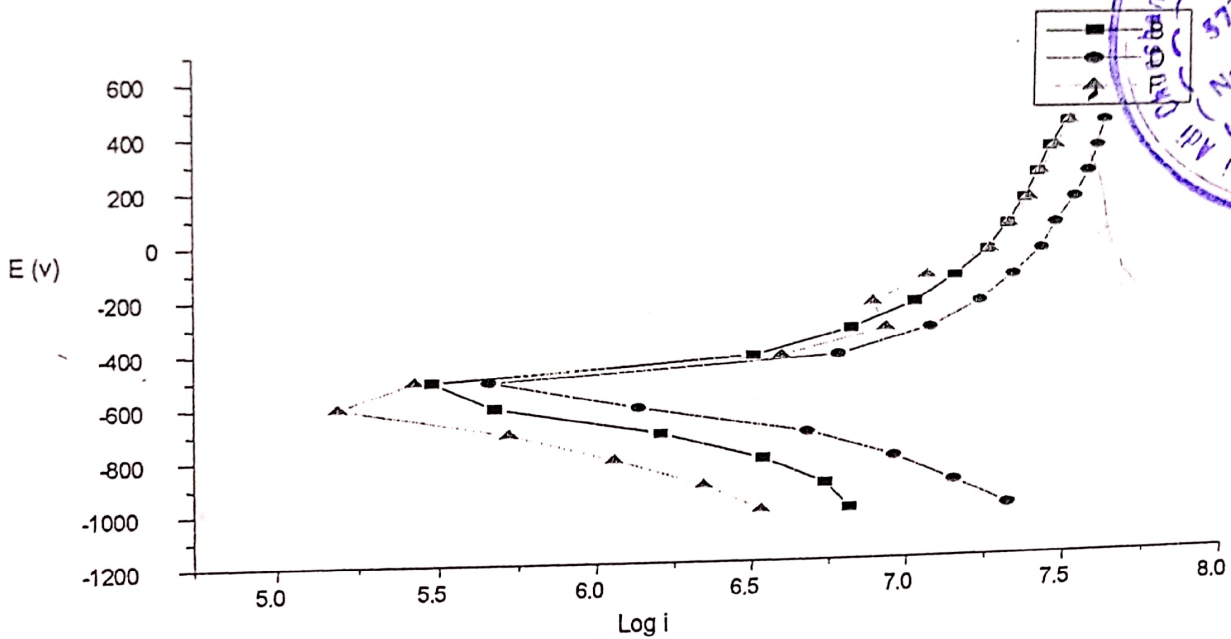
Table 3. The percentage protection efficiency,  $i_{corr}$  and  $E_{corr}$  of 1 M HCl with different concentration of inhibitor at 45 degree Celsius is as shown in the table.

Con in ppm	HCL	20ppm	40ppm	60ppm	100ppm	200ppm	300ppm	400ppm	500ppm
I corr	6.05	6.0375	6.0125	5.35	5.225	4.96	4.53	4.182	3.86
PE		0.2	0.12	11.6	13	18	25	30	36
E corr	-710	-790	-550	-620	-550	-550	-520	-500	-550

Table.4 The percentage protection efficiency,  $i_{corr}$  and  $E_{corr}$  of 1 M HCl with different concentration of inhibitor at 55 degree Celsius is as shown in the table.

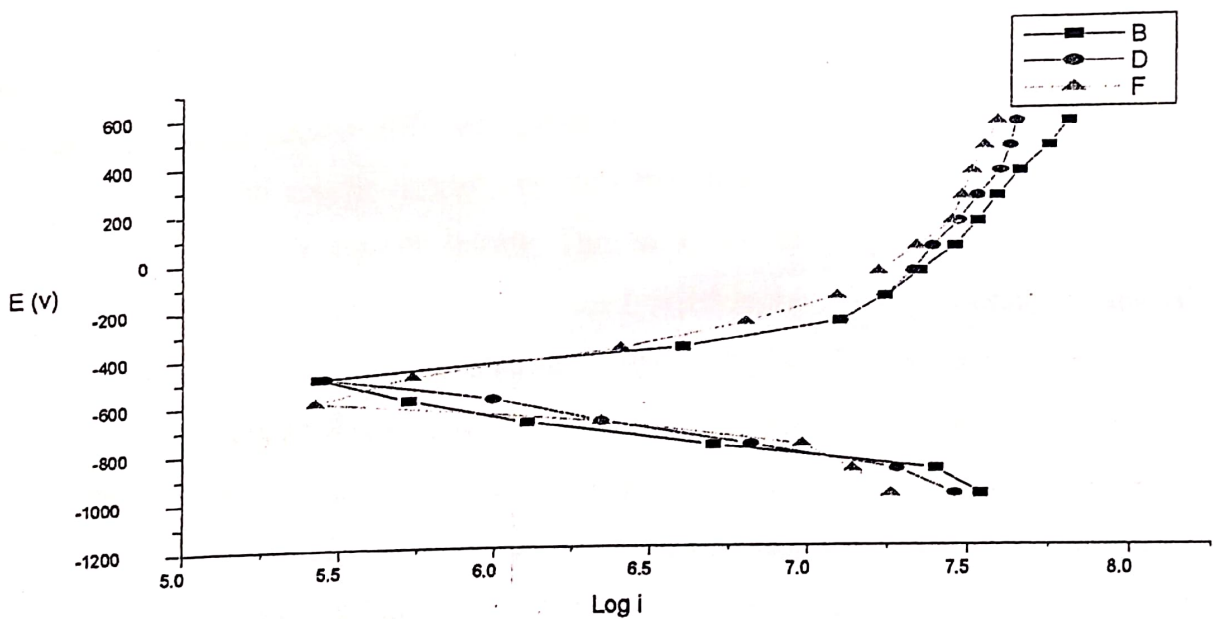
Con in ppm	HCL	20ppm	40ppm	60ppm	100ppm	200ppm	300ppm	400ppm	500ppm
I corr	6.575	6.475	6.20	5.95	5.925	5.24	4.903	4.28	3.900
PE		0.15	0.57	9.5	9.8	20	23	27	32
E corr	-550	-540	-520	-650	-610	-560	-540	-570	-560

Fig.2. Potentiodynamic polarization curves of cold rolled steel in 1 M HCl of different inhibitor concentration at 45 degree Celsius.



B, D, F shows the polarization curve for 300ppm, 400 ppm, and 500 ppm inhibitor concentration.

Fig.3. Potentiodynamic polarization curves of cold rolled steel in 2 M HCl of different inhibitor concentration at 25 degree Celsius.



B, D, F shows the polarization curve for 400ppm, 500 ppm, and 300 ppm inhibitor concentration.

## References:

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