Temporary Registration No. : TPN / 101029


# Project Proposal On

*"SYNERGISTIC TREATMENT OF INDUSTRIAL WASTEWATER USING MEMBRANE FILTERATION AND CHEMICAL OXIDATION"*

## Submitted to

**Division :**Water Technologies Cell

**Programme or Scheme :** DST Water Technology Call for Proposals 2023

## Submitted by

**Project Investigator:**

Dr. P SARITHA

MALLA REDDY ENGINEERING COLLEGE(AUTONOMOUS)-Hyderabad

# Part 1 : General Information

## General Information:

**Name of the Institute/University/Organisation submitting the Project Proposal :**

MALLA REDDY ENGINEERING COLLEGE(AUTONOMOUS)

| | |
|---|---|
| **State** | Telangana |
| **Principal Investigrator Name:** | Dr. P SARITHA |
| **Category:** | General |
| **Type of the Institue :** | Registered Societies (NGOs) |
| **Project Title :** | SYNERGISTIC TREATMENT OF INDUSTRIAL WASTEWATER USING MEMBRANE FILTERATION AND CHEMICAL OXIDATION |
| **Division :** | Water Technologies Cell |
| **Programme Or Scheme :** | DST Water Technology Call for Proposals 2023 |
| **Thematic Area :** | Water Quality Monitoring and Treatment |
| **Stream :** | Applied Research |
| **Academic Area :** | Civil Engineering, |
| **Application Area :** | Water, |
| **Goverment National Initiative :** | Swachh Bhart, Smart Cities, Nammami Gange, |
| **Type of Proposal :** | Proposal Against Call |
| **Project Duration :** | 3 Years |
| **Proposal Submit Date :** | 30/09/2023 |
| **Project Keywords :** | Advanced Oxidation Process, Membrane filtration, Recalcitrant, Chemical Oxygen Demand, Degradation |

**Project Summary :**

Objectives
1 To evaluate the feasibility of Advanced oxidation process to partially treat the industrial effluents
2 To determine the feasibility of membrane processes as efficient technologies in enhancing the degradation of organic contaminants by AOPs
3 To efficiently apply these optimum parameters of combined treatment using AOPs and membrane technology together and successfully treat the real wastewaters from effluent treatment plants

Methodology
The present study is aimed at evaluating the treatment methodologies for effluents contaminated with phenolics using sequential Advanced Oxidation Processes and Membrane Techniques. For successful implementation of the proposed research the detailed methodology is projected below

Step i Sample collection and preliminary treatment
The biorefractory compounds selected for the study will be initially checked for the solubility to prepare the stock solution. Further dilutions will be made from stock solution. All the stock solutions, standards and pure compounds will be stored in dark below room temperature. The samples will then be brought to room temperature before experimentation. Control samples would be run for every experiment to validate the degradation and also check for any loss on volatalization. All the experiments will be carried out in batch mode. 0.1 N /1.0N solution of H2SO4 or 0.1N/1.0N NaOH will be used for the adjustment of pH. Samples would be drawn at regular intervals and centrifuged, followed by filtration through syringe filters. The filtrate is to be stored at 4°c and further analyzed for compound reduction and chemical oxygen demand COD removal.

Step ii Treatment of model pollutants using Advanced Oxidation processes
The synthetic samples will be prepared keeping in view the characteristics of real effluents. These samples will be subjected to Fenton oxidation in a batch reactor while photofenton and photocatalysis with TiO2 in a photoreactor. Various operational parameters such as effect of pH, effect of initial peroxide concentration, effect of iron, effect of TiO2 dosage, effect of temperature and effect of ions will be studied to find the efficacy of the treatment system. The performance of the treatment system will be studied in terms of COD reduction and compound reduction Spectrophotometrical analysis and confirmation by HPLC. Analyses include target compound concentration, TOC, COD, total iron and UV-VIS spectra. HPLC, LC-MS analysis will be carried out for the identification of intermediates and a mechanistic degradative pathway will be proposed. Finally kinetic constants will be evaluated.

Step iii Treatment of partially/nonoxidized wastewater from AOPs using Membrane filteration
Pressure-driven membrane processes decrease the concentration of refractory organic intermediates to a biodegradability level enough for allowing the efficient degradation of the pre-treated effluent by a conventional biological treatment. Therefore, the installation of the membrane process as a step after advanced oxidation process would guarantee the correct operation of all the process units. They also perform as iron/TiO2 recovery step after advanced oxidation process. Moreover, the coupling of AOPs with membrane filteration would decrease the need of continuous oxidant/catalyst feed. UF or NF could be used for this purpose because of their expected capability of separating target compounds from wastewaters.

Three types of experiments will be performed to test the membrane efficiency. One experiment will be designed to test the of efficiency UF and NF membranes in completely oxidizing the synthetic effluent. Second experiment will be to test the feasibility of the above-mentioned membranes to recover iron and other metals from aqueous synthetic effluents. The third experiment will deal with the application of membrane filteration to real oxidized effluents.

To test the efficiency of membrane filteration, various process parameters such as permeate flux decline, fouling and cleaning efficiency are to be monitored. The separation of certain ions or compounds is often the main objective when considering a membrane technology in wastewater treatment applications. The retention percentage, R, can refer to an individual ion, molecule or to a global parameter. Therefore, the retention of iron ions, phenol or TOC can be of interest for a certain membrane application. The concentration of the species/parameter of interest in the feed solution Cf and in the permeate CP are needed to calculate the associated R. Thus, analyses determining the species/parameters of interest in aqueous samples are needed.

Deliverables of the project

1 The methodology developed using advanced oxidation processes and membrane techniques will be useful in designing a ‘Clean and Green Technology’ for reuse of complex industrial wastewaters.
2 The technique can be applied for wide range of effluents, contaminated with recalcitrant molecules.
3 The method showcases an excellent pretreatment alternative before biological treatment process.
4 Dissemination of technology to the industry for full-scale implementation of these results.
5 Publication of results in peer reviewed journals.
6 Helps bridge gaps between the research institutes and academic interests working with wastewater abatement technologies.

Target Beneficiaries
Industries generating non-biodegradable wastewaters.

# Part 2: Particulars of Investigators

## Principal Investigator:

| | |
|---|---|
| **1. Name:** | Dr. P SARITHA |
| **Gender:** | Female |
| **Date of Birth:** | 23/06/1976 |
| **Designation :** | ASSOCIATE PROFESSOR |
| **Department:** | CIVIL ENGINEERING |
| **Institute/University:** | MALLA REDDY ENGINEERING COLLEGE(AUTONOMOUS) |
| **State:** | Telangana |
| **District:** | MEDCHAL MALKAJGIRI |
| **City/Place:** | Hyderabad |
| **Address:** | Maisammaguda, Dhulapally, post via Kompally, Secundarabad, Telangana. |
| **Pin:** | 500100 |
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| **Mobile:** | 9849332474 |
| **Phone:** | |
| **Fax:** | |
| **Category:** | General |

## Co-Investigator:

| | |
|---|---|
| **1. Name:** | Dr. B SUDHARSHAN REDDY |
| **Gender:** | Male |

| | |
|---|---|
| **Date of Birth:** | 01/03/1982 |
| **Designation :** | PROFESSOR |
| **Department:** | CIVIL ENGINEERING |
| **Institute/University:** | MALLA REDDY ENGINEERING COLLEGE(AUTONOMOUS) |
| **State:** | Telangana |
| **District:** | MEDCHAL MALKAJGIRI |
| **City/Place:** | HYDERABAD |
| **Address:** | MAISAMMAGUDA |
| **Pin:** | 500100 |
| **Communication Email:** | sudharshanreddy@mrec.ac.in |
| **Alternate Email:** | |
| **Mobile:** | 9676076033 |
| **Phone:** | |
| **Fax:** | |
| **Category:** | General |

# Part 3: Suggested Refrees

## Suggested Refrees:

| | |
|---|---|
| **1. Name:** | V HIMABINDU |
| **Mobile:** | 9849692838 |
| **Designation :** | PROFESSOR |
| **Email:** | DRVHIMABINDU@GMAIL.COM |
| **Institute/University:** | JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD |
| **Address:** | Directorate of Research & Development<br>Jawaharlal Nehru Technological University Hyderabad<br>Kukatpally, Hyderabad, Telangana. Pin-500085 |

| | |
|---|---|
| **Academic Area:** | Civil Engineering, |
| **Application Area:** | Waste Processing, Water, |
| **State:** | Telangana |
| **District:** | MEDCHAL MALKAJGIRI |
| **City:** | HYDERABAD |
| **Address:** | JNTUH KUKATPALLY HYDERABAD |
| **Pin Code:** | 500085 |

**2.**

| | |
|---|---|
| **Name:** | S SRIDHAR |
| **Mobile:** | 8790748674 |
| **Designation :** | SENIOR PRINCIPAL SCIENTIST |
| **Email:** | SSRIDHAR@GOV.IN |
| **Institute/University:** | INDIAN INSTITUTE OF CHEMICAL TECHNOLOGY |
| **Address:** | Uppal Rd, IICT Colony, Tarnaka, Hyderabad, Telangana |
| **Academic Area:** | Chemical Engineering, |
| **Application Area:** | Waste Processing, Water, |
| **State:** | Telangana |
| **District:** | Hyderabad |
| **City:** | HYDERABAD |
| **Address:** | IICT, HABSIGUDA, HYDERABAD |
| **Pin Code:** | 500007 |

**3.**

| | |
|---|---|
| **Name:** | S KARTHIKEYAN |
| **Mobile:** | 9884612135 |
| **Designation :** | ASSOCIATE PROFESSOR |
| **Email:** | SKARTHI@ANNAUNIV.COM |
| **Institute/University:** | ANNA UNIVERSITY ,CHENNAI 25 |

| | |
|---|---|
| **Address:** | Anna University,<br>Guindy campus,Ssardar patal road,<br>chennai-25 |
| **Academic Area:** | Civil Engineering, |
| **Application Area:** | Water, |
| **State:** | Tamilnadu |
| **District:** | Chennai |
| **City:** | CHENNAI |
| **Address:** | ANNA UNIVERSITY, GUINDY, CHENNAI |
| **Pin Code:** | 600025 |

**4. Name:** K USHA ARAVIND

| | |
|---|---|
| **Mobile:** | 9447779269 |
| **Designation :** | PROFESSOR |
| **Email:** | usha@cusat.ac.in |
| **Institute/University:** | COCHIN UNIVERSITY OF SCIENCE  TECHNOLOGY (CUSAT) |
| **Address:** | Type C quarters,Cochin University of Science And Technology |
| **Academic Area:** | Civil Engineering, |
| **Application Area:** | Water, |
| **State:** | Kerala |
| **District:** | Alappuzha |
| **City:** | COCHIN |
| **Address:** | Cochin University of Science & Technology<br>Thrikkakara, Cochin-682022 |
| **Pin Code:** | 682022 |

# Part 4: Financial Details

## Financial Details:

# A. Non - Recurring

Equipment

| S. | Equipments | Qty. | Justification | 1 Year | Total |
|---|---|---|---|---|---|
| 1 . | Magnetic stirrers | 2 | Accessories for Chemical oxidation | 9354 | 9354 |
| 2 . | Membrane filtration equipment (RO) | 1 | Treatment technique | 578000 | 578000 |
| 3 . | Membrane filtration equipment (Ultra filtration) | 1 | Treatment technique | 650000 | 650000 |
| 4 . | Peristaltic pumps | 2 | Accessories for MF | 407808 | 407808 |
| 5 . | Photo immersion reactor | 1 | Treatment technique | 350000 | 350000 |
| 6 . | Submerged aerator | 3 | Accessories for Chemical oxidation | 105000 | 105000 |
| | | | **Total** | **2100162** | **2100162** |

# B. Recurring

Project Staff

| S. | Project Staff | No. | Justification | 1 Year | 2 Year | 3 Year | Total |
|---|---|---|---|---|---|---|---|
| 1 . | Junior Research Fellow (JRF) | 2 | JRF - AOPs<br>JRF - MF | 833280 | 833280 | 833280 | 2499840 |
| | | | **Total** | **833280** | **833280** | **833280** | **2499840** |

Consumables

| S. | Items | Qty. | Justification | 1 Year | 2 Year | 3 Year | Total |
|---|---|---|---|---|---|---|---|
| 1 . | Glassware & Chemicals | 1 | Experiments for Validation | 0 | 0 | 100000 | 100000 |
| 2 . | Glassware & Chemicals | 1 | Optimization Experiments | 200000 | 200000 | 0 | 400000 |
| | | | **Total** | **200000** | **200000** | **100000** | **500000** |

Contingency

| S. | Description | Justification | 1 Year | 2 Year | 3 Year | Total |
|---|---|---|---|---|---|---|
| 1 . | Contingency | Membrane fouling, maintenance of lamps | 200000 | 200000 | 0 | 400000 |
| 2 . | Contingency | publications, Printing documents, other stationary… | 0 | 0 | 100000 | 100000 |
| | | **Total** | **200000** | **200000** | **100000** | **500000** |

Travel

| S. | Description | Justification | 1 Year | 2 Year | 3 Year | Total |
|---|---|---|---|---|---|---|
| 1 . | Travel | Attending National & International Conferences & Seminars, Sample collection, field visit | 200000 | 200000 | 200000 | 600000 |
| | | **Total** | **200000** | **200000** | **200000** | **600000** |

Overhead

| S. | Description | Justification | 1 Year | 2 Year | 3 Year | Total |
|---|---|---|---|---|---|---|
| 1 . | Overhead | Usages of Laboratories, Electricity | 250000 | 250000 | 0 | 500000 |
| 2 . | Overhead | Usages of Printer, Stationaries etc.. | 0 | 0 | 200000 | 200000 |
| | | **Total** | **250000** | **250000** | **200000** | **700000** |

Any Other Recurring

| S. | Description | Justification | 1 Year | 2 Year | 3 Year | Total |
|---|---|---|---|---|---|---|
| 1 . | Outsourcing | Consultant for designing for large scale | 15000 | 15000 | 0 | 30000 |
| 2 . | Testing | HPLC analysis for intermediate products | 15000 | 15000 | 0 | 30000 |
| 3 . | Patenting | Patenting the Technology | 0 | 0 | 30000 | 30000 |
| | | **Total** | **30000** | **30000** | **30000** | **90000** |

# Budget Head Summary in (INR)

| Budget Head | Year-1 | Year-2 | Year-3 | Total |
|---|---|---|---|---|
| **1- Non-Recurring** | | | | |
| Equipment | 2100162 | 0 | 0 | **2100162** |
| Subtotal (Capital) | 2100162 | 0 | 0 | **2100162** |
| **2- Recurring** | | | | |
| Project Staff | 833280 | 833280 | 833280 | **2499840** |
| Consumables | 200000 | 200000 | 100000 | **500000** |
| Contingency | 200000 | 200000 | 100000 | **500000** |
| Travel | 200000 | 200000 | 200000 | **600000** |
| Overhead | 250000 | 250000 | 200000 | **700000** |
| Any Other Recurring | 30000 | 30000 | 30000 | **90000** |
| Subtotal (General) | 1713280 | 1713280 | 1463280 | **4889840** |
| Total Project Cost (Capital + General) | **3813442** | **1713280** | **1463280** | **6990002** |

## Part 5: PFMS Details

### PFMS Unique Code Available: Yes

**PFMS Unique Code :** TLML00000156

## Part 6: Current Ongoing Project

### Current Ongoing Project: NA

## NGO Details fetched from NGO Portal:

### (1) Registration Details:

**NGO Unique ID :** TS/2017/0154621

**Name:** CMR EDUCATIONAL SOCIETY

**Registration With :** Registrar of Societies

**Type of NGO :** Society

**Registration No :** 5613/2001

**Registration Date :** 2001-08-21

**Contact Name :** Sudhakar Muvvala

| | |
|---|---|
| **Designation :** | |
| **Act Name :** | Register under the Andhra Pradesh (Telangan Area) public societies ACT 1 of 1350 |
| **Reg Multiple :** | |
| **FCRA Registered :** | No |
| **FCRA Registration No :** | |
| **FCRA Registration Date :** | NA |
| **Valid upto :** | NA |
| **State :** | TELANGANA |
| **District :** | Medchal–Malkajgiri |
| **Address :** | Maisammaguda, Dhulpally, Secunderabad |
| **Pincode :** | 500100 |
| **State of Registration :** | TELANGANA |
| **City of Registration :** | Secunderbad |
| **Off Phone :** | |
| **Res. Phone :** | |
| **Mobile :** | 9348161224 |
| **Email :** | muvvala1963@yahoo.co.in |
| **Website :** | http://www.mrcp.ac.in/ |
| **Pan No :** | A********P |
| **Pan Status :** | Verified |
| **Work Issues :** | Education & Literacy |

## (2) Members Details:

| | |
|---|---|
| **1. Name:** | Sudhakar Muvvala |
| **Designation:** | Principal |
| **Aadhaar Status :** | Verified |

**Pan Status :** Verified

**Email :** muvvala1963@yahoo.co.in

**Last Updated :** 15-06-2017

**2. Name:** Kanagala Vijaya Sri

**Designation:** Professor

**Aadhaar Status :** Verified

**Pan Status :** Verified

**Email :** vijayasree_2002@yahoo.co.in

**Last Updated :** 15-06-2017

**3. Name:** satyabrata bhanja

**Designation:** Professor

**Aadhaar Status :** Verified

**Pan Status :** Verified

**Email :** satyabrata_bhanja@rediffmail.com

**Last Updated :** 15-06-2017

**4. Name:** Sudhakara Reddy Saripalli

**Designation:** Principal

**Aadhaar Status :** Verified

**Pan Status :** Verified

**Email :** principal@mrec.ac.in

**Last Updated :** 27-04-2019

**5. Name:** Ratlavath Seetharam

**Designation:** Assistant Professor

**Aadhaar Status :** Verified

**Pan Status :** Verified

**Email :** seetharam.seetharam@gmail.com

**Last Updated :** 27-04-2019

6. **Name:** Palaparthi Ananthababu

**Designation:** Assistant Professor

**Aadhaar Status :** Verified

**Pan Status :** Verified

**Email :** ananthatnet@gmail.com

**Last Updated :** 27-04-2019

7. **Name:** Megavath Vijay Kumar

**Designation:** Assistant Professor

**Aadhaar Status :** Verified

**Pan Status :** Verified

**Email :** vijaykumar.iitm37@gmail.com

**Last Updated :** 30-04-2019

# List of Uploaded Documents:-

1. Complete Project proposal
2. Biodata
3. Certificate from PI
4. Conflict of interest
5. Endorsement from head of Institute
6. Quotation for Equipments

# DST-WTCCall 2023

**COMPONENT/STREAM APPLIED FOR:**

| Serial No. | Thematic Area | Stream *(Tick the most appropriate one)* | |
|---|---|---|---|
| A | Water Availability, Distribution, and Management | Applied Research | |
| | | Technology Development | |
| | | Technology Assessment | |
| | | Convergent Solution | |
| B | Water Quality, Monitoring and Treatment | Applied Research | √ |
| | | Technology Development | |
| | | Technology Assessment | |
| | | Convergent Solution | |
| C | Waste Water Recycling and Management for Industrial, Domestic and Community based Solution | Applied Research | |
| | | Technology Development | |
| | | Technology Assessment | |
| | | Convergent Solution | |

# SUBMISSION OF PROPOSAL
# FOR SUPPORT

## CONTENTS

## I. Proposal Summary

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<tr><td>I</td><td>Title</td><td colspan="3">SYNERGISTIC TREATMENT OF INDUSTRIAL WASTEWATER USING MEMBRANE FILTERATION AND CHEMICAL OXIDATION</td></tr>
<tr><td>II</td><td>Project cost</td><td colspan="3">Rs.Rs.69,90,002-00</td></tr>
<tr><td>III</td><td>Duration</td><td colspan="3">36 MONTHS</td></tr>
<tr><td>III</td><td>PI Details</td><td>Name</td><td>Date of Birth</td><td>Category (General /SC/ ST/ Others etc)</td></tr>
<tr><td></td><td></td><td>Dr.P.SARITHA</td><td>23/06/1976</td><td>General</td></tr>
<tr><td>IV</td><td>Co-PI Details</td><td>Name</td><td>Date of Birth</td><td>Category(General/SC/ ST/ Others etc)</td></tr>
<tr><td></td><td></td><td>Dr B Sudharshan Reddy</td><td>01/03/1982</td><td>General</td></tr>
<tr><td>V</td><td>Lead Organization</td><td colspan="3">MALLA REDDY ENGINEERING COLLEGE</td></tr>
<tr><td>VI</td><td>Lead Organization Status</td><td colspan="3">Registered society(NGO)</td></tr>
<tr><td>VII</td><td>Partner/Collaborator Organization(CO)</td><td colspan="3">-</td></tr>
<tr><td>VIII</td><td>Partner/CO Status</td><td colspan="3">-</td></tr>
<tr><td>IX</td><td>Objectives</td><td colspan="3">➢ To evaluate the feasibility of Advanced oxidation process to partially treat the industrial effluents<br>➢ To determine the feasibility of membrane processes as efficient technologies in enhancing the degradation of organic contaminants by AOPs<br>➢ To efficiently apply these optimum parameters of combined treatment using AOPs and membrane technology together and successfully treat the real wastewaters from effluent treatment plants</td></tr>
<tr><td>X</td><td>Methodology</td><td colspan="3">➢ Optimization of parameters in both the technologies.<br>➢ Evaluating the efficiencies in terms of COD and compound reduction.<br>➢ Cost evaluation studies</td></tr>
<tr><td>XI</td><td>Deliverables</td><td colspan="3">➢ Methodology of the treatment technique<br>➢ Designing of pilot reactors for treating the above effluent</td></tr>
</table>

| File No. | *DST/WTC/2K23/*<br><br>**(TOBEFILLEDBYDST)** |
|---|---|

## II. Financial requirements:

*(Break-up of cost*)

| Slno. | ITEM | Description | | Individual sub-head cost | Total Amount (All figure in lakhs) |
|---|---|---|---|---|---|
| 1 | **MANPOWER**<br>*( mention Posts with gross emoluments)* | Junior Research Fellow-2 | | 31,000+HRA (12%) /3years | 24,99,840-00 |
| 2 | **PERMANENT EQUIPMENT LIST**<br>*(mention cost of the individual item)* | Indigenous | √ | | 21,00,162-00 |
| | | Foreign | | | |
| 3 | **OTHERCOST** | | | | 90,000-00 |
| 4 | **CONSUMABLES** | | | | 5,00,000-00 |
| 5 | **TRAVEL** | | | | 6,00,000-00 |
| 6 | **CONTINGENCIES** | | | | 5,00,000-00 |
| 7 | **OVERHEADSCHARGES** | | | | 7,00,000-00 |
| **GRANDTOTAL** | | | | | **69,90,002-00** |

Grand Total :**Rs.69,90,002-00** (**Rupees Sixty Nine Lakhs Ninety Thousand and Two only)**

## III. CORE PROPOSAL FORMAT

*(Applied Research)*

**1. Project Title:** SYNERGISTIC TREATMENT OF INDUSTRIAL WASTEWATER USING MEMBRANE FILTERATION AND CHEMICAL OXIDATION

**2. Principal Investigator(PI)**


| | |
|---|---|
| Name: | **Dr.P.Saritha** |
| Designation: | Associate Professor |
| Complete Address: | Civil Engineering Department, MREC, Sec'Bad-500100 |
| Telephone & Mobile No.: | 9849332474 |
| E-mail: | drpsaritha@mrec.ac.in |


**3. Co-Principal Investigator (Co-PI):** -


| | |
|---|---|
| Name: | Dr.B.Sudharshan Reddy |
| Designation: | Professor |
| Complete Address: | Civil Engineering Department MREC, Sec'Bad-500100 |
| Telephone &Mobile No.: | 9676076033 |
| E-mail: | sudharshanreddy@mrec.ac.in |


**4. Name:**-
Designation:
Complete address *(with city pin code)*:
Telephone & mobile No.:
E-mail**:**

***5.*** **Collaborating Agencies / Industries** *(If any):* **Nil**

**6. Target Beneficiaries:** Industries generating non-biodegradable wastewaters.

***7.*** **Objectives of the Proposal** *:*

- To evaluate the advanced oxidation process in treating the industrial effluents
- To understand the effectiveness of membrane processes as efficient technology in enhancing the degradation of organic contaminants
- To test whether the combined usage of both AOP and Membrane technology give better results in effluent treatment.

***8.*** **Critical Review of Status Identifying Gaps**

*i)* National Status Review

In times of scarcity of water here's some encouraging news. Indian scientists have developed a simple method to recover usable water from industrial waste. The technique, using ultrafiltration and reverse osmosis membranes, ensures the separation of harmful chlorides and cyanide from the contaminated waters in certain chemical industries. Ultrafiltration is a specialized membrane filtration technology that enhances pressure-mediated suspension of pathogenic and solid waste from waste mixture. The product produced after ultrafiltration is highly pure and free of any pathogenic waste. The membrane is economical and the process low pressure, which can substitute the regularly used reverse osmosis for specific applications. Developed by the Hyderabad-based CSIR-IICT (Indian Institute of Chemical Technology), it was demonstrated in Tata Steel's Jamshedpur plant in 2016. Explaining the process, the IICT scientists led by S. Sridhar said during one of the critical steps of its manufacture, steel from the blast furnace is quenched in a tower, which results in the release of excessive chloride and cyanide into

the aqueous stream. Chloride levels above 800 mg/L cause corrosion in the blast furnace. B. Govardhan et al (2020) investigated the chemical oxidation of the indigenously synthesized RO membrane using aqueous sodium hypochlorite (NaOCl). Ravichand Kancherla et al (2021) reviewed the various mathematical tools usage in membrane system design. Naresh Yadav et al (2022) studied the removal of Methylene Blue dye by photo catalysis integrated with nanofiltration using statistical and experimental approaches and observed that about 94% of the dye was decolorized, and 70% of TOC was removed in 94.23 minutes of operation by the hybrid system at optimized initial operating conditions. Sugali Chandra Sekhar et al (2023) studied the reduction of the impurity level in the MEE condensate of the wastewater using HPA-HR RO membrane at high pressure to facilitate water reclamation for industrial reuse in the process itself or in cooling towers to ensure zero liquid discharge (ZLD).

*ii)* International Status Review

Advanced Oxidation Processes (AOPs) are those which involve generation and use of powerful transitory species, principally the hydroxyl radical (•OH) (Glaze et al., 1987). This species can be generated from water using energy such as solar energy, electrical energy, sound energy etc. or simply by chemicals like $H_2O_2$, ozone etc. with or without the use of an appropriate catalyst; the difference being the way in which the hydroxyl radicals are produced. Other active oxygen species are the superoxide ion radical, $O_2^{\bullet -}$, and its conjugate acid form, the hydroperoxyl radical, $HO_2\bullet$ that are also produced in many AOPs but they are far less active than •OH. Now a days, in addition to hydroxyl radicals, experiments using other radicals like sulphate radicals as the transitory species have yielded excellent results and are classified as AOPs (Saritha et al., 2008).
The hydroxyl (•OH) radical with oxidation potential of 2.8 V (vs. normal hydrogen electrode) is a powerful, non-selective chemical oxidant that acts rapidly with most organic compounds and hence is often the oxidant of choice for chemical oxidations (Kurian et al., 2006) and (Kurian et al., 2015a). The heterogeneous systems have obvious advantages over the homogeneous ones such as easy separation of the catalyst for reuse from the treated water, lack of secondary treatment to remove dissolved metals from treated water and tolerance towards extreme operating conditions (Nair et al., 2017a). Membrane technology has grown significantly in the last couple of decades due to the benefits it offers in water and wastewater treatment. With significant reduction in the size of equipment, energy requirement and low capital cost, membrane technology offers many prospects in wastewater treatment (Quist-Jensen, 2015) According to Singh and Hankins (2016), membrane technology has the potential of bridging the economical and sustainability gap, amid possibilities of low or no chemical usage, environmental friendliness and easy accessibility to many. Ayoub Ejraei et al (2019) studied a combination of membrane filtration, photocatalytic degradation, adsorption, and found the treatment to be more effective when they were used in series, respectively. Nurafiqah Rosman et al (2022) studied the hybridization of a photocatalyst and membrane filteration technique and found that this combination could be utilized to improve and retrofit current water effluent treatment methods. Santiago Martínez Sosa et al (2023) found that The combined system, ceramic membranes modified with zinc oxide and UV-A LEDs proved to be effective to retain and disinfect water quality indicator bacteria present in real surface water matrices.

***9.*** **Outline of the Project** (withschematics,wherepossible)(*Definetheproblemsandgivetechnicaldetails)*

Water pollution has become a serious problem throughout the world. According to the UN's latest figures, approximately 40% of the world's population of more than two billion people face water shortage. By 2025, this figure is expected to increase to 5.5 billion or more than 2.5 times the present population. Chemical industry is at the forefront of the water management challenge, due to increasing government pressure on effluent discharge, raw water usage, increasing process water costs and in many locations, general lack of available water. The total amount of different chemicals produced is vast and continuously increasing. About 100000 different chemicals can be found in the market (Charpentier

2003). Despite their different properties and uses, their production processes are very similar. The need and use of water in chemical and pharmaceutical processes is defined by the required unit operations, raw materials and process equipment. As much as 20% of total wastewater flow from chemical and pharmaceutical industries contains 80% of the pollutant load (EU Water Saving Potential - Part 1, 2007). Increased knowledge about the consequences of water pollution and the public desire for better quality water has promoted the implementation of stringent regulations by expanding the scope of regulated contaminants and lowering their maximum contaminant levels (MCLs).

**Industrial Wastewater and Model Pollutants**

Phenols, drugs, pesticides, herbicides, aromatic hydrocarbons, surfactants are some of the recalcitrant compounds typically found in industrial effluents (Dojilido and Best 1993). These substances are not only toxic but also non-biodegradable and persistent in the environment for decades together; further, the symptoms of contamination may not manifest themselves until several generations after initial contact with the chemical of concern (Stirling 2001). Thus, it becomes crucial to treat such wastewaters containing non-biodegradable pollutants to avoid associated environmental pollution.

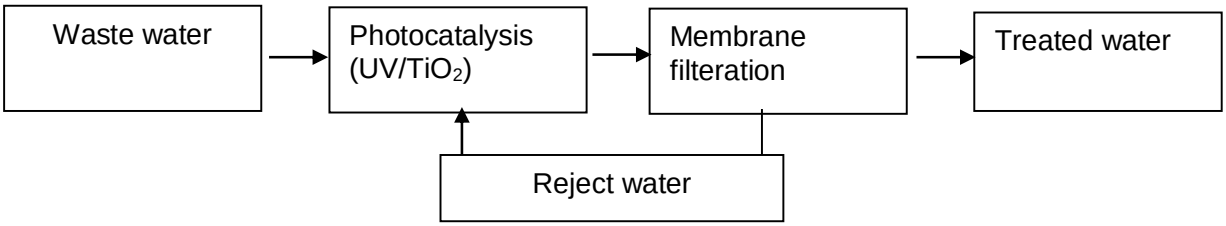
Large amounts of phenolic wastewater along with pharmaceutical drugs produced by many industrial processes pose severe threat to environment. Phenol and substituted phenols are moderate to highly toxic depending on the number, position and nature of substitution while pharmaceuticals have potential impact on human health and environment even at trace levels (µg/l). All these compounds are refractory and come to the natural water resources from the effluents of a variety of chemical industries such as pharmaceuticals, phenol manufacturing, and industries of resin paint, dying, textile wood petrochemical, pulp mill, etc. Consequently, aquatic organisms including fish are subjected to these pollutants ultimately affecting the ecosystem. The interest in these compounds is their selection by the US Environmental Protection Agency (USEPA) as persistent, bioaccumulative, and toxic (PBT) chemicals. Some of the USEPA listed priority pollutants selected for the study are 2,4- dinitrophenol; 2,4-dimethylphenol, 4-chloro-3-methylphenol, 4,6-dinitro-2-methylphenol, and pentachlorophenol. Pharmaceuticals include antibiotics like Ciprofloxacin, Clofibric acid and Diclofenac.

**Industrial Wastewater Treatment**

An ideal waste treatment process would be cost-effective and at the same time completely mineralize all the toxic species present in the waste stream without leaving behind any hazardous residues. At the current state of development, none of the treatment technologies approach this ideal situation. Air stripping, which is commonly employed for the removal of volatile organic contaminants in wastewater, just transfers the pollutants from water phase to air phase rather than destroying them. Thus, most air-stripping processes currently require subsequent treatment of the off-gas. Granular activated carbon (GAC) adsorption is the other commercialized process for water purification. However, the spent carbon, on which pollutants are adsorbed, is a new waste that needs to be disposed off. Biological degradation of municipal wastes has been practiced, but similar bio-treatments of industrial wastes are still not common because some toxic organics may kill the active microorganisms. The presence of such compounds like the phenolics (Gonzalez 1993), which cannot be treated by conventional techniques, require non-biological processes for effective elimination and Advanced Oxidation Processes (AOP) have such a capability.

In addition, legislations governing the effluent discharge standards laid by pollution control boards stress on freshwater conservation through water reuse and recycling. By recycling and reusing treated wastewater, industries can save on the costs of clean water, ensure adequate supplies and help to preserve a diminishing natural resource. The increase in water reuse has been driven largely by innovative treatment technologies like Membrane filteration that are both cost effective and reliable in removing harmful bacteria and pathogens.

Recent investigations on effluents generated from chemical industries focused on many recalcitrant molecules present in effluents at trace and ultra-trace concentrations. Till date most industries treat such effluents in their effluent treatment plants (ETPs) and alternatively treating effluents in a common effluent treatment facility. These treatment facilities are not sophisticated to manage recalcitrant molecules and many of these molecules are toxic to life. Several problems arise with AOPs in treating the organically polluted effluents. Complete mineralisation by AOP's results in excessive costs since the highly oxidized end products (i.e. carboxylic acids such as acetic, oxalic, etc.) formed tends to be refractory to further oxidation by chemical means. Moreover the catalyst (homogenous/heterogeneous) used in the process continuously leave the oxidation reactor in the form of environmentally hazardous sludge, posing serious environmental problems. Continuous injection of catalyst (due to its loss in the reactor effluent) is thus needed, which increases treatment costs. Membrane processes by themselves are unable to decompose organics as they only transport them from one phase to another. However, they are useful in those applications where subsequent solute separation is required. Under such circumstances, membrane technology can serve as an efficient tool for decreasing or even avoiding AOPs inconveniences and thus enhance the efficiency of the treatment of biorefractory wastewater. **Hence, the present research proposal aims and emphasizes to treat industrial wastewaters using the combination technique of advanced oxidation process and membrane technology.**




**10. Deliverables of the project (brief description)**

- The methodology developed using advanced oxidation processes and membrane techniques will be useful in designing a 'Clean and Green Technology' for reuse of complex industrial wastewaters.
- The technique can be applied for wide range of effluents, contaminated with recalcitrant molecules.
- The method showcases an excellent pretreatment alternative before biological treatment process.
- Dissemination of technology to the industry for full-scale implementation of these results.
- Publication of results in peer reviewed journals.
- Helps bridge gaps between the research institutes and academic interests working with wastewater abatement technologies.

**11. Methodology**

The present study is aimed at evaluating the treatment methodologies for effluents contaminated with phenolics using sequential Advanced Oxidation Processes and Membrane Techniques. For successful implementation of the proposed research the detailed methodology is projected below.

### Step (i) Sample collection and preliminary treatment

The biorefractory compounds selected for the study will be initially checked for the solubility to prepare the stock solution. Further dilutions will be made from stock solution. All the stock solutions, standards

and pure compounds will be stored in dark below room temperature. The samples will then be brought to room temperature before experimentation. Control samples would be run for every experiment to validate the degradation and also check for any loss on volatalization. All the experiments will be carried out in batch mode. 0.1 N /1.0N solution of $H_2SO_4$ or 0.1N/1.0N NaOH will be used for the adjustment of pH. Samples would be drawn at regular intervals and centrifuged, followed by filtration through syringe filters. The filtrate is to be stored at 4°c and further analyzed for compound reduction and chemical oxygen demand (COD) removal.

**Step (ii) Treatment of model pollutants using Advanced Oxidation processes**

The synthetic samples will be prepared keeping in view the characteristics of real effluents. These samples will be subjected to Fenton oxidation in a batch reactor while photofenton and photocatalysis with TiO2 in a photoreactor. Various operational parameters such as effect of pH, effect of initial peroxide concentration, effect of iron, effect of TiO2 dosage, effect of temperature and effect of ions will be studied to find the efficacy of the treatment system. The performance of the treatment system will be studied in terms of COD reduction and compound reduction (Spectrophotometrical analysis and confirmation by HPLC). Analyses include target compound concentration, TOC, COD, total iron and UV-VIS spectra. HPLC, LC-MS analysis will be carried out for the identification of intermediatesand a mechanistic degradative pathway will be proposed. Finally kinetic constants will be evaluated.

**Step (iii) Treatment of partially/ nonoxidized wastewater from AOPs using Membrane filteration**

Pressure-driven membrane processes decrease the concentration of refractory organic intermediates to a biodegradability level enough for allowing the efficient degradation of the pre-treated effluent by a conventional biological treatment. Therefore, the installation of the membrane process as a step after advanced oxidation process would guarantee the correct operation of all the process units. They also perform as iron/$TiO_2$ recovery step after advanced oxidation process. Moreover, the coupling of AOPs with membrane filteration would decrease the need of continuous oxidant/catalyst feed. UF or NF could be used for this purpose because of their expected capability of separating target compounds from wastewaters.

Three types of experiments will be performed to test the membrane efficiency. One experiment will be designed to test the of efficiency UF and NF membranes in completely oxidizing the synthetic effluent. Second experiment will be to test the feasibility of the above-mentioned membranes to recover iron and other metals from aqueous synthetic effluents. The third experiment will deal with the application of membrane filteration to real oxidized effluents.

To test the efficiency of membrane filteration, various process parameters such as permeate flux decline, fouling and cleaning efficiency are to be monitored. The separation of certain ions or compounds is often the main objective when considering a membrane technology in wastewater treatment applications. The retention percentage, R(%), can refer to an individual ion, molecule or to a global parameter. Therefore, the retention of iron ions, phenol or TOC can be of interest for a certain membrane application. The concentration of the species/parameter of interest in the feed solution (Cf) and in the permeate (CP) are needed to calculate the associated R(%). Thus, analyses determining the species/parameters of interest in aqueous samples are needed.

**12. Milestones with Months, Work Elements & Responsible Organization for each Work Element**

| S. No. | Milestone | Target Month | Work Elements | Responsible Organization |
|---|---|---|---|---|
| 1 | Tentative Degradative mechanism &Pathway | 12 months | 1.Optimization of parameters in AOPs<br>2.identification of intermediate compounds | Malla Reddy Engineering College, Hyderabad |
| 2. | Performance efficiency, with journal publication & presentation in conferences | 12 months | 1. Optimization of parameters in Membrane filteration<br>2.Synergistic treatment<br>3.Cost analysis | Malla Reddy Engineering College, Hyderabad |
| 3 | Knowledge sharing to industries | 12 months | Technology application to real waters | Malla Reddy Engineering College, Hyderabad |

**13. Work Plan**

| Activities | 12 months | | | 12 months | | | 12 months | | |
|---|---|---|---|---|---|---|---|---|---|
| | I | II | III | I | II | III | I | II | III |
| Procurement of material/equipment | | | | | | | | | |
| Sample preparation & characterization Studies | | | | | | | | | |
| Degradation of selected compounds Advanced Oxidation processes by optimizing the experimental conditions. | | | | | | | | | |
| Degradation mechanism and pathways of selected compounds | | | | | | | | | |
| Treatment using membrane filteration by optimizing the process parameters. | | | | | | | | | |
| Evaluation of intermediates using HPLC, LC-MS | | | | | | | | | |
| Application of optimized conditions to real wastewaters | | | | | | | | | |
| Review meeting | | | | | | | | | |
| Conference and final report | | | | | | | | | |
| Publication of results | 3-4 International papers with high impact factor | | | | | | | | |

**14. Names of Experts/Agencies/Institution working in the similar area**
*(PleasegivecompleteName,Designation,Addresswithpincode,telephonenumbers&e-mailaddresses)*

Dr.V.Himabindu
Professor
Center for Environment, IST
JNTUH, Hyderabad-500085
9849692838
drvhimabindu@gmail.com

Dr.S.Sridhar
Senior Principal Scientist
Indian Institute of Chemical Technology (IICT), Hyderabad
8790748674
ssridhar@gov.in

Dr.S.Karthikeyan
Associate Professor
Anna University Chennai
9884612135
skarthi@annauniv.com

Prof.K.Usha Aravind
School of Environmental Studies
Cochin University of Science & Technology
Thrikkakara, Cochin-682022
9447779269
usha@cusat.ac.in

## IV. Proforma for Bio-Data of Principal Investigator (PI)

1. **Name: Dr.P.Saritha**
2. **Gender : Female**
3. **E-mail ID: drpsaritha@mrec.ac.in**
4. **Qualifications**

| S.No. | Degree | Institution | Year | Division/Class |
|---|---|---|---|---|
| 1 | CSIR-RA | JNTUH | 2012 | - |
| 2 | Ph D | JNTUH | 2011 | - |
| 3 | MSc | JNTUH | 2001 | I |

**4. Employment Experience**

| S. No. | Position sheld | Name of the Institute | From | To |
|---|---|---|---|---|
| 1 | Associate Professor | Malla Reddy Engineering College | June- 2014 | Till date |
| 2 | CSIR-RA | Jawaharlal Nehru Technological University Hyderabad | April -2012 | MAY-2014 |

## *5.* List of Publications


1. Yamuna rani. M, Bhagawan. D, Himabindu.V, VenkateswaraReddy.V,**Saritha. P,** Preparation And Characterization Of Environmental Friendly Bricks From Pharmaceutical Industrial Wastes Environ SciPollut Res. ISSN: 1614-7499.
2. D. Bhagawan, **SarithaPoodari**, Gujarathi Ravi kumar, ShankaraiahGolla, Ch. Anand, Kumara Swamy Banda, VurimindiHimabindu, et al. Reactivation and recycling of spent carbon using solvent desorption followed by thermal treatment (TR), Journal of Material Cycles and Waste Management (2015) 17:185–193.
3. G. Shankaraiah, **SarithaPoodari**, D. Bhagawan, VurimindiHimabindu,S. Vidyavathic, Degradation of antibiotic norfloxacin in aqueous solution using advanced oxidation processes (AOPs)—A comparative study Desalination and Water Treatment (2016) 1–12.
4. Yamuna Rani M, Bhagawan D, Himabindu V, Venkateswara Reddy V, **Saritha P** (2017) Utilization of Polluted Dredged Sediment for Making of Bricks. JSM Chem 5(2): 1043.
5. DheeravathBhagawan, **SarithaPoodari**, NaralaChaitanya, Surya Ravi, Yamuna M. Rani, VurimindiHimabindu, S. Vidyavathi, Industrial solid waste landfill leachate treatment using electrocoagulation and biological methods, Desalination and Water Treatment, 68 (2017) 137–142.
6. G. Shankaraiah, **P. Saritha**, D. Bhagawan, V. Himabindu, S. Vidyavathi, Photochemical oxidation of antibiotic gemifloxacin in aqueous solutions:A comparative study South African Journal of Chemical Engineering 24 (2017) 8-16.
7. Yamuna R M, Bhagawan D, **Poodari S**, Himabindu V, Venkateswara R V (2017) Recovery of SiO2 from Pharma Waste and its Application for Environmental Remediation. ChemEng Process Tech 3(2): 1040.
8. Yamuna Rani M, Bhagawan D, **Saritha P**, V. Himabindu, V. Venkateswara Reddy, Treatment of Hazardous Solid Waste Using Solidification and Stabilization Technique American Journal of Environmental Protection 2017; 6(4): 94-100.
9. D. Bhagawan, **P. Saritha**, G. Shankaraiah, and V. Himabindu, Fluoride Removal from Groundwater Using Hybrid Cylindrical Electrocoagulation Reactor ISSN 1063_455X, Journal of Water Chemistry and Technology, 2019, Vol. 41, No. 3, pp. 164–169.
10. Treatment Of Methylated Chloro Phenols Using Uv Mediated Oxidation Processes **S Poodari**, CMV Vardhan, D Bhagawan, ANS Baba - Solid State Technology, 2020
11. Pharmaceutical Wastewater Treatment Using Natural And Chemical Coagulants CMV Vardhan, **P Saritha**, ANS Baba - Solid State Technology, 2020


## 6. Patents Granted:

| S. No | Patent Title | Date of Filing of Application | Application Number | Publication Date |
|---|---|---|---|---|
| 1 | Smart Drone Roof Top and Ground Airport System for efficient and secure drone operations | 23/06/2023 | 202341042444 A | 01-09-2023 |

| | | | | |
|---|---|---|---|---|
| 2 | The transesterification of crude Mahua oil in two stages with different materials to produce maximum biodiesel | 07-12-2022 | 202241070514A | 16-12-2022 |
| 3 | Application of Innovative Technology in the field of Agriculture | 23-12-2021 | 202141060242 A | 31-12-2021 |
| 4 | Strengthening of Expansive Clayey Subgrade Pavement by using Admixture and Geosynthetic | 22-02-2021 | 202141007413 A | 26-02-2021 |
| 5 | An efficient device and a methodology to identify the quality of construction materials | 15-02-2020 | 202041006605 A | 28-02-2020 |
| 6 | System to collect Air Pollutant from Exhaust of a vehicle and further generates oxygen | 30-05-2018 | 201841020231 A | 08-06-2018 |

**7. Books Published / Chapters contributed:** -

**8. Sponsored Research Projects**

| S.No | Title | Sponsoring Agency and Officer Concerned | Period | Amount (Rs) |
|---|---|---|---|---|
| 1 | Design and development of Electrocoagulation unit for the processing of Electroplating wastewater | AICTE | 2021-2024 | 17,50,000-00 |
| 2 | Degradation of some of the USEPA listed recalcitrants using nanosize semiconductors | UGC-Minor Project | 2015-2016 | 2,50,000-00 |

| | | | | |
|---|---|---|---|---|
| 3 | Treatment of Industrial wastewaters using Advanced oxidation Processes | DST (WOS-A) | 2009-2012 | 12,50,000-00 |

**9. Consultancy Projects**

| S.No | Title | Sponsoring Agency | Period | Amount |
|---|---|---|---|---|
| | | | | |

**10. Sponsored Research/Consultancy Projects submitted for approval**

| S.No. | Title | Agency to whom submitted | Duration | Amount |
|---|---|---|---|---|
| | | | | |
| | | | | |

## V Proforma for Bio-Data of Co-Principal Investigator (PI)

1. Name, Designation, Agency:

   **Dr.B.Sudharshan Reddy**
   Professor
   Civil Engineering Department
   Malla Reddy Engineering College

2. Gender & Date of Birth: Male & 01/03/1982
3. Qualifications: B.Tech, M.Tech and Ph.D
4. Employment Experience (Last 10 years): Teaching and Research
5. Publications (Last 5 years): 8
6. Patents: 4

**BUDGET ESTIMATES**

**1. Break-up of Total Budget**

**(All Amount in Lakhs)**

| S.No | Item | | 1st Year | 2nd Year | 3rd Year | Total |
|---|---|---|---|---|---|---|
| 1. | Manpower JRF (2) (31,000+HRA 12%=34,720-00) | | 8,33,280-00 | 8,33,280-00 | 8,33,280-00 | 24,99,840-00 |
| 2. | Permanent Equipment | Indigenous | 21,00,162-00 | - | - | 21,00,162-00 |
| 3. | Other Costs | | 30,000-00 | 30,000-00 | 30,000-00 | 90,000-00 |
| 4. | Consumables | | 2,00,000-00 | 2,00,000-00 | 1,00,000-00 | 5,00,000-00 |
| 5. | Domestic Travel | | 2,00,000-00 | 2,00,000-00 | 2,00,000-00 | 6,00,000-00 |
| 6 | Contingencies | | 2,00,000-00 | 2,00,000-00 | 1,00,000-00 | 5,00,000-00 |
| 7 | Overhead Charges | | 2,50,000-00 | 2,50,000-00 | 2,00,000-00 | 7,00,000-00 |
| | **TOTAL** | | 38,13,442-00 | 17,13,280-00 | 14,63,280-00 | **69,90,002-00** |

Grand Total: **Rs.69,90,002-00** (**Rupees Sixty Nine Lakhs Ninety Thousand and Two only)**

## 2. Itemized Budget

### 2.1. Manpower

**Budget for Salaries** (To be borne by DST)

| Designation | Qualification | Salary per month | No. of Persons | Amount Rupees in Lakh | Justification |
|---|---|---|---|---|---|
| Junior research Fellow | PG | 31,000+3720(12%HRA) =34,720-00 | 2 | **24,99,840-00** | JRF (1)- AOPs<br>JRF (2)- MF |

### 2.2 Equipment*

**Budget for Permanent Equipment (**To be borne by DST**)**

| Description of Equipment | Foreign/Indigenous | Unit Landed Price (CIF+ Custom Duty+ others) | Nos. of Equipment | Total Rupees | Justification in relation to project requirement |
|---|---|---|---|---|---|
| Membrane filteration equipment (Ultra filteration) | Indigenous | - | 1 | 6,50,000-00 | Treatment technique |
| Membrane filteration equipment (RO) | Indigenous | - | 1 | 5,78,000-00 | Treatment technique |
| Photo immersion reactor | Indigenous | - | 1 | 3,50,000-00 | Treatment technique |
| Peristaltic pumps | Indigenous | - | 2 *(2,03,904-00) | 4,07,808-00 | Acessories for MF |
| Magnetic stirrers | Indigenous | - | 2* (4677-00) | 9,354-00 | Acessories for Chemical oxidation |
| Submerged aerator | Indigenous | - | 3*(35,000-00) | 1,05,000-00 | Acessories for Chemical oxidation |
| | | | **TOTAL** | **21,00,162-00** | |

**2.3. Other Costs (**Outsourcing, Fabrication, Testing and Patenting etc.**)**

**Budget for Other Costs (**To be borne by DST**)**

| Item | 1st Year | 2nd Year | 3rd Year | Total | Justification including basis of cost estimates/quotations |
|---|---|---|---|---|---|
| Outsourcing | 15,000-00 | 15,000-00 | - | 30,000-00 | Consultant for designing for large scale |
| Fabrication | - | - | - | - | |
| Testing | 15,000-00 | 15,000-00 | - | 30,000-00 | HPLC analysis for intermediate products |
| Patenting | - | - | 30,000-00 | 30,000-00 | Patenting the Technology |
| **Total** | - | - | - | **90,000-00** | - |

**2.4 Consumables**

**Budget for Consumable Materials (**To be borne by DST**)**

| 1st Year | 2nd Year | 3rd Year | Total | Justification including basis of cost estimates/quotations |
|---|---|---|---|---|
| 2,00,000-00 | 2,00,000-00 | 1,00,000-00 | **5,00,000-00** | Glassware & Chemicals |

## 2.5. Domestic Travel*

**Budget for Domestic Travel (**To be borne by DST**)**

| 1st Year | 2nd Year | 3rd Year | Total Rupees | Justification |
|---|---|---|---|---|
| 1,50,000-00 | 1,50,000-00 | 2,00,000-00 | 5,00,000-00 | Attending National & International Conferences & Seminars |
| 50,000-00 | 50,000-00 | - | 1,00,000-00 | Sample collection, field visit |
| | | **TOTAL** | **6,00,000-00** | |

## 2.6 Contingencies

**Budget for Contingencies (**To be borne by DST**)**

| **1st Year** | **2nd Year** | **3rd Year** | **Total** | **Justification including basis of cost estimates/quotations** |
|---|---|---|---|---|
| 2,00,000-00 | 2,00,000-00 | 1,00,000-00 | **5,00,000-00** | Membrane fouling, maintenance of lamps, publications, Printing documents, other stationary… |

**2.7** Designation of the officer in the organization who is vested with financial power: Proposal if approved, Payment shall be made in favour of

**Principal, Malla Reddy Engineering College**

i. Bank Account No.: 769401000078
ii. IFSC Code.: ICIC0007694
iii. MICR Code.: 500229130
iv. Bank Branch Address: MREC Campus, Maisammaguda

**2.8** Mention HRA% applicable to Research fellow in your institute and the classification category of your city/town **12%**

# CURRICULUM VITAE

**Dr. SARITHA POODARI**

Mobile: 9849332474
E-mail: poodarisaritha@gmail.com
drpsaritha@mrec.ac.in

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## EDUCATIONAL PROFILE

**2006-2011**
**Ph.D** (Environmental Science & Technology)
Jawaharlal Nehru Technological University Hyderabad

**1998-2001**
**Master of Science** (Environmental Science & Technology) with **Distinction**
Jawaharlal Nehru Technological University Hyderabad

**1993-1996**
**Bachelor of Science** (Microbiology, Botany & Chemistry) with **Distinction**
Osmania University, Hyderabad

## PROFESSIONAL EXPERIENCE

**Associate Professor: June 2014-Till date**
**Malla Reddy Engineering College (MREC), Secunderabad**

Responsibilities include teaching course work for B.Tech students, Supervising Students for their dissertation writing technical reports, research proposals and research publications for peer reviewed journals.

**My Mode of teaching includes:**

- Supervise graduate or postgraduate teaching, internship, and research work
- Initiate, facilitate, and moderate classroom discussions
- Prepare course materials such as syllabi, homework assignments, and handouts
- Keep abreast of developments in the field by reading current literature, talking with colleagues, and participating in professional conferences
- Supervise student's laboratory and field work
- Evaluate and grade students class work, laboratory work, assignments, and papers
- Plan, evaluate, and revise curricula, course content, and course materials and methods of instruction
- Compile, administer, and grade examinations, or assign this work to others
- Maintain regularly scheduled office hours to advise and assist students
- Conduct research in the particular field of knowledge and publish findings in professional journals, books, or electronic media.

**Research Associate-CSIR: April 2012-May 2014**
**Center for Environment, Institute of Science & Technology, Jawaharlal Nehru Technological University, Hyderabad.**

Responsibilities include: Working with environmental projects related to lake water quality analysis along with remediational measures. Supervising Masters Students for their dissertation, teaching course work for M.Tech & Masters students, writing technical reports and research publications for peer reviewed journals. Drafting research proposals for Government funding agencies such as Department of Science and Technology, Ministry of Environment and Forest, Department of Biotechnology, Department of Ocean Development of Government of India.

**Women Scientist–DST: May 2009–March 2012**
**Center for Environment, Institute of Science & Technology, Jawaharlal Nehru Technological University, Hyderabad.**

Studied treatment of non-biodegradable pollutants commonly found in wastewaters using advanced techniques with special reference to drug impurities found in pharmaceutical effluents. Advanced techniques include studying oxidation techniques like Sonication and UV mediated reactions.

**Project Scientist: July 2006-April 2009**
**Center for Environment, Institute of Science & Technology, Jawaharlal Nehru Technological University, Hyderabad.**

Working on doctoral thesis, studied the degradation of various multisubstituted recalcitrant in synthetic and environmental samples by Advanced Oxidation Processes (AOPs). Writing research publications, technical reports, supervising junior researchers, attending and organizing conferences were other challenges.

**Research Assistant: March 2005 – June 2006**
**Center for Environment, Institute of Science & Technology, Jawaharlal Nehru Technological University, Hyderabad.**

Executed studies on the sampling, analysis, data interpretation and documentation of various environmental projects funded by different agencies like CPCB, APPCB, etc.

**Academic Assistant: March 2002 – April 2003**
**Center for Environment, Institute of Science & Technology, Jawaharlal Nehru Technological University, Hyderabad.**
Teaching in the field of Environmental studies with emphasis on ecology, environmental management and Zero Pollution studies. Also tutored wastewater analysis / treatment laboratory classes graduate students.

## ACADEMIC ACCOMPLISHMENTS

- B.Sc. (Microbiology, Botany & Chemistry) with Distinction, Osmania University, Hyderabad
- M.Sc. (Environmental Science & Technology) with Distinction, Center for Environment, IPGSR, JNTU, Hyderabad
- Women Scientist – Department of Science & Technology, New Delhi, Government of India
- Research Associate – Council of Scientific & Industrial Research, New Delhi, Government of India

## INSTRUMENTAL PROFICIENCY

- Working experience on HPLC, GC, GC-MS and Ion Analyzer
- Developed methods for the identification of chloro, nitro and methyl substituted phenols in environmental samples
- GC-MS analysis carried for commercial samples from PCB (Pollution Control Board) and various Pharmaceutical industries.
- Heavy metal analysis in environmental samples using Atomic Absorption Spectra (AAS)

## RESEARCH INTEREST AND SKILLS

- Ten years of research experience in **'Environmental Research'** with special reference to the treatment of industrial effluents using advanced oxidation process
- Monitoring and optimizing process parameters for evaluating best treatment methodology for industrial effluents contaminated with chloro, nitro and methyl substituted phenolics.
- Identification and elucidation of degradative mechanistic pathways for the recalcitrants present in effluents.
- Developed sample preparation methods for the quantification of substituted phenols using HPLC.
- Synthesized Nano $TiO_2$ and zerovalent iron using sol-gel and flame synthesis method.
- Expertise on water, sediment and soil quality analysis along with their remediation using various physico-chemical methods.
- Conduct membrane pilot plant experiments on process waters from industry to clearly demonstrate the added value of adapting cleaner production solutions, both economically and environmentally.
- Bioremediation and biodegradation of recalcitrant compounds using composting and aerobic shake flask culture.
- Dissemination of results along with development of reports and presentations.
- Contributed research articles in peer reviwed journals and also presented in international conferences.
- Supervised many masters students for their dissertation

| | |
|---|---|
| 1 | ***Research projects***<br><br>➢ **UGC – Minor project** - Degradation of USEPA listed recalcitrant compounds using Nano- sized semi conductors (Completed)<br><br>➢ **CSIR - Research Associate** - Treatment of biorefractory wastewaters using advanced oxidation process (Completed)<br><br>➢ **DST-Women Scientist** - Treatment of non-biodegradable pollutants commonly found in industrial wastewaters using advanced techniques (Completed)<br><br>➢ **AICTE (RPS)** - Design & Development of Electro coagulation unit for the processing of Electroplating wastewater |

## AWARDS

- DST - **Women Scientist (2009-12)**
- Presented paper in International conference on Environment and Energy and has been awarded for the **'Best paper presentation' (2014).**
- **Chaired a Technical Session in** International conference on Environment and Energy, JNTUH (2014)
- Invited as a speaker for **DBT sponsored Teacher/Researcher short-term training course (STTC)** on **Pharma Innovations for Better Perspective in Healthcare organized by Malla Reddy College of Pharmacy, Maisammaguda, Secunderabad** on **June 18, 2019** morning session from 9.30 to 10.20 am on the topic **"Pharmaceutical waste effluents testing by different analytical methods".**

## PROGRAMMES ATTENDED

| S.No | Title of FDP | Organized by | Type of Programme | Duration dates | Year |
|---|---|---|---|---|---|
| 1. | National Intellectual Property Awareness Mission | Intellectual Property Office, India | IP Awareness / Training Programme | May 31 | 2022 |
| 2. | Amalgam 2.0 | Atal incubation Centre, BHIMTECH | FDP | March 8-11 | 2022 |
| 3. | Intellectual Property | NPTEL | FDP | Jan-April | 2022 |
| 4. | Research | JNTUH | STC (UGC | Jan 24-31 | 2022 |

| | | | | | |
|---|---|---|---|---|---|
| | Methodology | | sponsored) | | |
| 5. | Pedagogy & Research Methodologies | Gokaraju Rangaraju Institute of Engineering & Technology | AICTE-ISTE approved Refresher/Orientation | Dec 21-28 | 2021 |
| 6. | Research Funding & IPR | K. C. College of Engineering & Management studies and Research, Thane (East) | FDP | May7 -10 | 2020 |
| 7. | Shrutam - Unfolding Bharateeya vichar | Bharatiya Shikshan Mandal, Nagpur | FDP | May 20-25 | 2020 |
| 8. | Recent advances in concrete technology and sustainable infrastructure | GRIET, Hyderabad | FDP | May 21-23 | 2020 |
| 9. | Recent Advances in Civil Engineering | CMR Institute of Technology, Hyderabad | FDP | May 20-22 | 2020 |
| 10. | IPR awareness | Keyway research, Hyderabad | FDP | May 13-17 | 2020 |
| 11. | Outcome based education and NBA accreditation | Shri Chhatrapati Shivajiraje College of Engineering, Thane | FDP | May 12-17, 2020 | 2020 |
| 12. | NAAC Awareness Programme for Faculty | MMIT, Pune | FDP | May 08-14, 2020 | 2020 |
| 13. | Remote Sensing & GIS | NPTEL | FDP | Aug 26-Oct 03 | 2019 |
| 14. | Contemporary Research & IPR | JNTUH | FDP | Jan 28-Feb 01 | 2019 |
| 15. | Plastic Waste Management | NPTEL | FDP | Feb 25-April 28 | 2019 |
| 16. | Environment, Health and Safety | JNTUH | FDP | April 30-May 02 | 2018 |

**PROGRAMMES ORGANIZED**

| S. No. | Name of the Program | Dates | Associated Agency | No of participants |
|---|---|---|---|---|
| 1 | Best out of Waste Competition | 22-04-2022 | MREC | 80 |
| 2 | One day workshop on “World Earth Day” | 22-04-2022 | University College for Women, Koti, Hyderabad | 160 |

| | | | | |
|---|---|---|---|---|
| 3 | Free Offline Capacity Building Program (National SC/ST Hub Scheme) | 05-04-2022 to 05-05-2022 | NI-MSME, Yousufguda, Hyderabad | 90 |
| 4 | National Science Day Celebrations | 26-02-2022 | MREC | 50 |
| 5 | One day Program on Entrepreneurship Awareness | 25-02-2022 | DI-MSME, Balanagar, Hyderabad | 100 |
| 6 | National Pollution Control Day Celebrations | 19-02-2022 | MREC | 80 |
| 7 | Plastic Waste Management, Issues Challenges and Opportunities for SME's | 18-02-2022 | NI-MSME, Yousufguda, Hyderabad | 100 |
| 8 | Scope of Entrepreneurship and Employment in Defense Sector and it's PSU's | 28-12-2021 | Military College of Electronics and Mechanical Engineering | 250 |
| 9 | Virtual T-Tribe Launch Pad program - Orientation Session on Entrepreneurship | 17-12-2021 | T-HUB, IIIT, Hyderabad | 500 |
| 10 | e-National Level Awareness Programme on Entrepreneurship | 15-11-2021 | DI-MSME, Balanagar, Hyderabad | 240 |
| 11 | Workshop on Entrepreneurship & Innovation as Career Opportunity | 12-11-2021 | GP Wealth Solutions, Hyderabad | 150 |
| 12 | Invited talk on Hindrances faced by Entrepreneurs | 24-08-2021 | Alumini, EE consultancy services | 250 |
| 13 | Debate on Mindset of Entrepreneurs before and after Corona | 24-08-2021 | MREC | 30 |

**OTHER ACTIVITIES**

- Coordinator for Entrepreneurship Development Cell
- Member of women grievance cell at Malla Reddy Engineering College (MREC)
- Actively involved in NBA, NAAC, UGC inspection activities
- Supervising the students for their dissertation
- Judge in one of the presentation sessions of students during Akshara Fest
- Actively involved in examination duties such as:
  - *Question paper setting*
  - *Paper evaluation*
  - *Invigilation*

## LIST OF INTERNATIONAL PUBLICATIONS

1. **P. Saritha**, C. Aparna, V. Himabindu, Y. Anjaneyulu, Comparison of various advanced oxidation processes for the degradation of 4-chloro-2 nitrophenol,

Journal of Hazardous Materials, Volume 149, Issue 3, 19 November 2007, Pages 609-614.

2. C. Aparna, **P. Saritha**, V. Himabindu, Y. Anjaneyulu, Techniques for the evaluation of maturity for composts of industrially contaminated lake sediments, Waste Management, Volume 28, Issue 10, 2008, Pages 1773-1784.
3. **P.Saritha**, D. Samuel Suman Raj, C. Aparna, P. Nalini Vijaya Laxmi, V. Himabindu and Y. Anjaneyulu, Degradative Oxidation of 2,4,6 Trichlorophenol Using Advanced Oxidation Processes – A Comparative Study, Water, Air, & Soil Pollution, Volume 200, Numbers 1-4 / June, 2009, Pages 169-179.ISSN: 1573-2932.
4. P. Nalini Vijaya Laxmi, **P. Saritha**, N. Rambabu, V. Himabindu, Y. Anjaneyulu, Sonochemical degradation of 2chloro-5methyl phenol assisted by $TiO_2$ and $H_2O_2$, Journal of Hazardous Materials, Volume 174, Issues 1-3, 15 February 2010, Pages 151-155
5. **Saritha Poodari**, Shankaraiah Golla, Bhagawan. D and Vurimindi Himabindu, Assessment of Water Quality of Peddacheruvu, Sambaiah Cheruvu, Gaddapotharam and Rudraram Cheruvu of Medak District , Journal of Engineering Science and Technology Review 7 (1) (2014) 137– 142. ISSN; 1791-2377.
6. G. Shankaraiah, **P. Saritha**, Nalini Vijayalaximi Pedamalla, D. Bhagawan, V. Himabindu , Degradation of Rabeprazole-N-oxide in aqueous solution using sonication as an advanced oxidation process, Journal of Environmental Chemical Engineering 2 (2014) 510–515. ISSN 2213-3437.
7. D. Bhagawan & **Saritha Poodari** & Tulasiram Pothuraju & D. Srinivasulu & G. Shankaraiah & M. Yamuna Rani & V. Himabindu & S. Vidyavathi, Effect of operational parameters on heavy metal removal by electrocoagulation, Environ Sci Pollut Res (2014) 21:14166–14173. ISSN: 1614-7499.
8. D. Bhagawan, **Saritha Poodari**, Shankaraiah Golla, Vurimindi Himabindu & S. Vidyavathi, Treatment of the petroleum refinery wastewater using combined electrochemical methods, Desalination and Water Treatment (2014) 1–8 online: http://dx.doi.org/10.1080/19443994.2014.987175. IF-0.9.
9. Yamuna rani. M, Bhagawan. D, Himabindu.V, Venkateswara Reddy.V, **Saritha. P,** Preparation And Characterization Of Environmental Friendly Bricks From Pharmaceutical Industrial Wastes Environ Sci Pollut Res. ISSN: 1614-7499.
10. D. Bhagawan, **Saritha Poodari**, Gujarathi Ravi kumar, Shankaraiah Golla, Ch. Anand, Kumara Swamy Banda, Vurimindi Himabindu, et al. Reactivation and recycling of spent carbon using solvent desorption followed by thermal treatment (TR), Journal of Material Cycles and Waste Management (2015) 17:185–193.

11. G. Shankaraiah, **Saritha Poodari**, D. Bhagawan, Vurimindi Himabindu, S. Vidyavathic, Degradation of antibiotic norfloxacin in aqueous solution using advanced oxidation processes (AOPs)—A comparative study Desalination and Water Treatment (2016) 1–12.
12. Yamuna Rani M, Bhagawan D, Himabindu V, Venkateswara Reddy V, **Saritha P** (2017) Utilization of Polluted Dredged Sediment for Making of Bricks. JSM Chem 5(2): 1043.
13. Dheeravath Bhagawan, **Saritha Poodari**, Narala Chaitanya, Surya Ravi, Yamuna M. Rani, Vurimindi Himabindu, S. Vidyavathi, Industrial solid waste landfill leachate treatment using electrocoagulation and biological methods, Desalination and Water Treatment, 68 (2017) 137–142.
14. G. Shankaraiah, **P. Saritha**, D. Bhagawan, V. Himabindu, S. Vidyavathi, Photochemical oxidation of antibiotic gemifloxacin in aqueous solutions: A comparative study South African Journal of Chemical Engineering 24 (2017) 8-16.
15. Yamuna R M, Bhagawan D, **Poodari S**, Himabindu V, Venkateswara R V (2017) Recovery of $SiO_2$ from Pharma Waste and its Application for Environmental Remediation. Chem Eng Process Tech 3(2): 1040.
16. Yamuna Rani M, Bhagawan D, **Saritha P**, V. Himabindu, V. Venkateswara Reddy, Treatment of Hazardous Solid Waste Using Solidification and Stabilization Technique American Journal of Environmental Protection 2017; 6(4): 94-100.
17. D. Bhagawan, **P. Saritha**, G. Shankaraiah, and V. Himabindu, Fluoride Removal from Groundwater Using Hybrid Cylindrical Electrocoagulation Reactor ISSN 1063_455X, Journal of Water Chemistry and Technology, 2019, Vol. 41, No. 3, pp. 164–169.
18. **Saritha Poodari**, CM Vivek Vardhan, D Bhagawan, G Shankaraiah, Akella Naga Sai Baba Treatment Of Methylated Chloro Phenols Using Uv Mediated Oxidation Processes, Solid State Technology, 2020 63, 2s
19. Vivek Vardhan, P Saritha, Akella Naga Sai Baba Pharmaceutical Wastewater Treatment Using Natural And Chemical Coagulants, CM, Solid State Technology, 2020, 8360-8368

**Conference Papers**

1. Treatment of Solid Waste Using Solidification and Stabilization Technique, Bhagawan. D, **Saritha Poodari,** Kumara Swamy. Banda**,** Ch. Anand**,** Shankaraiah Golla**,** G. Ravi kumar**,** Vurimindi Himabindu**,** S.Vidyavathi, **Accepted for conference - IconSWM 28-30 Jan' 2014**

2. Manufacturing of Eco-environmental bricks containing lake sediment: Hussain sagar, India, Yamuna rani.M, Bhagawan.D, Himabindu.V, Venkateswara

Reddy.V, **Saritha. P**, P.R. Reddy, **Accepted for conference - IconSWM 28-30 Jan' 2014**.

3. Sonochemical oxidation of Rabeprazole-N-Oxide in aqueous solutions. Shankaraiah, Nalini Vijayalaxmi Pedamalla, **Saritha Poodari**, Himabindu Vurimindi, Anjaneyulu Yerramillia, Oral presentation in the conference of International conference on Environmental management (ICEM-2), October 2010.

4. Degradation of Omeprazole – N - Oxide using Advanced Oxidation Processes: A Comparative Study. Pushpa Raj Katam, **Saritha Poodari**, Himabindu Vurimindi, Anjaneyulu Yerramillia, Oral presentation in the conference of International conference on Environmental management (ICEM-2), October 2010.

5. Removal of yellow disperse dye from Textile industrial effluent by Coagulation. V.Himabindu, **P. Saritha,** National Seminar on Environmental Pollution, Impacts, Remediation and Management (EPIRAM). July 2001

6. Treatment of Pharmaceutical effluent by Physico-chemical methods- Coagulation and Adsorption.V. Himabindu, M.Shanthi, **P. Saritha**. National Seminar on Environmental Pollution, Impacts, Remediation and Management (EPIRAM). July 2001

## LIST OF PATENTS

| S.No | Patent Title | Date of Filing of Application | Application Number | Publication Date |
|---|---|---|---|---|
| 1 | The transesterification of crude Mahua oil in two stages with different materials to produce maximum biodiesel | 07-12-2022 | 202241070514A | 16-12-2022 |
| 2 | Application of Innovative Technology in the field of Agriculture | 23-12-2021 | 202141060242 A | 31-12-2021 |
| 3 | Strengthening of Expansive Clayey Subgrade Pavement by using Admixture and Geosynthetic | 22-02-2021 | 202141007413 A | 26-02-2021 |

| | | | | |
|---|---|---|---|---|
| 4 | An efficient device and a methodology to identify the quality of construction materials | 15-02-2020 | 202041006605 A | 28-02-2020 |
| 5 | System to collect Air Pollutant from Exhaust of a vehicle and further generates oxygen | 30-05-2018 | 201841020231 A | 08-06-2018 |

**PERSONAL PROFILE**

| | | |
|---|---|---|
| Date of Birth | : | 23-06-1976 |
| Sex | : | Female |
| Nationality | : | Indian |
| Marital status | : | Married |
| Personal Attributes | : | Reliable, Adaptive, Co-Operative, and Assertive. |
| Permanent Address | : | Plot No 539, H.M.T Hills<br>Opp. JNTU, Kukatpally<br>Hyderabad 500 072, Andhra Pradesh, India |

**(Dr.P.Saritha)**

**Annexure-I**

## UNDERTAKING FROM THE INVESTIGATOR(S)/ CO-INVESTIGATOR (S)

***Project Title: Synergistic treatment of industrial wastewater using membrane filteration and chemical oxidation***

1. I/We have carefully read the terms and conditions of the **Water Technologies Cell** Programme and I/We agree to abide by them.
2. I/We have not submitted this or a similar Project proposal elsewhere for financial support.
3. I/We have explored and ensured that the equipment and the basic facilities described in the Research Proposal, will actually be available as and when required for the purpose of the Project. I/We shall not request financial support under this project, for procurement ofthese items.
4. I/We undertake that spare or idle capacity of the permanent equipment procured under the Project will be made available to other legitimate users from parent and other organizations.
5. I/We have enclosed the following:

   a. Endorsement from the Head of the Institution (on letterhead)

(Dr. P. Saritha)

Name and signature of the Investigators

Date 29/9/2023

Place Hyderabad

**Annexure – VI**

## DEPARTMENT OF SCIENCE AND TECHNOLOGY

## POLICY ON CONFLICT OF INTEREST FOR APPLICANT

Issues of Conflicts of Interest and ethics in scientific research and research management have assumed greater prominence, given the larger share of Government funding in the country's R & D scenario. The following policy pertainingto general aspects of Conflicts of Interest and code of ethics are objective measures that are intended to protect the integrity of the decision-making processes and minimize biases. The policy aims to sustain transparency, increase accountability in funding mechanisms and provide assurance to the general public that processes followed in the award of grants are fair and non-discriminatory. The Policy aims to avoid all forms of bias by following a system that is fair, transparent and free from all influence/ unprejudiced dealings, before, during and after the currency of the programme to be entered into with a view to enablingthe public to abstain from bribing or any corrupt practice in order to secure the award by providing assurance to them that their competitors will also refrain from bribing and other corrupt practice and the decision-makers will commit to preventing corruption, in any form, by their officials by following transparent procedures. This will also ensure a global acceptance of the decision-making process adopted byDST.

**Definition of Conflict of Interest:**

Conflict of Interest means "any interest which could significantly prejudice an individual's objectivity in thedecision-making process, thereby creating an unfair competitive advantage for the individual or to the organization which he/she represents". The Conflict of Interest also encompasses situations where an individual, in contravention to the accepted norms and ethics, could exploit his/her obligatory duties for personalbenefits.

1. **Coverage of the Policy:**

a) The provisions of the policy shall be followed by persons applying for and receiving funding from DST, Reviewers of the proposal and Members of Expert Committees and Programme Advisory Committees. The provisions of the policy will also be applicable to all individuals including Officers of DST connected directly or indirectly or through intermediaries and Committees involved in the evaluation of proposals and subsequent decision-makingprocess.

b) This policy aims to minimize aspects that may constitute actual Conflict of Interest, apparent Conflict of Interests and potential Conflict of Interests in the funding mechanisms that are presently being operated by DST. The policy also aims to cover, although not limited to, Conflict of interests that are Financial (gains from the outcomes of the proposal or award), Personal (association of relative / Family members) and Institutional (Colleagues, Collaborators, Employer, persons associated in a professional career of an individual such as PhD supervisoretc.)

2. **Specifications as to what constitutes Conflict ofInterest:**

Any of the following specifications (non-exhaustive list) imply Conflict of Interest if,

(i) Due to any reason by which the Reviewer/Committee Member cannot deliver a fair and objective assessment of theproposal.

(ii) The applicant is a direct relative or family member (including but not limited to a spouse, child, sibling, parent) or personal friend of the individual involved In the decision-making process or alternatively if any relative of an Officer directly involved in any decision-making process / has influenced interest/ stake in the applicant's formetc.

(iii) The applicant for the grant/award is an employee or employer of an individual involved in the process as a Reviewer or Committee Member; or if the applicant to the grant/award has had an employer-employee relationship in the past three years with that individual.

(iv) The applicant to the grant/award belongs to the same Department as that of the Reviewer/Committee Member.

(v) The Reviewer/Committee Member is a Head of an Organization from where the applicant isemployed.

(vi) The Reviewer /Committee Member is or was, associated with the professional career of the applicant (such as PhD supervisor, Mentor, present Collaboratoretc.)

(vii) The Reviewer/Committee Member is involved in the preparation of the research proposal submitted by theapplicant.

(viii) The applicant has joint research publications with the Reviewer/Committee Member in the last three years.

(ix) The applicant/Reviewer/Committee Member, in contravention to the accepted norms and ethicsfollowed in scientific research has a direct/indirect financial interest in the outcomes of theproposal.

(x) The Reviewer/Committee Member stands to gain personally should the submitted proposal be accepted orrejected.

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# The Term "Relative" for this purpose would be referred to in section 6 of Companies Act,1956.

**3. Regulation:**

The DST shall strive to avoid conflict of interest in its funding mechanisms to the maximum extent possible. A self-regulatory model is however recommended for stakeholders involved in scientific research and research management, on issues pertaining to Conflict of Interest and scientific ethics. Any disclosure pertainingto the same must be made voluntarily by the applicant/Reviewer/Committee Member.

**4. Confidentiality:**

The Reviewers and the Members of the Committee shall safeguard the confidentiality of all discussionsand decisions taken during the process and shall refrain from discussing the same with any applicant or a third party unless the Committee recommends otherwise and records for doingso.

**5. Code of Conduct**

(a) The applicant must refrain from suggesting referees with potential Conflicts of Interest that may arise due to the factors mentioned in the specifications described above in Point No.2.

(b) The applicant may mention the names of individuals to whom the submitted proposal should not be sent for refereeing, clearly indicating the reasons for thesame.

**6. Final Appellate authority:**

Secretary, DST shall be the appellate authority in issues pertaining to conflict of interest and issues concerning the decision-making process. The decision of Secretary, DST in these issues shall be final and binding.

**7. Declaration**

**I have read the above "Policy on Conflict of Interest" of the DST applicable to Applicant and agree to abide by provisionsthereof.**

I hereby declare that I have no conflict of interest of any form pertaining to the proposed grant * ✓

I hereby declare that I have a conflict of interest of any form pertaining to the proposed grant *

* & # (Tick whichever isapplicable)

Dr. P. Savitha

**(Name /Signature with date)**

29/9/2023

**Annexure-II**

## ENDORSEMENT FROM THE HEAD OF THE LEAD/PARTNER ORGANISATION

***Project Title: Synergistic treatment of industrial wastewater using membrane filteration and chemical oxidation***

1. Certified that the organization welcomes the participation of **Dr P Saritha** as the PI and **Dr B Sudharshan Reddy** as the Co-PI for the project and that in the unforeseen and legitimate event of discontinuation by the PI, the Co-PI will assume full responsibility for completion of the project. Information to this effect, endorsed by me, will be promptly sent to the DST
2. Certified that the equipment, other basic facilities and other administrative facilities as per the terms and conditions of the award of the Project, will be extended to the investigator(s) throughout the duration of the project
3. The Organization shall ensure that financial and purchase procedures are followed as per the prevailing norms of the organization, within the allocated budget.
4. The Organization shall provide timely the Statement of Expenditure and the Utilization Certificate of the grant as required by the DST in the prescribed format.
5. The grant for the proposal, if approved may be made in favour of, Payment shall be made in favour of **Principal, Malla Reddy Engineering College**
    i. Organization Name as per Bank records: Malla Reddy Engineering College
    ii. Bank Account No.: 769401000078
    ii. IFSC Code: ICIC0007694
    iii. MICR Code: 500229130
    iv. Bank Name: ICICI
    v. Bank Branch Address: MREC Campus, Maisammaguda

**(Head of the Institute)**

**Seal/Stamp**

Principal
Malla Reddy Engineering College
Maisammaguda, Dhulapally,
(Post Via Kompally), Secunderabad-500100.

**Date** 29/9/23

**Place** Hyderabad

# MULTI WAVELENGTH MUTILAMP PHOTO REACTOR

**₹ 3,50,000**/ Piece **Get Latest Price**

| | |
|---|---|
| Capacity | <1 KL |
| Material | Mild Steel |
| Usage/Application | UNIVERSITIES & INSTITUTES |
| Automation Grade | Manual |

MULTI WAVELENGTH MUTILAMP PHOTO REACTOR

# RAVEL Aluminum Peristaltic Pump, Flow Rate Range 0.2 l/min - 600 ml/h

RAVEL[R]

(RH-P100S-200-RPM-6H-ID)

₹203,904.00 11% OFF

Trends

## Product Details

| | |
|---|---|
| Price For : | 1 pieces |
| MRP/Unit: | ~~₹ 228,800.00~~ |


# DROLAX Mild Steel Microprocessor Controlled Magnetic Stirrers

**DROLAX**[R]

(DROLAX-12-MLH)

**₹ 4,677.00** 82% OFF

Trends

## Product Details

| | |
|---|---|
| Price For : | 1 pieces |
| MRP/Unit: | ₹ ~~25,500.00~~ |
| Offer Price/Unit: | **₹ 4,677.00** |

## Submersible Aerators, 1 (m3/h), 1 mm

**₹ 35,000/** Piece  **Get Latest Price**

Air flow Rate: 1 (m3/h)
Bubble Diameter: 1 mm
Automation Grade: Automatic
Brand: Pervel Water Management Solutions
Power: 1.5 kW
Voltage: 220 V

# 20000 Lph Industrial Ultra Filtration System

Approx. Price: **Rs 6.5 Lakh** / Piece Get Latest Price

Product Brochure

**Product Details:**

| | |
|---|---|
| Minimum Order Quantity | 01 Piece |
| Capacity | 200 KLD |
| Filter Type | Multigrade Sand Filter |
| Filter Medium Material | Fiberglass |
| Frequency | 50-60 Hz |
| Model Type | Online |
| Water Source | Any portable |
| Capacity Inlet Flow Rate | Other |
| Usage/Application | Industrial |

# Industrial Ro Plant

Approx. Price: **Rs 5.78 Lakh** / Piece Get Latest Price

Product Brochure

**Product Details:**

| | |
|---|---|
| Minimum Order Quantity | 01 Piece |
| Country of Origin | Made in India |
| Purification Type | RO |
| Model Name/Number | IND RO |
| Brand | swati |
| Material | FRP |
| RO Capacity | Other |
| RO Membrane Type | TFC |