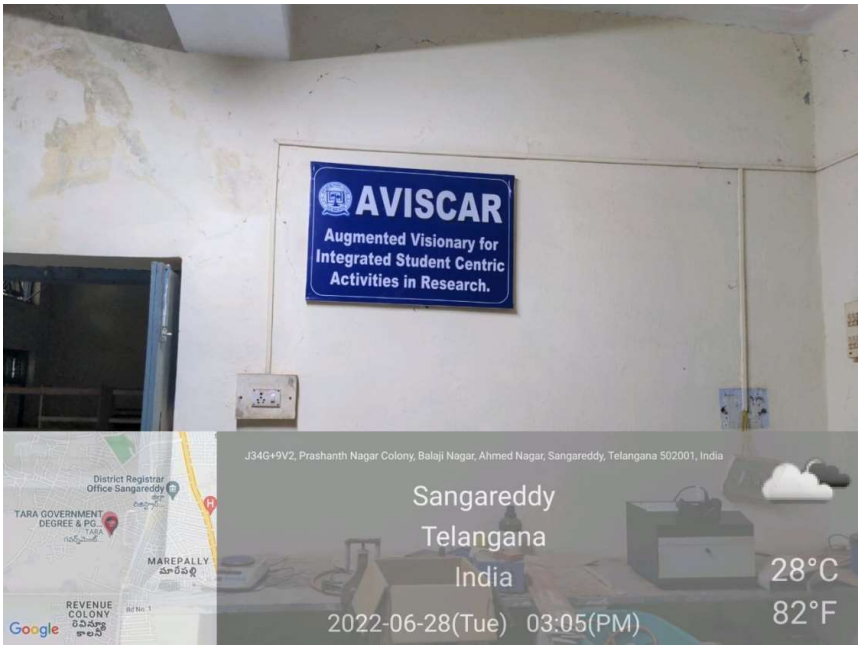
Program Coordinator: Dr.Abhijit Kantankar

AVISCAR

(Augmented Visionary for Integrated Student Centric Activities in Research)

Department of Chemistry started the unique platform to encourage the students to participate in active research projects under the programme called **AVISCAR (Augmented Visionary for Integrated Student Centric Activities in Research).** In this programme students were sensitized to research and innovations with unique and feasible approaches. The programme focused on application of academic knowledge in designing and implementing the Research prototypes to solve the specific research problems and obstacles. In this programme students share their views and come up with unique approach where the Teacher provides proper guidance to materialize the idea to be implemented. The student research projects comes under **AVISCAR** programme utilize the existing resources and materials with the motto of "**No-Cost Low Cost**" approaches. The motif of the **AVISCAR** is based on modus operandi, "**Why Not**?" which creates the enthusiasm in the subject through logical and critical thinking of existing knowledge. All the student Research projects designed with interdisciplinary modes which need the divergent academic fusions. The projects designed on fundamentals of the Chemistry as Central science with inter-connected aspects of other branches of Sciences to metamorphose the idea into applications.



OBJECTIVES OF THE PROGRAMME

- Create the interest in students towards Research.
- Application of the academic knowledge to solve the issues pertaining to the day to day life.
- Design the projects based on Green and eco-friendly schemes.
- No-Cost Low-Cost approach should be incorporated in the research.
- Multidisciplinary designs should be adopted to minimize the technical complexity and reduce the cost expenditure.

OUTCOMES OF THE PROGRAMME

Innovative thinking and critical application of academics inculcated in the students to solve the contemporary research problems with minimum resources.

Major Student Research Projects of the "AVISCAR"

PROJECT TITLE: Antimicrobial Silver Nanoparticle coating on Paper currency notes and Mobile phones using Eco-friendly Tollens process for prevention of infectious diseases

Contaminated Paper currency notes may cause a public health risk by spreading nosocomial (Hospital acquired infections) infections when simultaneous handling of food and in addition to this, also cause normal sort of contaminations in persons with immunodeficiency. Especially when banknotes recovered from hospitals may be highly contaminated by *Staphylococcus aureus*, *Salmonella* species and *Escherichia coli.* Laboratory studies revealed that methicillin-resistant *S. aureus* can easily survive on paper currency notes, whereas *E. coli*, *Salmonella* species and viruses, including human influenza virus, Norovirus, Rhinovirus, hepatitis A virus and Rotavirus, which can be transmitted through hand contact. Large-scale, 16S rRNA, metagenomic studies and culturomics have the capacity to dramatically expand the known diversity of bacteria and viruses on money and fomites.

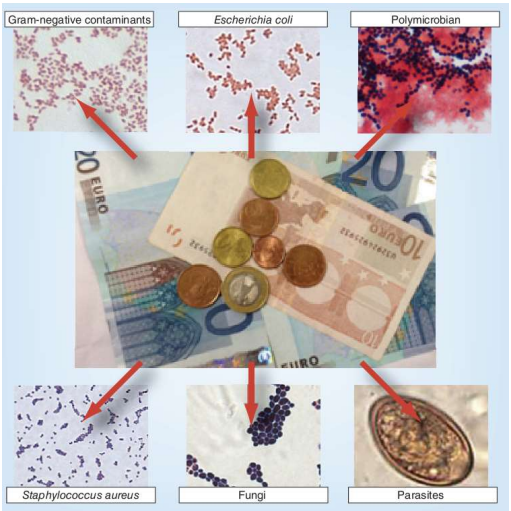


Figure 1: Depiction microbes on paper currency notes (**Courtesy:** *Future Microbiol.* (2014) 9(2), 249–261).

Similarly, constant handling of the Mobile phone by different users exposes it to an array of microorganisms, and makes it a good carrier for microbes, especially those associated with the skin resulting in the spread of different microorganisms from user to user. Because of the multifaceted benefits of the mobile phones, it is easy to overlook its hazard to health; this is against the background that many users may have no regard for personal hygiene, and the number of people who may use the same phone. Many research studies has shown that the mobile phone could be a health hazard with tens of thousands of microbes living on each square inch of the phone .

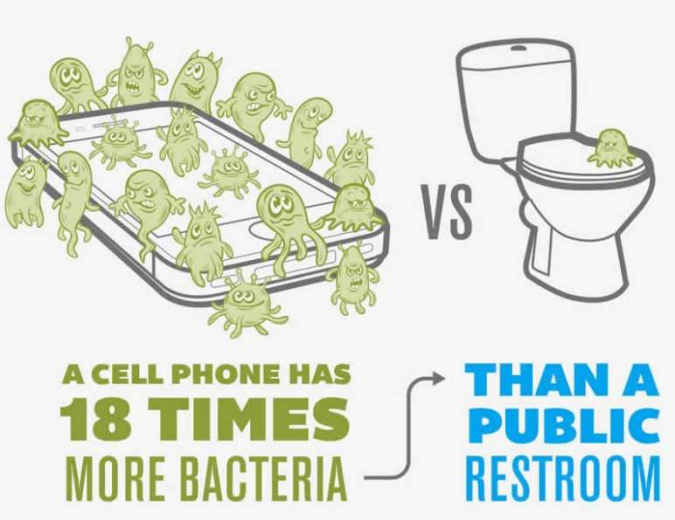


Figure 2: Depiction microbes on Mobile phones.

(**Courtesy:** https://www.phonesoap.eu/medical-professional)

However, Nosocomial infections caused by microorganisms which usually originated from hospital environments and cross-contamination due to the incorrect use of medical equipment can be prevented or reduced by replacing normal equipments with Silver nanoparticles (AgNPs) coated medical devices. Many medical studies have revealed that silver is effective against more than 650 pathogens, having a broad spectrum of activity. Further its use in the form of Nanoparticles enhances this property up to great extent and allows its use in a wide range of applications. Therefore, in recent years Nano-silver is considered as one of the most viable alternatives to antibiotics because it seems to have high

potential to solve the problem of multidrug resistance, which is often observed in several bacterial strains.

Nanoparticles are usually a clusters of atoms, with sizes ranging between 1 and 100 nm, whereas the word "Nano" is used to indicate one billionth of a meter. Because of the variation in the size of AgNPs, they exhibited variety of physical and chemical characteristics to that of metallic silver.

Students involved:

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1	**A.Bhanupraksh**	**17016058445001**	B.Sc.(BZC)	III
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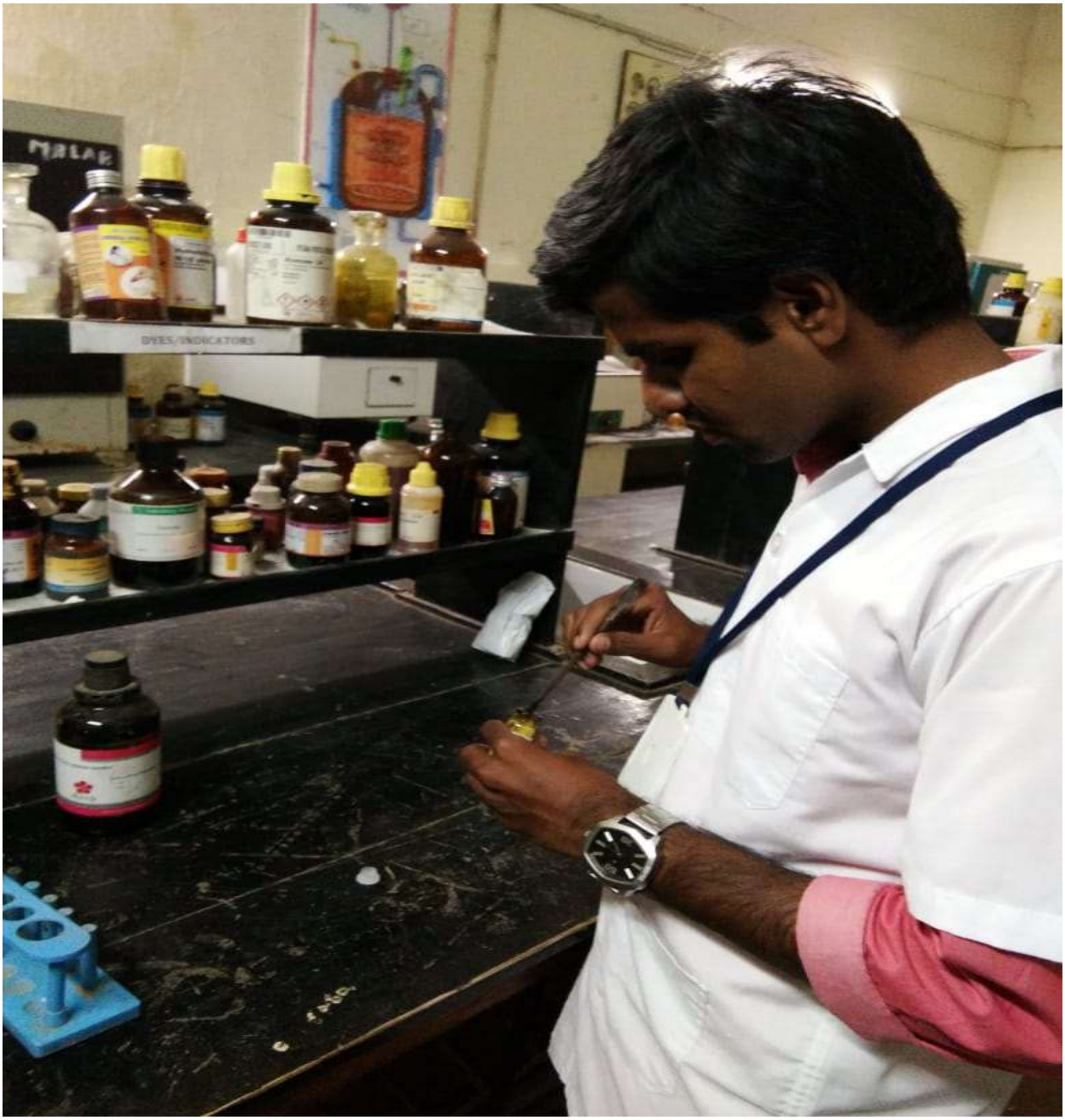
3	**A.Pranaya**	**17016058481001**	B.Sc.(BCCA)	III
4	**P. Pooja**	**17016058445028**	B.Sc.(BZC)	III
5	**J.Swetha**	**17016058457026**	B.Sc.(MZC)	III
6	**G.Sai Ganesh**	**17016058457023**	B.Sc.(MZC)	III

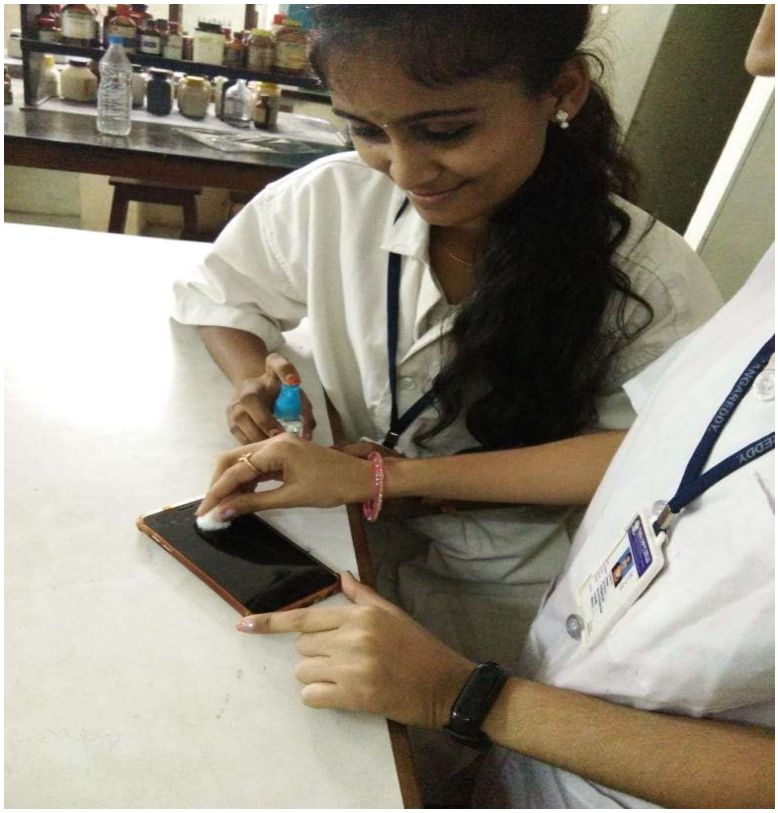
In this context, we have been used silver nanoparticles (AgNP) to coat the surfaces of both Paper currency notes and mobile phones for the prevention of microbial contamination.

From this project it is clear that AgNP coating on Paper currency notes and Mobile phone screens by using innovative modified Tollens process provide an excellent protection against microbial contamination which will be fatal in nosocomial infections caused by microorganisms in hospitals when contaminated Paper currency notes and Mobile phones handled by healthcare associates. The problem of cross contamination will be serious in patients with immunodeficiency disorders like HIV/AIDS or patients who were underwent organ transplantation to whom usually immune-depressant drugs were given. The outlook of the projects also opens new avenue for public health care aspects especially in situations

where multidrug bacterial strains like *mycobacterium tuberculi* evolved by excessive use of antibiotics. The process is very convenient, ecofriendly and economical to scale up for bulk usage.




DYES/INDICATORS



SUGGESTIONS:

Further studies should investigate the combination of AgNPs and antibiotics against resistant hospital strains for the development of new materials and substances for medical application. As "***prevention is better than cure"*** the following suggestions were made basd on this project:

- The paper currency notes should be printed with inks impregnated with the AgNP.
- Automatic Teller Machines (ATM) should be reloaded with AgNP suspension for spraying on used Paper currency notes.
- The interiors of hospitals to be painted with AgNp impregnated paints to prevent Nosocomial infections and to keep the intensive care units (ICU) hygiene and sterile.
- To prevent contagious diseases like swine flu, the public transport utilities like buses and metros to be coated with AgNP impregnated paints.
- The mobile phone screen guards to be manufactured with AgNP incorporated polymers.

PROJECT TITLE: Qualitative Analysis of Absorption of Phenolic Drugs by Oryza Sativa

Absorption of PAOM's like drugs in plants lead to multilevel biochemical combination with phyto-chemicals which further generates series of physiological changes in plants. The interaction between plants biochemical system and drugs may cause several complex compounds, further they can involve in biosynthesis of new molecules like free radicals or bio organic conjugates. In most of the cases plants do not tolerate high concentrations of the drugs and detoxification process occurs by either bio combination with plant proteins and organic acids or bio degradation of the foreign compounds (drugs) by enzymatic action.

Quantitative analysis of absorption of drugs by plants is very important aspect to study the biological fate of absorbed drugs in plants. Qualitative analysis is helpful to characterize the bio organic conjugate of drugs, Detoxification process and precursor activity of ingested drugs. Quantitative analysis of absorbed drugs by plants was manifested by spectro analytic techniques like FTIR, H^1-NMR and Mass spectroscopy. The present work aimed at study the biological fate of the drugs which were ingested in higher concentration to the plants and also focused on

distribution of drugs in various parts of plants. The Experiments were performed with *Oryza sativa L.* plants in hydroponic culturing for short duration exposure of high concentration of drugs.

The selected plant, *Oryza sativa L.* absorbs and metabolizes the drugs APAP and ASA. Extracts of *Oryza sativa L.* plants (which were treated with APAP and ASA hydroponically) were analyzed spectroscopically. The traces of APAP and ASA were detected in these extracts along with unknown metabolites of these drugs. The reports showed that drugs were absorbed by plants degraded into fragments and these fragments combined with phytochemicals to form bio-conjugates. The analytical data was not prominent to suggest any precursor activity of these drugs in the plant.

PROJECT TITLE: Electro Kinetic Enhanced Phytoremediationof ASA and APAP by *Oryza Sativa L.* plants

Electro Kinetic Enhanced Phytoremediation (EK-PR) technique is one of the reliable and efficient procedure for the phytoremediation of pollutants from aqueous medium. The scope of this method is evolving in the present scenario as remediation of pollutants becoming a challenging task. EK-PR can be coupled with variety of plants including hydrophytic and non-hydrophytic plants. In the present study modified EK-PR is coupled with Oryza Sativa L. plants (paddy plants) to remediate Acetyl Salicylic Acid (ASA) and APAP (Acetyl Para Amino Phenol) from aqueous solution. 11^{th} leaf paddy plant absorbs 6.1% more APAP and 3.1% more ASA compared to the plant incubated under 24 hours of normal conditions under EK-PR method. EK-PR(Electro Kinetic Enhanced Phytoremediation) is a bio electro restoration technique strategically designed and developed for in situ treatment of contaminated soils. The combination of EKR (Electro Kinetic Remediation) and phyto remediation enhances the effectiveness of remediation process and overcome the limitations of phyto remediation. (Hodko et.al., 2000; Bedmar et.al., 2009). This process involves action of electrolysis using low intensity electric field potential and phyto absorption of contaminants from soil. EKPR consists of application of low intensity electric field in the vicinity of plant grown in the contaminated soil. Effects of Electric field on plants characteristics was reported first by Lemstorm(1904). He stated that plants tolerate electric field, stay greener and shows an increase in yield. This experimental finding inspired to develop newer strategies of combining EKR with phytoremediation for effective environmental restoration.In the EK-PR cleaning up process of contaminants performed by plants and this process is enhanced by electric field by increasing bioavailability of contaminants.

Factors affects the efficiency of EK-PR are;

1) Use of AC/DC current

2) Voltage level

3) Frequency of voltage (continuous or periodic)

4) pH level of soil/water

5) Addition of Facilitating/ Chelating agents

In the EK-PR technology, due to applications of electric field which effectively brings large amount of soluble heavy metal ions towards plant's root system, this sometimes result stress conditions for the plants. Thus plants with high tolerance level and hyper accumulating capacity are selected for EK-PR application (Bedmar et.al., 2009). Absorption of Drugs by plants from their aqueous solutions was greatly increased by Electro-stimulation. ASA and APAP get ionized in aqueous solution and moves faster due to electro-stimulation. This might enhance probability of interaction of drug molecules and root system which leads increased absorption. The application of this knowledge in remediation of other highly toxic organic pollutants will be helpful to redesign the phyto-remediation approaches.

S.No.	Name of the Student	Roll Number	Group	Year
1	**K.Jyothsna**	**6058-20-441-037**	B.Sc.(MPC)	II
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3	**T.Vaishnavi** ***Note:*** ***Girraj Govt. College (A), Nizamabad, as a Part of MoU.***	**19055005572070**	B.Sc.(BtBC)	III

PROJECT TITLE: Impact of Paracetamol and Aspirin on germination of paddy seeds (*Oryza sativa L.)*

Morphological characters of plant are diagnostic for quantitative and qualitative study of physiological changes by exogenous and endogenous modulations. The morphological characters related to plant development include study of plant anatomy and plant physiology. The plants constantly produce new tissues and phytostructures throughout their lifespan from meristem, hence a living plant always has embryonic tissues (Bäurle et al., 2003). This aspect makes plant development differ from animals.

Morphological characteristics related to growth factors have greater attraction for studying the impact of physical factors like light, gravity etc., Growth in the plants is not only account of cell division but also due to cell elongation. Both the things are mediated by specific plant hormones and Plant Growth Regulators (PGRs) (Ross et al.,1983). Usually these PGRs produced endogenously and show their deep impact on plant morphology. Certain exogenous chemical compounds also show significant impact on plant morphology by direct interaction or modulating plant physiology.Pharmaceutical industrial effluents and drugs contaminants may also affect seed germination. The Physiologically Active Organic Molecules (PAOMs) like drugs may interact with enzyme of seeds which will play an important role in germination process. The reclaimed water from pharmaceutical industries always contains PAOMs or metabolites of drugs which will interact with seeds of the field that was shown.

In this context, it is necessary to determine how the germination process will affected by the pharmaceutical products. The current laboratory experiment was designed to determine

the effects of different concentration (01-50 ppm) of Paracetamol and Aspirin on seed germination in paddy (*Oryza sativa.L*).

There was mere research concerning the effects of pharmaceutical drugs on plant growth. The current experiment clearly indicated that Aspirin and Paracetamol showed incredible changes in morphological and vegetative parameters of *Oryza sativa L*. in many aspects. This is due to either the interaction of these Physiologically Active Organic Molecules directly with phyto-hormones /Growth Regulators or acts as growth regulators. The above said drugs gradually degraded by soil bacteria and environmental factors into their phenolic monographs (4-amino phenol in case of Paracetamol and Salicylic acid in case of Aspirin) which are more physiologically active as the polarity of functional group increases.

Students involved:

S.No.	Name of the Student	Roll Number	Group	Year
1	**S.Shirisha,**	**605819578029**	B.Sc.(MCCs)	III
2	**M.Sucharitha**	605821445067	B.Sc.(BZC)	II
3	**Deepthi** ***Note:* Girraj Govt. College (A), Nizamabad, as a Part of MoU.**	**19055005572030**	B.Sc(BtBC)	III
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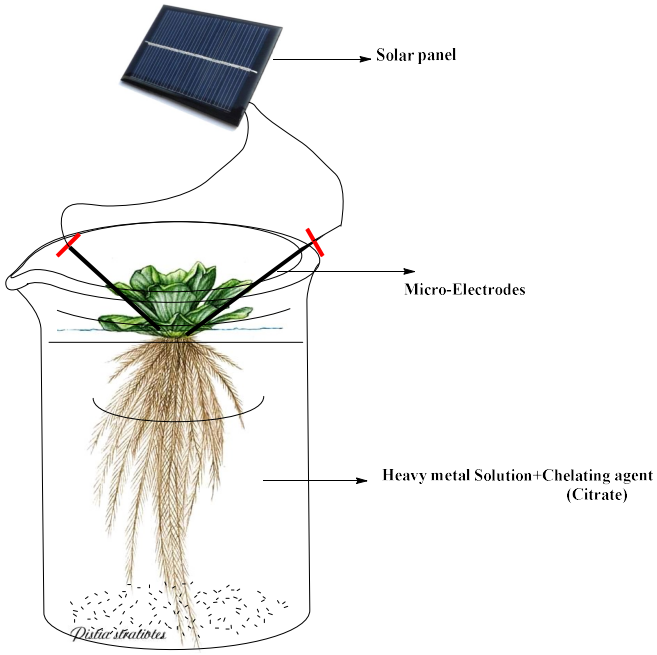
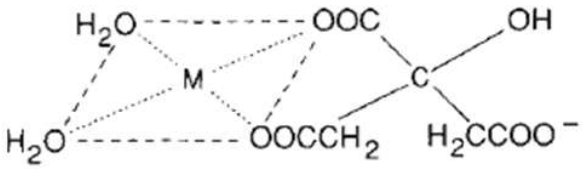
Aspirin and Paracetamol showed considerable impact on seed germination. The gradual decrease in germination of paddy seeds with concentration of Aspirin and Paracetamol, suggests that plants were very sensible to PAOM's. Even in the range of ppm, Aspirin and Paracetamol retards seed germination severely. This experiment reveals that the physiologically active organic molecules (PAOM) like drugs shows significant impact not only on animals but also on plants to various extents.

Solar Cell Induced Electro-Kinetic Enhanced Phyto-Remediation of Toxic Heavy Metal Pollutants from Water using Hydrophytic Plants

In the Current situations where Industrialization is inevitable which consequently leads to pollution of natural resources, it is necessary to design environmental protection strategies using simple natural processes by applying concepts of 'Science and Technology'. In the current project we have focused on phytoremediation of Hg and Pb from sample solutions using Citrate as a Chelating agent under the reduced pH and Electro-kinetic induction of **6V** voltage with help of light weight solar panels which acts as renewable energy sources using Hydrophytic plant, *Pistia stratiotes*. Lemon Juice extract was used to provide Citrate and to maintain reduced pH conditions. The chemistry behind this project based on concepts Coordination complexes and Electrochemistry as electrochemical pumping of charged heavy Metal-Citrate complexes into plant roots with a steady rate.



Experimetal Model of our Redesigned Electrokinetic enhanced Phyto-Remediation(Ek-PR) using Solar panels and Citrate as green Chelating Agent

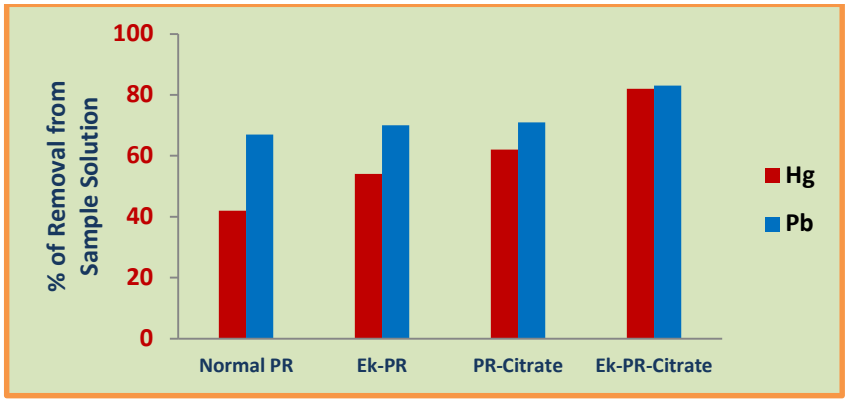


Metal-Citrate complex

The Chelated heavy metal complexes are stable and mild on plant cell hence the Phytoremediation process prolonged and maximum amount of heavy metal was removed from sample solution. The Modified Electro-kinetic enhanced Phyto-Remediation (**Ek-PR**) in

which small amount of current was passed through plants directly which enhance the heavy metal pumping into the plant. Selection of Citrate as a "Green Chelating agent" based on its chemical tendency to form stable and mobile charged Metal-Ligand complex which can be absorbed by plants under Ek-PR conditions. Reduced pH is useful to increase the mobility of heavy metal complexes and leach them from sediments and plant surfaces. Although efficiency of Ek-PR increases by using chelating agent like EDTA but at the same time these chelating agents (EDTA) shows negative impact on ecosystem and induces environmental issues.

It is evident from the results of the current research project is that the Citrate coupled Electro-kinetic Phytoremediation (Ek-PR) removes **82%** of Hg and **83%** of Pb from approximately 100ppm of heavy metal solutions in 96 hours at **5.2** pH which is nearly **40%** more in case of Hg under normal sort of Phytoremediation. Similarly Citrate coupled Ek-PR of Pb showed **16%** of increased Phytoremediation compared to normal conditions. The Strategic development of Phytoremediation plan depends on Plant's "Bio-concentration Factor (**BCF**)" value which must be greater than **1000**. In the current experiment BCF value for Hg is **1042** and for Pb it is **1164** under the Ek-PR-Citrate model. It is observed that absence of chelating agent drops the BCF value below 1000. Hence the Chelating agent is an essential aspect of Ek-PR.



The outlook of the projects also opens new avenue for Environmental protection especially in the restoration of polluted lakes and ponds using natural flora present in them like *Pistia*, *Icornia* etc. This process is very convenient, eco-friendly and economical to scale up for bulk usage. Another merit of this project is the usage of renewable energy source i.e.

solar panels for Electro-kinetic potential. This Modified Citrate coupled Ek-PR method is an effective method to remove heavy metals at higher concentrations.

Students involved:

S.No.	Name of the Student	Roll Number	Group	Year
1	**U.Kavya Sri**	**6058-19-457-028**	B.Sc.(MZC)	III
2	**E.Shivaleela**	**6058-19-457-007**	B.Sc.(MZC)	III
3	**Uroojunnisa**	**6058-19-457-029**	B.Sc.(MZC)	III
4	**Amrin**	**6058-19-457-001**	B.Sc.(MZC)	III
5	**N.Ranjitha**	**6058-19-457-013**	B.Sc.(MZC)	III

PROJECT TITLE: Innovative approach for designing and developing eco-friendly bricks from Demolition waste using Clay Chemistry

Construction and Demolition waste management (C&DWM) has become a significant environmental concern in most of the India's urban cities as the C&D W generated in India is over 150 MT and accounts for more than 40% of the global C & D waste annually (*Jain, 2021; Kolaventi et al., 2019*). To address the crucial issue we designed an innovative approach for eco-friendly bricks from Demolition waste using the simple concepts of Clay Chemistry and modified Silicate Engineering. In the present project we have used the Demolition Waste (DW), which is added to clay in different percentages to made fired micro-bricks.

In the methodology have we have made FIVE categories of Brick composition to develop an efficient prototype-design. They are namely;

1. 100% Clay-sand Mixture (**Control**)
2. 50% Clay+50% Demolition waste(**Category-I**)
3. 75% Clay+25% Demolition waste(**Category-II**)
4. 45% Clay+3% CaO+2% charcoal+ 50% Demolition waste(**Category-III**)
5. 70% Clay+3% CaO+2% charcoal+ 25% Demolition waste (**Category-IV**)

By using above said composition different categories of Micro-Bricks were molded and set them on coal furnace at 400-600^{o}C for 6hours. The hardened bricks were then analyzed for their conformation, strength and durability. The free Drop test performed to all the Brick samples to assess the material strength. In this method the dissociated weight (weight loss) of the sample was calculated by weighing the initial weight ($\mathbf{W_1}$) and final weight after impact ($\mathbf{W_2}$) and calculating the difference i.e. $\mathbf{W_1}$-$\mathbf{W_2}$. From the Drop test it is evident that Demolition waste provides strength to the Brick as it a good source of silica and calcium which plays an important role cross linking silicate formation with aluminium pyrosilicates of clay. **Category-I** sample displayed **10** times more strength compared to the control category samples which is made of normal-sand mixture.

Further addition of Charcoal and CaO provides an additional strength to the material as CaO acts as flux which facilitated the complex silicate formation during thermal treatment and

charcoal acts as filler which doped in to interstitial space of silicate frame work of brick material, due to this **Category-III** and **Category-IV** samples showed **19** and **25** times more strength compared to control.

Addition of demolition waste to clay makes bricks lighter and stronger which reflects in their densities. Adding of **50%** of demolition wastes makes brick **1.4** times lighter than control category which certainly helpful in construction strategies. While doping of CaO and Charcoal slightly increases the density due to their filler properties.

The Durability of samples was tested using Hydro-percolation and Hydro-Disintegration tests. In this method samples were suspended in distilled water for 24 hrs and calculated the weight of percolated water using following formula;

Weight of Percolated water (W_4)= Wet weight (W_3)- Initial(Dry) weight (W_1).

All the samples showed more or less similar range of Hydro-percolation properties which demonstrated the durability of bricks made up of demolition waste is equal to that of normal clay bricks. Whereas, Hydro-Disintegration test showed all the bricks samples disintegrate **12-18%** less weight compared normal clay bricks (control) after 24 hours of water suspension process. From the above experimental observations it is clear that the present project will provide an efficient and effective Construction and Demolition waste

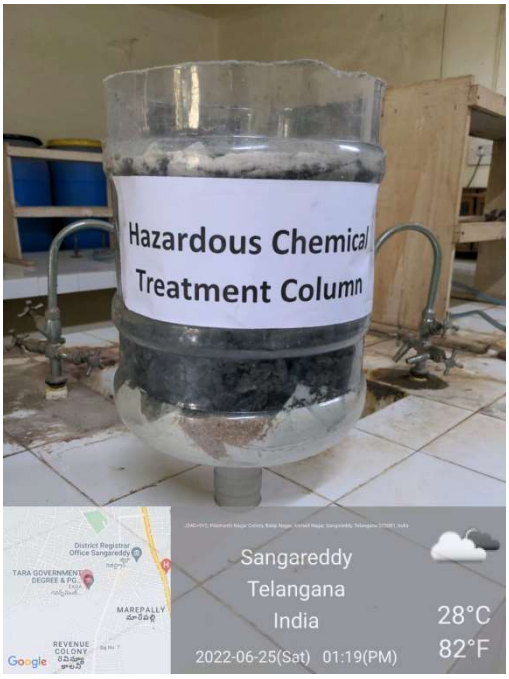
management (C&DWM) strategy.

Students involved:

S.No.	Name of the Student	Roll Number	Group	Year
1	**K.Jyothsna**	**6058-20-441-037**	B.Sc.(MPC)	III
2	**C.Eshwari**	**6058-20-441-014**	B.Sc.(MPC)	III
3	**M.Rahul**	**6058-21-578-025**	B.Sc.(MCCs)	II
4	**V.Shiva Kumar**	**6058-21-578-042**	B.Sc.(MCCs)	II
5	**J.Bhavani**	**6058-20-578-011**	B.Sc.(MCCs)	III
6	**S.Barsa**	**6058-20-578-024**	B.Sc.(MCCs)	III

PROJECT TITLE: Multilayered Adsorbent Infused Low Cost Hazardous Chemical Treatment Column

Heavy metals and other toxic hazardous chemicals found laboratory waste can be effectively treated with the innovative **MULTILAYERED ADSORBENT INFUSED LOW COST HAZARDOUS CHEMICAL TREATMENT COLUMN** developed by Chemistry students under the program of Augmented Visionary for Integrated Student Centric Activities in Research (AVISCAR).



Adsorption is a process in which solids come into contact with liquids or gases, and the mass transfer occurs from liquids to solids. Desorption is the reversal of this action. Adsorption operations take advantage of a solid's capacity to concentrate certain chemicals from a fluid on to its surface. Adsorbate refers to the adsorbed substance, while adsorbent refers to the solid substance. In the project we used waste water bubble and filled it with charcoal, quick lime, bentonite, celite, silica, clay and cellulose as multilayered adsorbents. These adsorbents

are versatile in their chemical behavior which can be used to efficient adsorb the toxic chemicals and heavy metals.

The experiments which release hazardous fumes can be performed under Low-cost Fume Hood developed and constructed by the students under **AVISCAR** Programme.

Students involved:

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1	**S.Shirisha**	**6058-19-578-029**	B.Sc.(MCCs)	III
2	**Mukthi Kanth Rout**	**6058-19-578-022**	B.Sc.(MCCs)	III
3	**N.Shiva Shankar**	**6058-19-578-025**	B.Sc.(MCCs)	III
4	**Y. Avinash Reddy**	**6058-19-578-038**	B.Sc.(MCCs)	III
5	**T.Chandana**	**6058-19-578-032**	B.Sc.(MCCs)	III
6	**K.Dheeraj Kumar**	**6058-19-578-017**	B.Sc.(MCCs)	III

PROJECT TITLE: Quantitative Analysis of Absorption of APAP and ASA by *Oryza sativa L.* plants under variable pH conditions

Plants do absorb organic compounds efficiently compared to metal ions or other ionic compounds but if the organic compounds quite soluble in water and having active polar functional groups plants can absorbs organic molecules for some extent. Usually amino acids and sugars are absorbed by root cells of plants by contransport with H^+. (Baker, 1978; Giaquinta, 1983) but the exact mechanism was still not revealed. PAOMs like drugs having reactive polar functional groups like –OH, -COOH, $-NH_2$ etc. are considerably absorbed by plant's root system. The functional groups of drugs bind with proteins of plasma membranes of root cells and initially get accumulated in roots, from there the accumulated drugs distributed to different parts of plants through phloem due to Osmotic and Pressure gradients. Absorption of APAP and ASA by *Oryza sativa L.* plants were greatly affected by pH conditions. The optimal pH for maximum absorption were observed at 6.5 for ASA and 5.5 for APAP by *oryza sativa L.* plants. The quantity of APAP absorbed by 11^{th} leaf *Oryza sativa L.* plant incubated in medium having pH around 5.5 was enhanced by 24.687 % compared to plants incubated in neutral medium (pH = 7), whereas the increase was only 1.103 %, in the case of absorption of ASA by plants under similar conditions. But at the optimal pH point for ASA absorption i.e. at 6.5 the increase in absorption was 11.067 % compare to plants incubated in neutral conditions.

Students involved:

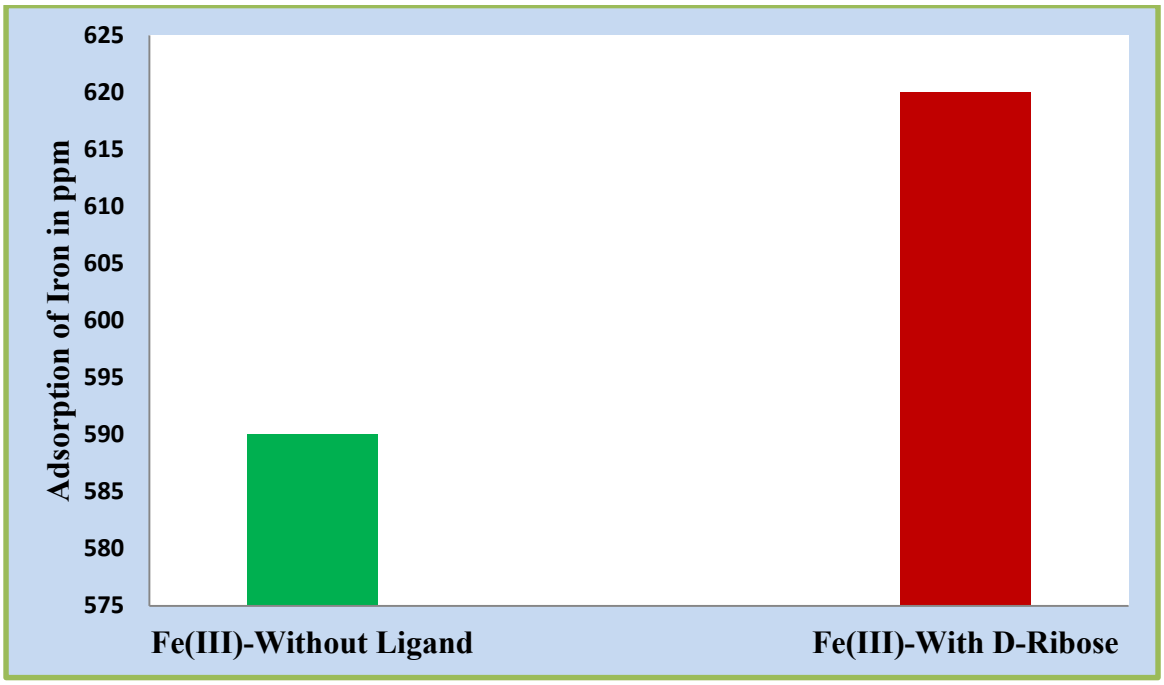
S.No.	Name of the Student	Roll Number	Group	Year
1	**G.Shirisha**	**1601-6058-441-013**	B.Sc.(MPC)	III
2	**M.Prasanna**	**1601-6058-441-028**	B.Sc.(MPC)	III
3	**S. Susma**	**1601-6058-481-035**	B.Sc.(BCCA)	III
4	**Ayesha Nazneen**	**1601-6058-441-002**	B.Sc.(MPC)	III

Series of Projects focused on Heavy Metal Remediation using Adsorption Process

PROJECT TITLE: Adsorption Studies of Fe[III] on Celite in The Presence of D-Ribose as Chelating Agent

Adsorption of heavy metals is an important strategy to develop newer remediation technologies for the sustainable environmental protection. But the efficacy of adsorption of heavy metals under the normal conditions using suitable adsorbent depends on several factors which need to be finely tuned to get efficient adsorption process. In the presence of proper facilitating agents, the adsorption of heavy metals enhanced which will certainly improves the existing heavy metal techniques. The project evaluates the impact of D-Ribose as chelating agent in the adsorption of Fe (III) from aqueous solution by Celite as an adsorbent to develop efficient remediation technology using concept of Coordination chemistry.

Celite adsorbs **620** ppm of Iron metal from aqueous solution of Fe(III)-D-Ribose metal ligand solution. Whereas, Celite adsorbs only **590** ppm when D-Ribose is absent. It is evident from the AAS results, ligand involvement enhanced the metal adsorption by initiating potential chemical interactions between adsorbate and adsorbent. D-Ribose firmly interacts with Fe(III) to form a stable complex in aqueous condition. The complex coordination sphere in the resulted complex facilitates strong interactions with the polar points of the adsorbent, Celite. From the AAS results, it is conclusive that **5.08** % of adsorbtion increased in the presence of D-Ribose as chelating agent.



Impact of D-Ribose on Adsorption of Fe (III) ions from aqueous solution by Celite

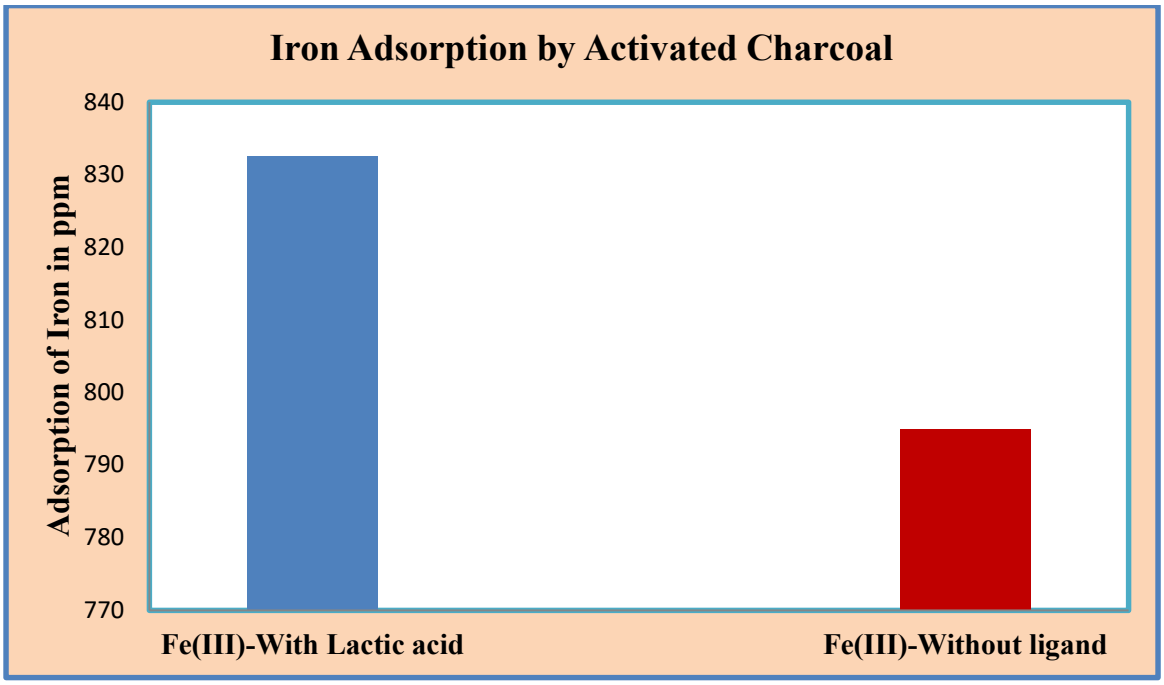
Students involved:

S.No.	Name of the Student	Roll Number	Group	Year
1	**S.SHIRISHA**	605819578029	B.Sc (MCCs)	III
2	**A.LAVANYA**	605819578002	B.Sc (MCCs)	III
3	**T.PRASANNA LAXMI**	605819578031	B.Sc (MCCs)	III
4	**S.ALEKHYA**	605819578028	B.Sc (MCCs)	III
5	**K.MANASA**	605819578015	B.Sc (MCCs)	III
6	**B.SRAVANI**	605819578006	B.Sc (MCCs)	III

PROJECT TITLE: Adsorption Studies of Fe[III] on Activated Charcoal in the presence of Lactic Acid as Chelating Agent

Adsorption of heavy metals is a key development approach for more advanced remediation technologies for the preservation of the environment. However, the effectiveness of heavy metal adsorption under typical conditions using a good adsorbent depends on a number of variables that must be precisely adjusted to get an effective adsorption process. The adsorption of heavy metals was boosted in the presence of suitable facilitating agents, which undoubtedly improved the heavy metal procedures already in use. The project evaluates the impact of Lactic acid as chelating agent in the adsorption of Fe (III) from aqueous solution by activated charcoal as an adsorbent to develop efficient remediation technology using Metal-ligand interactions.

Activated charcoal adsorbed **832.5** ppm of Iron metal from aqueous solution of Fe(III)-Lactic acid metal ligand solution. Whereas, Activated charcoal adsorbed only **795.0** ppm when Lactic acid is absent. It is evident from the AAS results, ligand involvement enhanced the metal adsorption by initiating potential chemical interactions between adsorbate and adsorbent. Lactic acid strongly form coordination bonding with Fe(III) to form a soluble complex in aqueous solution. The ligand capped Fe(III) complex strongly adsorbed to Activated charcoal by establishing chemical bonding. From the AAS results, it is conclusive that **4.71** % of adsorption increased in the presence of Lactic acid as chelating agent.



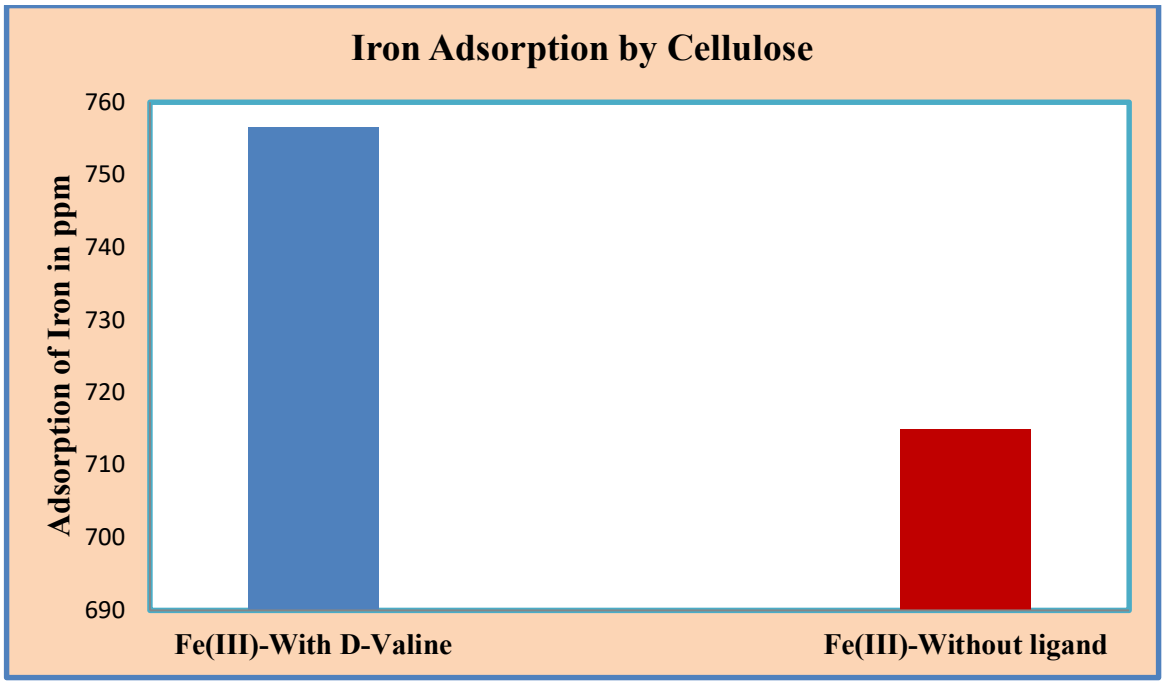
Impact of Lactic acid on Adsorption of Fe (III) ions from aqueous solution by Activated Charcoal

Students involved:

S.No.	Name of the Student	Roll Number	Group	Year
1	**MukthiKanth Rout**	6058-19-578-022	B.sc - MCCS	III
2	**S. Raja Ramesh**	6058-19-578-030	B.sc - MCCS	III
3	**P. Sujil Kumar**	6058-19-578-027	B.sc - MCCS	III
4	**Ch. Srinivas**	6058-19-578-008	B.sc - MCCS	III
5	**B. Mahesh Kumar**	6058-19-578-004	B.sc - MCCS	III
6	**B. NikhileshBabu**	6058-19-578-005	B.sc - MCCS	III

PROJECT TITLE: Adsorption of Fe[III] on Cellulose using D-Valine as Facilitating Agent

Cellulose can be used for adsorption of heavy metals owing to its polyhydric functional groups which will be a fetching tool to develop eco-friendly remediation strategy. Mean while, there is a need to improve the adsorption efficacy of cellulose by the incorporation of facilitating agents to design and develop standardized heavy metal remediation technology. For this purpose organic ligands will be useful to bring the metal-adsorbent linkages by stabilizing the metal complexes which will bind to the adsorbent more covalently. The project evaluates the impact of D-Valine as facilitating agent in the adsorption of Fe (III) from aqueous solution by Cellulose as an adsorbent to develop efficient remediation technology using concept of Coordination chemistry. From an aqueous solution of the metal ligand solution Fe(III)-D-Valine, Cellulose absorbed **756.5**ppm of iron. When D-Valine is absent, Cellulose only absorbed **715.0**ppm. The AAS data clearly show that the addition of ligands improved the metal adsorption by triggering possible chemical interactions between the adsorbent and adsorbate. Strong coordination bonds between D-Valine and Fe(III) result in the formation of a soluble complex in aqueous solution. By creating chemical bonds, the ligand-capped Fe(III) complex firmly adhered to Cellulose. The AAS data clearly show that **5.804**% more adsorption occurred when D-Valine was included as a chelating agent.



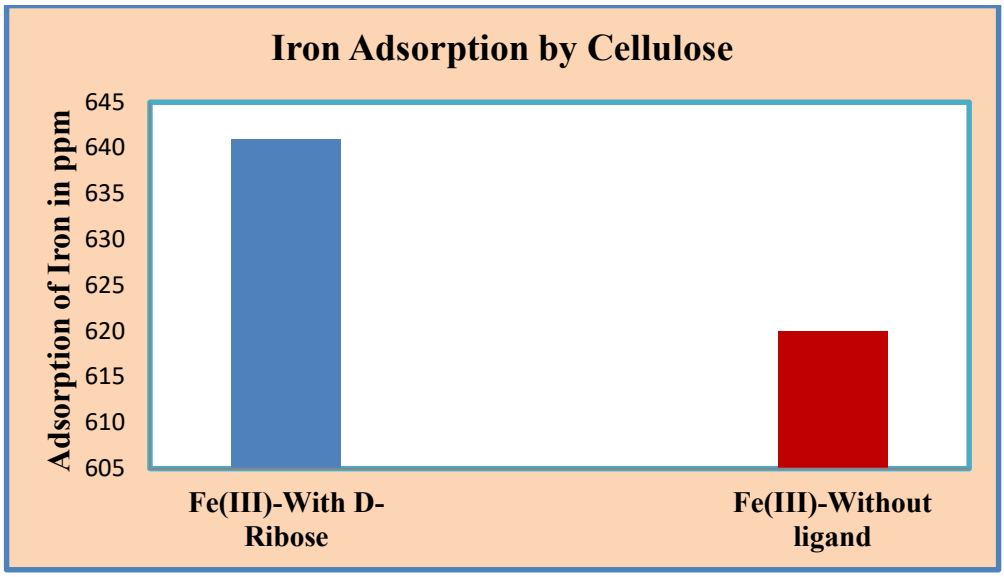
Impact of D-Valine on Adsorption of Fe (III) ions from aqueous solution by Cellulose.

Students involved:

S.No.	Name of the Student	Roll Number	Group	Year
1	**K.Dheeraj Kumar**	605819578017	BSc MCCs	III
2	**G.Laxmi kanth**	605819578012	BSc MCCs	III
3	**K.Narasimha**	605819578016	BSc MCCs	III
4	**G.Omkar**	605819578014	BSc MCCs	III
5	**D.Anil**	605819578009	BSc MCCs	III
6	**A.Jeremiah**	605819578001	BSc MCCs	III

PROJECT TITLE: Analysis of Adsorption of Fe[III] on Cellulose using D-Ribose as a Chelating Agent

Due to its polyhydric functional groups, cellulose may be utilised to adsorb heavy metals, making it a valuable tool for developing environmentally acceptable remediation methods. The adsorption efficiency of cellulose must be increased in the interim by the addition of facilitating agents in order to design and create standardised heavy metal remediation technology. By stabilising the metal complexes that will more strongly bind to the adsorbent, organic ligands will be helpful for this aim in bringing the metal-adsorbent connections. The project evaluates the impact of D-Ribose as chelating agent in the adsorption of Fe (III) from aqueous solution by Cellulose as an adsorbent to develop efficient remediation technology using concept of Coordination chemistry. Cellulose adsorbs **641** ppm of Iron metal from aqueous solution of Fe(III)-D-Ribose metal ligand solution. Whereas, Cellulose adsorbs only **620** ppm when D-Ribose is absent. It is evident from the AAS results, ligand involvement enhanced the metal adsorption by initiating potential chemical interactions between adsorbate and adsorbent. D-Ribose firmly interacts with Fe(III) to form a stable complex in aqueous condition. The complex coordination sphere in the resulted complex facilitates strong interactions with the polar hydroxyl functional groups of the adsorbent, Cellulose. From the AAS results, it is conclusive that **3.387** % of adsorbtion increased in the presence of D-Ribose as chelating agent.



Impact of D-Ribose on Adsorption of Fe (III) ions from aqueous solution by Cellulose.

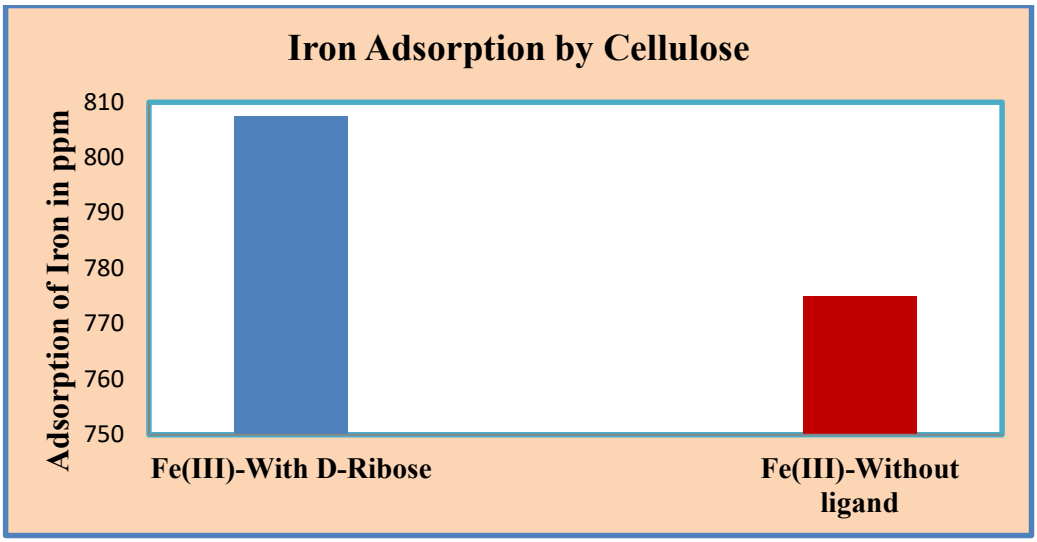
Students involved:

S.No.	Name of the Student	Roll Number	Group	Year
1	**N.Shiva shankar**	6058-19-578-025	B.Sc (MCCS)	III
2	**K.Rahul**	6058-19-578-019	B.Sc (MCCS)	III
3	**L.Sai ram goud**	6058-19-578-020	B.Sc (MCCS)	III
4	**M.Arjun**	6058-19-578-021	B.Sc (MCCS)	III
5	**M.Madhav**	6058-19-578-024	B.Sc (MCCS)	III
6	**M.Binesh**	6058-19-578-023	B.Sc (MCCS)	III

PROJECT TITLE: Adsorption Studies of Fe[III] on Bentonite in the presence of D-Ribose as Chelating Agent

Adsorption of heavy metals is an important strategy to develop newer remediation technologies for the sustainable environmental protection. But the efficacy of adsorption of heavy metals under the normal conditions using suitable adsorbent depends on several factors which need to be finely tuned to get efficient adsorption process. In the presence of proper facilitating agents, the adsorption of heavy metals enhanced which will certainly improves the existing heavy metal techniques. The project evaluates the impact of D-Ribose as a chelating agent in the adsorption of Fe (III) from aqueous solution by Bentonite as an adsorbent to develop efficient remediation technology using concept of Coordination chemistry.

Bentonite adsorbs **807.5ppm** of Iron metal from aqueous solution of Fe(III)-D-Ribose metal ligand solution. Whereas, Bentonite adsorbs only **775.0ppm** when D-Ribose is absent. It is evident from the AAS results, ligand involvement enhanced the metal adsorption by initiating potential chemical interactions between adsorbate and adsorbent. D-Ribose firmly coordinates with Fe(III) to form a stable complex in aqueous condition. The complex coordination sphere in the resulted complex facilitates strong interactions with the polar points of Bentonite. From the AAS results, it is conclusive that **4.193%** of adsorbtion increased in the presence of D-Ribose as chelating agent.



Impact of D-Ribose on Adsorption of Fe (III) ions from aqueous solution by Bentonite.

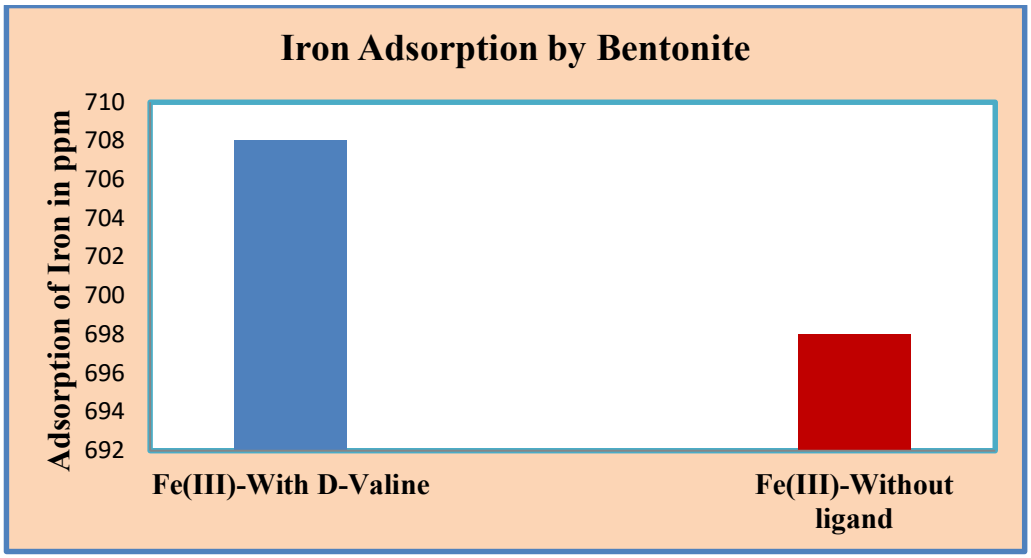
Students involved:

S.No.	Name of the Student	Roll Number	Group	Year
1	**T.Chandana**	6058-19-578-032	B.Sc(MCCs)	III
2	**T.Pranay Kumar**	6058-19-578-033	B.Sc(MCCs)	III
3	**T.Shiva Charan**	6058-19-578-034	B.Sc(MCCs)	III
4	**N.Sai Mahesh**	6058-19-578-026	B.Sc(MCCs)	III
5	**T.Raghavendra**	6058-19-578-035	.Sc(MCCs)	III

PROJECT TITLE: Adsorption Studies of Fe[III] on Bentonite in the presence of D-Valine as Chelating Agent

Adsorption of heavy metals is an important strategy to develop newer remediation technologies for the sustainable environmental protection. But the efficacy of adsorption of heavy metals under the normal conditions using suitable adsorbent depends on several factors which need to be finely tuned to get efficient adsorption process. In the presence of proper facilitating agents, the adsorption of heavy metals enhanced which will certainly improves the existing heavy metal techniques. The project evaluates the impact of D-Valine as a chelating agent in the adsorption of Fe (III) from aqueous solution by Bentonite as an adsorbent to develop efficient remediation technology using concept of Coordination chemistry.

Bentonite adsorbs **708.0ppm** of Iron metal from aqueous solution of Fe(III)-D-Valine metal ligand solution. Whereas, Bentonite adsorbs only **698.0ppm** when D-Valine is absent. It is evident from the AAS results, ligand involvement enhanced the metal adsorption by initiating potential chemical interactions between adsorbate and adsorbent. D-Valine firmly coordinates with Fe(III) to form a stable complex in aqueous condition. The complex coordination sphere in the resulted complex facilitates strong interactions with the polar points of Bentonite. From the AAS results, it is conclusive that **1.432%** of adsorbtion increased in the presence of D-Valine as chelating agent.



Impact of D-Valine on Adsorption of Fe (III) ions from aqueous solution by Bentonite.

Students involved:

S.No.	Name of the Student	Roll Number	Group	Year
1	**V. Prashanth**	**6058-19-578-036**	B.Sc.(MCCs)	III
2	**V. Aravind**	**6058-19-578-037**	B.Sc.(MCCs)	III
3	**Y. Avinash Reddy**	**6058-19-578-038**	B.Sc.(MCCs)	III
4	**Y. Shashi Pranay**	**6058-19-578-039**	B.Sc.(MCCs)	III
5	**D. Sai Kiran**	**6058-19-578-010**	B.Sc.(MCCs)	III
6	**K.Prashanth Reddy**	**6058-19-578-018**	B.Sc.(MCCs)	III

List of On-Going Projects:

1. **Development of Strategy for Remediation of Cr (VI) using Organic acid infused adsorbents.**
2. **Adsorption studies of Cr (III) from aqueous samples using Natural carboxylic acids assisted adsorbents.**
3. **Innovative approach for designing and developing eco-friendly bricks from Demolition waste using Clay Chemistry.**
4. **Impact of Natural carboxylic acid infusion on adsorbents for effective adsorption procedure for Mn (VII) ions.**
5. **Absorption studies of Fe+2 on carboxylic acid infused adsorbents.**
6. **Study of absorption capacity of Fe+3 on natural carboxylic acid permeated adsorbents.**
7. **Absorption studies of metal ions on active carbons prepared from pyrolysis of Almond shell.**
8. **MD study on Diffusion coefficient of water with varying Temperature.**
9. **MD Study on Diffusion coefficient of Methanol with varying Temperature.**

Program Coordinator: Dr.Abhijit Kantankar

CATALYST
Centre For Advanced Teaching and Learning Yields By Students of Tara

Centre for Advanced Teaching And Learning Yields by Students of Tara

Department of Chemistry has started an innovative program called **CATALYST** (Centre for Advanced Teaching And Learning Yields by Students of Tara) under which group of Teacher-students design and prepares students friendly learning modules. This program also provides the content for curricular and co-curricular activities to create enthusiasm in the chemistry subject. Students with different intellectual levels were segregated and make them two groups. The group of students with fast learning capabilities and academically strengthened records will act as a peer-teacher group which provides the support to the other group in which students are academically backward. The peer teacher group clarified the fundamental doubts of the slow learners and prepares them for upcoming classes and assessments. The catalyst program also prepared teaching modules like ICT enabled PPTs and Charts and models. Further Peer-Learning has been expanded with collaboration with IIT-Hyderabad under PMRF scheme. **CATALYST** also provide suggestions for the preparation of standard teaching plans like online content links of various open source teaching platforms for effective learning tools for out-side class room support to the low achievers. **CATALYST** also identifies the **CFD** (Concept, Formulae & Definitions) of the various topics for effective learning methodology. In the pandemic situation catalyst plays a significant role in peer learning by using online platforms like zoom for allied curricular transfer.

Some of the innovative activities under CATALYST Programme are detailed below;

Title of the activity:

RANGOLI COMPETITION FOR CREATING INTEREST IN CHEMISTRY

Context:

Rangoli is an art form, originating in the Indian subcontinent, in which patterns are created on the floor or the ground using materials such as colored rice, dry flour, colored sand or flower petals. It is usually made during Diwali or Tihar, Onam, Pongal and other Hindu festivals in the Indian subcontinent. Designs are passed from one generation to the next, keeping both the art form and the tradition alive.

The purpose of rangoli is decoration, and it is thought to bring good luck. Design depictions may also vary as they reflect traditions, folklore, and practices that are unique to each area. It is

traditionally done by girls or women. Generally, this practice is showcased during occasions such as festivals, auspicious observances, marriage celebrations and other similar milestones and gatherings. Rangoli designs can be simple geometric shapes, deity impressions, or flower and petal shapes (appropriate for the given celebrations), but they can also be very elaborate designs crafted by numerous people. The base material is usually dry or wet powdered rice or dry flour, to which sindoor (vermilion), haldi (turmeric) and other natural colours can be added. Chemical colors are a modern variation. Other materials include colored sand, red brick powder and even flowers and petals, as in the case of flower rangolis.

In this context, Department of chemistry have conducted "Rangoli competition" to create interest in chemistry by using this art form as a media of expressing views of students.

Objective of the Program:

To create interest in chemistry through rangoli as medium of innovative expression.

Date: 7th February 2019.

Nature of the Activity: Rangoli Pattern Designing using Colors.

Coordinator of the Activity: **K.Abhijit, Head of the Department.**

Number of Students participated: 24

COMPETITION PROFILE DESCRIPTION

Rangoli-1:

Participants: G.Sirisha, B.Sc.(MPC-III)
S. Sushma, B.Sc.(BCCA-III)
T. Anitha, B.Sc.(MPC-III)
P. Shashank, B.Sc.(BCCA-III)

Description:

Shirisha and team expressed ion exchange chromatography through their rangoli, in which they have explained metal ions separation indicated by their original colors in rangoli. They have also drawn naphthalene and camphor chemical structure with Naphthalene and camphor balls. The rangoli was beautifully decorated with lights and flowers which attracts most of the viewers and brought their attention in chemistry which reflected in their art form.


1

Rangoli-2:

Participants: M. Saikiran, B.Sc.(BZC-III),
K. Vikram, B.Sc.(BZC-III),
B. Pavan, B.Sc.(BZC-III),
S. Mohan Raj, B.Sc.(BZC-III),
T. Sushma, B.Sc.(BZC-III),
T. Sujatha, B.Sc.(BZC-III),
M. Mounika, B.Sc.(BZC-III),
P. Maheshwari, B.Sc.(BZC-III)

Description:

Saikiran and team viewed their ideas through rangoli using aromatic rings and lab glass ware like columns, beakers and round bottom flasks which indicated chemistry, along with structures of Chlorophyll and hemoglobin. This represents their group i.e. BZC as Chlorophyll indicates Botany (B), Hemoglobin indicates Zoology (Z) and Glass ware indicates Chemistry(Z). Their creativity was appreciated by viewers.


CH=CH2
CH3
CH2
CH2
COOH
OCH3

Rangoli-3:

Participants: V. Shobha, B.Sc.(MPC-III),
G. Mounika, B.Sc.(MZC-III),

Description:

Shobha and team viewed their ideas through rangoli using aromatic phenol rings embedded in Lotus flowers. Their rangoli art form was inspired by pairing of electrons and orbital lobes. The rangoli was beautifully decorated with colors and symmetrical proportions of chemical structures.


CHEMISTRY

Rangoli-4:

Participants: M. Prasanna, B.Sc.(MPC-III),
R. Manjula, B.Sc.(MPC-III),

Description:

Prasanna and team viewed their ideas through rangoli using aromatic naphthalene rings embedded in Hexagonal benzene ring. Their rangoli art form was inspired by spinning of electrons and orbital lobes. The rangoli also consists glass ware and different heterocycles. The rangoli was beautifully decorated with colors and lights which attracts viewer's attention.

Rangoli-5:

Participants: D.Mounika, B.Sc.(MZC-III),
S. Srilatha, B.Sc.(MZC-III),

Description:

Mounika and team viewed their ideas through rangoli using neuro transmitter Dopamine structures and lab glass ware like conical flasks and glass rods along with overlapping of orbitals to form sigma(σ) and pi(π) bonds with symmetrical pattern mixed with ribose sugar molecules. The overall combination of structures and colors made rangoli beautiful and receives viewers

appreciation.

Rangoli-6:

Participants: M. Sushmaswaraj, B.Sc.(MZC-III),
K.Priyanka, B.Sc.(MZC-III),

Description:

Sushmaswaraj and team viewed their ideas through rangoli using physical chemistry concepts like electrolysis using voltaic cells and the clock embedded at the centre has a dial in which numbers expressed by elements which has same atomic number to which they are represents. The color combinations and outlines of the patterns were perfectly balanced.

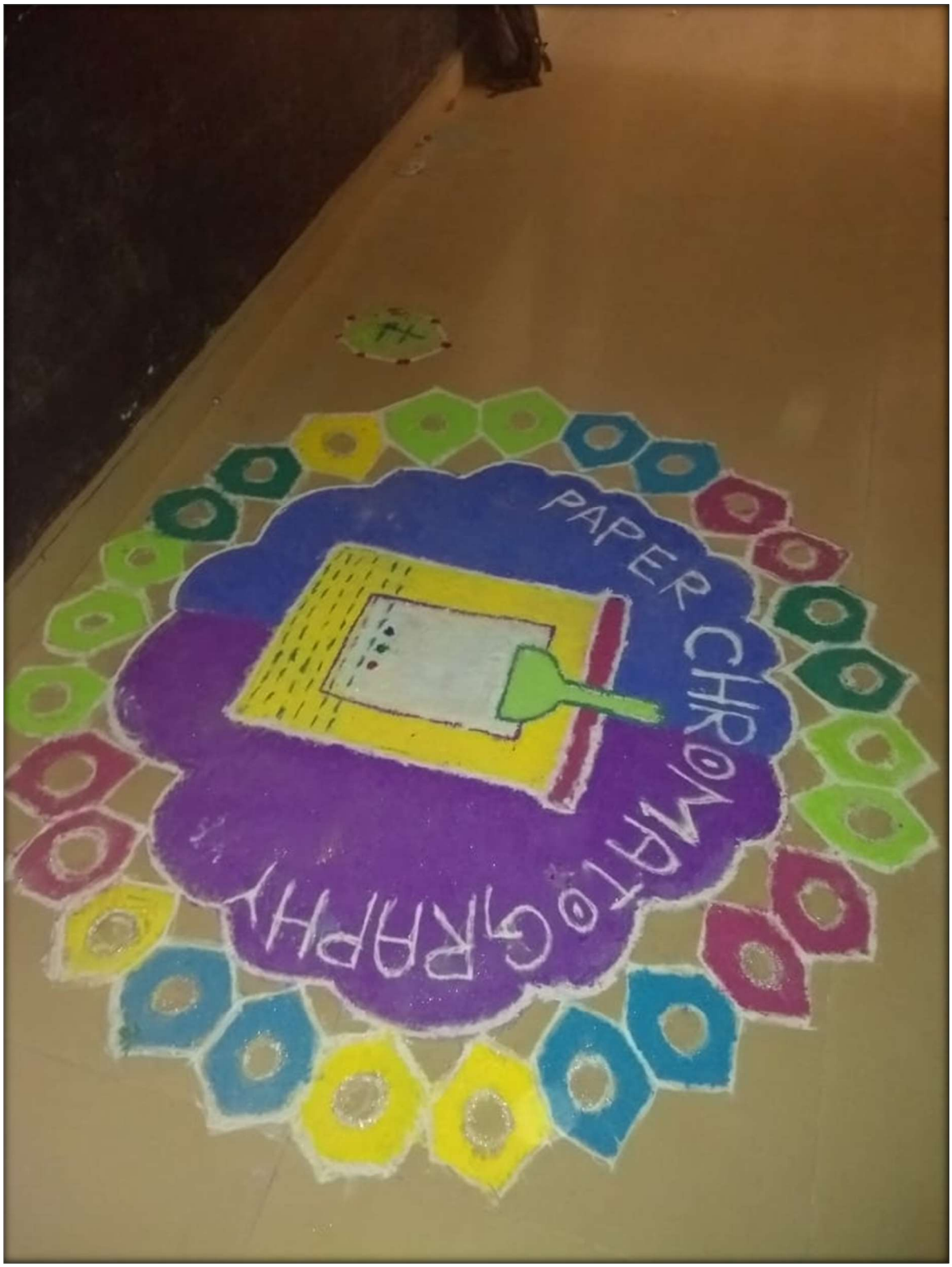

Ne
Na
Mg
H
F
Li
O
N
C
B
Be

Rangoli-6:

Participants: Juweria Amena, B.Sc.(MPC-III),
Ayesha Nazneen, B.Sc.(MPC-III),
Tehreen Begum, B.Sc.(MPCs-III),
Ayesha Afreen, B.Sc.(MPCs-III),

Description:

Juweria and team expressed their views in rangoli using concepts of chromatography. The rangoli has paper chromatography setup which is surrounded by hexagonal aromatic rings in a consecutive manner decorated with different colors. The color combinations and outlines are perfectly designed.


PAPER CHROMATOGRAPHY

PRESS COVERAGE

విద్యార్థుల వినూత్న ప్రయోగం

కొండాపూర్(సంగారెడ్డి): రసాయన శాస్త్రంపై ఆసక్తిని పెంపొందించేందుకు సంగారెడ్డిలోని తారా ప్రభుత్వ కళాశాల విద్యార్థులు గురువారం రసాయన శాస్త్రానికి సంబంధించిన సమీకరణలు, నిర్మాణాలతో ముగ్గుల ద్వారా వినూత్న ప్రయోగం చేశారు. ఈ సందర్భంగా విద్యార్థులు మాట్లాడుతూ ఇలాంటి వినూత్న ప్రయోగాలు చేయడం వల్ల విద్యార్థులకు సృజనాత్మకతతో పాటు శాస్త్ర విజ్ఞానంపై అవగాహన పెరుగుతుందని తెలిపారు. ఇందులో భాగంగా ద్రావణంలోని వివిధ అయాన్‌లను, విభజనను అయాన్ వినిమయ క్రోమటోగ్రఫీ ద్వారా వేరు చేయడాన్ని ప్రత్యేకంగా ఆయా అయాన్‌ల రంగులను ఉపయోగించి ప్రయోగం చేశారు. క్రోమియం(ఆకుపచ్చ), ఫెర్రిక్(పసుపు), కోబాల్ట్ (ఆరెంజ్), మాంగనీస్(పింక్) వంటి అయాన్‌లు సహజసిద్ధంగా పరికల్పన

ముగ్గుల రూపంలో రసాయన సమీకరణలు వేస్తున్న తారా కళాశాల విద్యార్థులు

చేస్తూ ముగ్గుల రూపంలో ప్రదర్శించారు. అదే విధంగా నాఫ్తలిన్ బాల్స్, కర్పూరం గుళికలను ఉపయోగించి ముగ్గులు వేశారు. ఈ కార్యక్రమంలో తారా కళాశాల విద్యార్థులు శిరీష, సుష్మ, శశాంక్, అనిత తదితరులు పాల్గొన్నారు

'తారా'లో చారిత్రక ప్రదర్శన

సంగారెడ్డి అర్బన్, ఫిబ్రవరి 7 : సంగారెడ్డిలోని తారా డిగ్రీ కళాశాలలో చరిత్ర విభాగం ఆధ్వర్యంలో చారిత్రక ప్రదర్శనను గురువారం నిర్వహించారు. దేశంలోని ఢిల్లీ సుల్తాన్, మొగలుల వాస్తు కళ, ఆలయాల కట్టడి, నమూనాలను కళ్లకు కట్టినట్లు ప్రదర్శించారు. చారిత్రక ప్రదర్శనను ప్రిన్సిపాల్ చంద్రముఖర్జీ తిలకించారు. ఈ కార్యక్రమంలో అధ్యాపకులు, విద్యార్థులు పాల్గొన్నారు.

సంగారెడ్డిలోని తారా ప్రభుత్వ కళాశాలలో రసాయన నిర్మాణాలు, ప్రయోగ పద్ధతులను ముగ్గుల రూపంలో ప్రదర్శించిన విద్యార్థులు

Title of the activity:

MY FAVORITE ELEMENT

Elocution competition

Context:

The United Nations General Assembly during its 74th Plenary Meeting proclaimed 2019 as the International Year of the Periodic Table of Chemical Elements (IYPT 2019) on 20 December 2017. Based on the 202 EX/Decision 43, the IYPT2019 was adopted by the UNESCO General Conference at its 39th Session (39 C/decision 60).

1869 is considered as the year of discovery of the Periodic System by the Russian scientist, Dmitri Mendeleev. The IYPT 2019 also commemorates the 150th anniversary of the establishment of the Periodic Table of Chemical Elements. The International Year aims to recognize the importance of the Periodic Table of Chemical Elements as one of the most important and influential achievements in modern science reflecting the essence not only of chemistry, but also of physics, biology and other basic sciences disciplines.

The IYPT 2019 is an opportunity to reflect upon many aspects of the periodic table, including its history, the role of women in research, global trends and perspectives on science for sustainable development, and the social and economic impacts of this field.

In this connection, the Department of Chemistry has conducted elocution competition on “MY FAVORITE ELEMENT”. In this activity students have expressed their views about their favorite element and defend them with the knowledge of chemical concepts related to the particular Chemical element of the periodic table.

Objective of the Program:

To create awareness on multifaceted applications of chemical elements in day to day life.

Date: 17th February 2019.

Nature of the Activity: Elocution.

Coordinator of the Activity: **K.Abhijit, Head of the Department.**

Number of Students participated: 14

Winner: **1. First Prize: G. Shirisha B.Sc.MPC-III-EM**

2. Second Prize: P. Sashank, B.Sc.BCCA-III-EM


DEPARTMENT OF


DEPARTMENT OF CHEMISTRY

PRESS COVERAGE

యునెస్కో పరిపర్తన పట్టికకు 150 వసంతాలు

సంగారెడ్డి చౌరస్తా: యునెస్కో పరివర్తన పట్టికను రూపొందించి 150 సంవత్సరాలు పూర్తయిన సందర్భంగా యునెస్కో ఈ ఏడాదిని అంతర్జాతీయ ఆవర్తనా పట్టిక సంవత్సరంగా ప్రకటించిందని తారా డిగ్రీ కళాశాల రసాయన శాస్త్ర విభాగధిపతి డాక్టర్ అభిజిత్ తెలిపారు. ఈ మేరకు యునెస్కో సంవత్సరాన్ని పురస్కరించుకొని బుధవారం కళాశాలలో 'నా ఇష్టమైన మూలకం' అనే అంశంపై రసాయన మూలకాల ప్రాముఖ్యత, అనువర్తనాల గురించి విద్యార్థులకు అవగాహన కల్పించారు. ఈ కార్యక్రమంలో కళాశాల ప్రిన్సిపాల్ డాక్టర్ చంద్రముఖర్జీ, కళాశాల అధ్యాపకులు కె శ్రీధర్, రవికుమార్, మనోజ్‌కుమార్, శ్రావణి, శివదీప్తి, రాంబాబు, రాధా, విద్యార్థులు పాల్గొన్నారు.

Title of the Activity:

CHEMICAL ELEMENT'S MANUAL

through

DIGITAL ASSIGNMENTS ON ELEMENTS OF PERIODIC TABLE

On the Occasion of

2019 - International Year of the Periodic Table of Chemical Elements

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Under

Centre for Advanced Teaching And Learning Yields by Students of Tara

ABOUT THE ACTIVITY

The United Nations General Assembly during its 74th Plenary Meeting proclaimed 2019 as the International Year of the Periodic Table of Chemical Elements (IYPT 2019) on 20 December 2017. Based on the 202 EX/Decision 43, the IYPT2019 was adopted by the UNESCO General Conference at its 39th Session (39 C/decision 60).

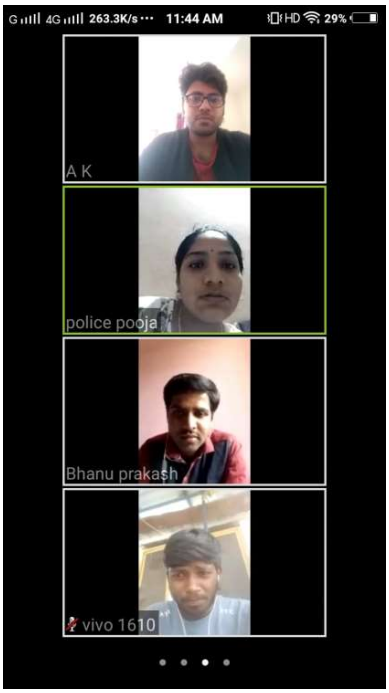
1869 is considered as the year of discovery of the Periodic System by the Russian scientist, Dmitri Mendeleev. The IYPT 2019 also commemorates the 150th anniversary of the establishment of the Periodic Table of Chemical Elements. The International Year aims to recognize the importance of the Periodic Table of Chemical Elements as one of the most important and influential achievements in modern science reflecting the essence not only of chemistry, but also of physics, biology and other basic sciences disciplines.

The IYPT 2019 is an opportunity to reflect upon many aspects of the periodic table, including its history, the role of women in research, global trends and perspectives on science for sustainable development, and the social and economic impacts of this field.

In this connection, the Department of Chemistry has conducted Digital Assignments on Elements of Periodic Table under CATALYST program. Students have developed content of different elements which includes their Discovery, Properties and Applications. This content used as study manual for students as a Learning Module.

Name of the Activity:

Peer-Teaching to the Slow Learners in the Pandemic Situation



In the pandemic situation students with good communication and presentation skills with good academic excellence were selected and trained for conducting "**ONLINE TEACHING and DOUBT CLARIFICATION**" sessions using with **SMALL PEER GROUPS** using user friendly Zoom platform under the **CATALYST** program. This activity exclusively designed for identified slow learners, as they feel inferior to ask doubts on basic concepts but they feel comfortable in the small peer groups with good friendly atmosphere. This activity helped us to achieve good results in the final examinations.

The details of **Online Peer Learning Sessions conducted by the Students** under **CATALYST** program are as follows:

S.No.	Name of the Student who conducted the Online Session	Roll No.	Group/Class	Topic Covered	No. of Students participated
1	**Adiki Pranaya**	605817481001	BSc-BCCA-III	Concepts of Medicinal Chemistry	9
2	**Jarupla Manjulatha**	605817457025	BSc-MZC-III	Enzyme Inhibition	12
3	**Jonnada Swetha**	605817457026	BSc-MZC-III	ADMET	10
4	**Ankam Bhanu Prakash**	605817445001	BSc-BZC-III	Molecular Binding points in Drug	10
5	**Madgul Sneha Reddy**	605817445018	BSc-BZC-III	Drug Synthesis	12
6	**Maloth Swathi**	605817445020	BSc-BZC-III	Drug Synthesis	12
7	**Police Pooja**	605817445028	BSc-BZC-III	Harmones	10
8	**Muthkani Pooja**	605817445022	BSc-BZC-III	Vitamines	9
9	**Shameem**	605817445035	BSc-BZC-III	Neuro-transmitters	12
10	**Chavan Nanditha**	605817481005	BSc-BCCA-III	Molecular Messengers	10

Name of the Activity:

Active Learning through ICT Content Development by Students

The main objective of the **CATALYST** program is "*the active participation of students in curricular design and development*". In order to fulfill this aspect, students prepared PPTs learning friendly PPTs on critical topics of Chemistry by taking the help of effective feedback especially from slow learners. These PPTs were utilized in curricular enrichment by the faculty. Program Coordinator of **CATALYST** provided additional inputs in the development of the ICT through power point presentations. This activity provided strong and efficient peer learning platform. It also inculcates "*Critical Thinking Abilities*" among the Students.

The following are the Power Point Presentations prepared by the students under **CATALYST** program:

S.No.	Name of the Student	Roll Number	Group	Academic Year	Topic on which PPT prepared
1	**Maloth Sai Kiran Kumar**	605816445019	BSc-BZC-III	2018-19	Carbonyl Compounds
2	**Thammali Sushma**	605816445034	BSc-BZC-III	2018-19	Hydroxy Compounds & Ethers
3	**Toorpu Sujatha**	605816445035	BSc-BZC-III	2018-19	Chemistry of d-block elements
4	**Ayesha Nazneen**	605816441002	BSc-MPC-III	2018-19	p-Block Elements-I

5	**Gajjela Shirisha**	605816441013	BSc-MPC-III	2018-19	Chemistry of Zero Group
6	**Jamalpur Vaishnavi**	605816441018	BSc-MPC-III	2018-19	Theory Quantitative Analysis
7	**Juveria Amena**	605816441019	BSc-MPC-III	2018-19	Carbanions
8	**Lakhavath Srilatha**	605816441026	BSc-MPC-III	2018-19	Chemical Bonding
9	**Machagoni Prasanna**	605816441028	BSc-MPC-III	2018-19	Chemistry of f-Block Elements
10	**A Ashwini**	605816481001	BSc-BCCA-III	2018-19	Chromatography
11	**KarraSwarnalatha**	605816481011	BSc-BCCA-III	2018-19	Evaluation of Analytical Data
12	**Patlolla Sushma Reddy**	605816481025	BSc-BCCA-III	2018-19	Properties of Halo Compounds
13	**Neeradi Vinod Kumar**	605816481020	BSc-BCCA-III	2018-19	p-Block Elements-II
14	**Swantham Sushma**	605816481035	BSc-BCCA-III	2018-19	Quantitative Analysis
15	**Kummari Priyanka**	605816457029			Isomerism
16	**Molugu Sushmaswaraj**	605816457036	BSc-MZC-III	2018-19	Metal Carbonyls
17	**PoshettyChandrakanth**	605816457042	BSc-MZC-III	2018-19	Nitrogen Compounds
18	**Sangola Anusha**	605816457049	BSc-MZC-III	2018-19	Organometallic Compounds

19	**Joshi Naveenkumar**	605816578016	BSc-MCCs-III	2018-19	Mass Spectra
20	**Chavan Nanditha**	605817481005	BSc-BCCA-III	2019-20	Chromatography-II
21	**Adiki Pranaya**	605817481001	BSc-BCCA-III	2019-20	Electrochemistry
22	**Syed Saddam Ali**	605817481023	BSc-BCCA-III	2019-20	Chromatographic Techniques
23	**L Neeraja**	605817481015	BSc-BCCA-III	2019-20	Reactions of Carboxylic acids
24	**Ankam Bhanu Prakash**	605817445001	BSc-BZC-III	2019-20	Solid State
25	**Madgul Sneha Reddy**	605817445018	BSc-BZC-III	2019-20	Solutions
26	**Maloth Swathi**	605817445020	BSc-BZC-III	2019-20	Alkyl Halides
27	**Muthkani Pooja**	605817445022	BSc-BZC-III	2019-20	Alkenes
28	**Nikhath Naaz**	605817445023	BSc-BZC-III	2019-20	Inorganic Reaction Mechanism
29	**Police Pooja**	605817445028	BSc-BZC-III	2019-20	Coordination Compounds
30	**Ramavath Radhika**	605817445031	BSc-BZC-III	2019-20	Nitrohydrocarbons
31	**Sathyagama Shravani**	605817445034	BSc-BZC-III	2019-20	Chemistry of Organometallic Compounds

32	**Shameem**	605817445035	BSc-BZC-III	2019-20	Applications of Organometallic Compounds
33	**Boga Mounika**	605817457012	BSc-MZC-III	2019-20	Phenols
34	**Boini Ravali**	605817457013	BSc-MZC-III	2019-20	Properties of Carbonyl Compounds
35	**Bollu Lavanya**	605817457014	BSc-MZC-III	2019-20	Carboxylic Acids
36	**Buranwadi Sampurna**	605817457015	BSc-MZC-III	2019-20	Introduction to Chromatographic Techniques
37	**Jarupla Manjulatha**	605817457025	BSc-MZC-III	2019-20	Properties of Phenols
38	**Jonnada Swetha**	605817457026	BSc-MZC-III	2019-20	Valance Bond Theory
39	**Megavath Sunitha**	605817457036	BSc-MZC-III	2019-20	HSAB Principle and Applications
40	**Vuttukuru Srilatha**	605817457049	BSc-MZC-III	2019-20	Solvent Extraction
41	**Macherla Bhavana**	605818572009	BSc-BtBC-III	2020-21	Heterocyclic Compounds
42	**K Meena**	605818572007	BSc-BtBC-III	2020-21	Optical Isomerism
43	**Kyasaram Meena Kumari**	605818572008	BSc-BtBC-III	2020-21	Chemistry of Dilute Solutions

44	**Begari Krishnaveni**	605818572003	BSc-BtBC-III	2020-21	Amino Acids
45	**Muthkani Nandini**	605818572014	BSc-BtBC-III	2020-21	Amino acids and Proteins
46	**Police Sai Kiran**	605818572015	BSc-BtBC-III	2020-21	Electrophilic Aromatic Substitution Reactions
47	**Shreya Reddy**	605818572017	BSc-BtBC-III	2020-21	Concepts of Chemical Kinetics
48	**Avusali Shivajyothi**	605818489001	BSc-BtZC-III	2020-21	Factors affecting Rate of the Reactions
49	**Bansuwada Sowmya**	605818489003	BSc-BtZC-III	2020-21	Concept of Order and Molecularity
50	**Gattumeedi Durgesh**	605818489005	BSc-BtZC-III	2020-21	Zero Order Kinetics
51	**Naziya Fathima**	605818489010	BSc-BtZC-III	2020-21	First Order Kinetics
52	**Sumera Jabeen**	605818489015	BSc-BtZC-III	2020-21	Second Order Kinetics
53	**Gonguluri Swarna Latha**	605818458005	BSc-MBC-III	2020-21	Methods Determining Reaction Order
54	**Patnam Mamatha**	605818458011	BSc-MBC-III	2020-21	Nuclear Magnetic Resonance Spectroscopy-Concepts

55	**Talla Nikhila**	605818458014	BSc-MBC-III	2020-21	Nuclear Magnetic Resonance Spectroscopy-Equivalent and Non Equivalent Protons
56	**Vadla Manasa**	605818458017	BSc-MBC-III	2020-21	Nuclear Magnetic Resonance Spectroscopy-Chemical Shifts
57	**Kurva Swetha**	605818458007	BSc-MBC-III	2020-21	Nuclear Magnetic Resonance Spectroscopy-Spin-Spin Coupling
58	**Alugulla Mamatha**	605818578001	BSc-MCCs-III	2020-21	IR-Spectroscopy
59	**Bhamini Anupama**	605818578004	BSc-MCCs-III	2020-21	Structural Theory of Organic Chemistry
60	**Chindam Madhavi**	605818578007	BSc-MCCs-III	2020-21	Diels-Alder Reactions
61	**Godugu Swapna**	605818578013	BSc-MCCs-III	2020-21	First law of Thermodynamics-I
62	**Kummari Ruchitha**	605818578022	BSc-MCCs-III	2020-21	Ag-Pb Phase Diagram
63	**Naika Narayana**	605818578032	BSc-MCCs-III	2020-21	Black Body Radiation

64	**T Sandeep Reddy**	605818578041	BSc-MCCs-III	2020-21	Concept of Heat Capacity
65	**Yelamala Manisha**	605818578043	BSc-MCCs-III	2020-21	Critical Phenomenon
66	**Golla Sheshikanth**	605819572005	BSc-BtBC-III	2021-22	De Broglie hypothesis
67	**Kallem Sai Prasanna**	605819572006	BSc-BtBC-III	2021-22	Derivation of Relationship between Vander Waals Constants
68	**Maldoddi Nikitha**	605819572008	BSc-BtBC-III	2021-22	Expression for work of Expansion
69	**Rathod Meenakshi**	605819572012	BSc-BtBC-III	2021-22	First law of Thermodynamics-II
70	**Sanadhi Laxman**	605819572013	BSc-BtBC-III	2021-22	Gibb's Phase Rule and its Components
71	**U Navaneetha**	605819572014	BSc-BtBC-III	2021-22	Hiesenberg Uncertainty Principle
72	**Aluri Lavanya**	605819578002	BSc-MCCS-III	2021-22	Isothermal and Adiabatic Prcesses
73	**Bisa Sravani**	605819578006	BSc-MCCS-III	2021-22	Law of Corresponding states and Joule Thompson Effect

74	**Chembeti Srinivas**	605819578008	BSc-MCCS-III	2021-22	Liquification of Gaseous
75	**Shankarampet Alekhya**	605819578028	BSc-MCCS-III	2021-22	NaCl-water System
76	**Singitham Shirisha**	605819578029	BSc-MCCS-III	2021-22	Photo-Electric effect
77	**Talelma Prasannalaxmi**	605819578031	BSc-MCCS-III	2021-22	Quantum Numbers
78	**Thammali Chandana**	605819578032	BSc-MCCS-III	2021-22	Relation Between Cp,Cv- Concept of Enthalpy
79	**Thammalithota Pranay Kumar**	605819578033	BSc-MCCS-III	2021-22	Thermodynamic Quantities
80	**Tudumu Shiva Charan**	605819578034	BSc-MCCS-III	2021-22	Vander Waals equation
81	**Yellayolla Avinash Reddy**	605819578038	BSc-MCCS-III	2021-22	Various Forms of First Law of Thermodynamics
82	**Amrin**	605819457001	BSc-MZC-III	2021-22	Water Phase Diagram
83	**Nelapati Vijaya**	605819457016	BSc-MZC-III	2021-22	Work Done in adiabetic Process
84	**Patnam Prashanth Kumar**	605819457018	BSc-MZC-III	2021-22	Zn-Mg System

Name of the Activity:

Student Contribution to Curricular Integrity and Understanding through open access e-Resources

Under the **CATALYST** Programme student's active participation in curricular framework and design is encouraged. The academic perception with viewpoint of students was analyzed by the students by via multilevel peer discussions for the complex topics of chemistry. The students search the e-Resources for these topics and selected exemplary e-Resources with affirmative feedback from their peer. These e-Resources were considered for the designing "**TEACHING PLANS**" for the efficient curricular transfer. **CATALYST** Programme provides a peculiar delegation to the students in the Curricular development strategies which inculcate "**Critical thinking and Problem solving abilities**" among the students.

The following are the open access e-Resources suggested by the students under **CATALYST** Programme and incorporated in teaching plans of the Department of Chemistry;

S.No.	Name of the Student	Roll No.	Group/ Class	Academic Year	Topic of e-Resources	Link of the e-Resources
1	**Ayesha Nazneen**	605816441002	BSc-MPC-III	2018-19	**Isomerism**	https://youtu.be/YUEkOBvJSNg
2	**Gaini Panchasheela**	605816441012	BSc-MPC-III	2018-19	**P- Block elements -II**	https://www.youtube.com/watch?v=lB32YDiR-cY
3	**Jamalpur Vaishnavi**	605816441018	BSc-MPC-III	2018-19	**Atomic structure and elementary quantum mechanics**	https://youtu.be/vuGpUFjLaYE
4	**Kummari Shivaleela**	605816441025	BSc-MPC-III	2018-19	**Chemical Kinetics**	https://youtu.be/e4qci9b2d3U

5	**Machagoni Prasanna**	605816441028	BSc-MPC-III	2018-19	**Dilute Solutions & Colligative Properties**	https://www.youtube.com/watch?v=nCWSWbffQ8k
6	**Thalari Anitha**	605816441042	BSc-MPC-III	2018-19	**Theory of Quantitative Analysis**	https://www.youtube.com/watch?v=ynAx9gln7ZM
7	**Vadthya Shobha**	605816441044	BSc-MPC-III	2018-19	**Amines, Cyanides and Isocyanides**	https://youtu.be/DbvCRSgiuew
8	**A Ashwini**	605816481001	BSc-BCCA-III	2018-19	**Introduction and Terminology of Medicinal chemistry**	https://youtu.be/v6sFdawERRU
9	**Karra Swarnalatha**	605816481011	BSc-BCCA-III	2018-19	**Inorganic Qualitative Analysis**	https://youtu.be/QQo1e-BUZWs
10	**Swantham Sushma**	605816481035	BSc-BCCA-III	2018-19	**P- Block elements 1**	https://youtu.be/4H4kTtdL55k
11	**Poshetty Chandrakanth**	605816457042	BSc-MZC-III	2018-19	**Hydroxy compounds and ethers**	https://www.youtube.com/watch?v=03rfdQYjFVA
12	**Patlolla Shashank Kumar**	605816481024	BSc-BCCA-III	2018-19	**Carboxylic acids and derivatives**	https://youtu.be/gSEYrWwREkI
13	**Manne Swarna Latha**	60581616481017	BSc-BCCA-III	2018-19	**Thermodynamics**	https://youtu.be/Qi3m9sD5w-A
14	**Gajjela Shirisha**	605816441013	BSc-MPC-III	2018-19	**Synthetic Strategies**	https://youtu.be/Brw4_mNQEiw
16	**Adiki Pranaya**	605817481001	BSc-BCCA-III	2019-20	**Aromatic hydrocarbons**	https://youtu.be/BDooDi7zQxo
17	**Chavan Nanditha**	605817481005	BSc-BCCA-III	2019-20	**Chemical Bonding**	https://www.youtube.com/watch?v=x2-nP7i6T34
18	**Saraf Sahithya**	605817481022	BSc-BCCA-III	2019-20	**Gaseous State**	https://youtu.be/Knu9F3H0B9I

19	**Syed Saddam Ali**	605817481023	BSc-BCCA-III	2019-20	**Liquid State and Solutions**	https://youtu.be/55dHnYaupgQ
20	**Vadla Aishwarya**	605817481024	BSc-BCCA-III	2019-20	**Solid state chemistry**	https://youtu.be/pUJtSPICn0w
21	**Ankam Bhanu Prakash**	605817445001	BSc-BZC-III	2019-20	**Structural Theory in Organic Chemistry**	https://youtu.be/HwK8P9CHTx0
22	**Kanchi Nissi**	605817445017	BSc-BZC-III	2019-20	**Chemistry of d-block elements**	https://www.youtube.com/watch?v=lSi849GO5CA
23	**Madgul Sneha Reddy**	605817445018	BSc-BZC-III	2019-20	**Electrochemistry**	https://www.youtube.com/watch?v=gYEbvyRR2Og
24	**Maloth Swathi**	605817445020	BSc-BZC-III	2019-20	**Carbanions-I**	https://youtu.be/2mGhkk4qZoA
25	**Muthkani Pooja**	605817445022	BSc-BZC-III	2019-20	**Chemistry of f-block elements**	https://youtu.be/hTEiGJS9W2A
26	**Nikhath Naaz**	605817445023	BSc-BZC-III	2019-20	**Metal carbonyls and Organometallic Chemistry**	https://youtu.be/3FRV31YYtL8
27	**Police Pooja**	605817445028	BSc-BZC-III	2019-20	**Amino acids and proteins**	https://youtu.be/-C7o6waCIj0
28	**Ramavath Radhika**	605817445031	BSc-BZC-III	2019-20	**Bioinorganic Chemistry**	https://youtu.be/v7Yn9ngYF9Q
29	**Sathyagama Shravani**	605817445034	BSc-BZC-III	2019-20	**Separation techniques - II**	https://www.youtube.com/watch?v=Ia8yrBL2Xwc
30	**Shameem**	605817445035	BSc-BZC-III	2019-20	**Molecular Messengers, Vitamins and Micronutrients**	https://youtu.be/cFslt2ps634
31	**Jarupla Manjulatha**	605817457025	BSc-MZC-III	2019-20	**Electro analytical methods**	https://www.youtube.com/watch?v=KmynBWxyRxw
32	**Jonnada Swetha**	605817457026	BSc-MZC-III	2019-20	**Non - aqueous solvents**	https://www.youtube.com/watch?v=djfYNs0-yQg
33	**Goudigama Sai Ganesh**	605817457023	BSc-MZC-III	2019-20	**Symmetry of molecules**	https://www.youtube.com/watch?v=Nb4j_FishI0

34	**Macherla Bhavana**	605818572009			**Acyclic hydrocarbons**	https://youtu.be/AQmZrC7Mgs8
35	**Muthkani Nandini**	605818572014	BSc-BtBC-III	2020-21	**Carbonyl compounds**	https://www.youtube.com/watch?v=SkCrBqbPrWM
36	**Police Sai Kiran**	605818572015	BSc-BtBC-III	2020-21	**Nitrohydrocarbons**	https://youtu.be/FZ4ZuKrKzHs
37	**Shreya Reddy**	605818572017	BSc-BtBC-III	2020-21	**Separation techniques - I**	https://www.youtube.com/watch?v=mz_xcNrTK_U
38	**Bansuwada Sowmya**	605818489003	BSc-BtZC-III	2020-21	**Asymmetric synthesis**	https://www.youtube.com/watch?v=pPe9iTLLdNI
39	**Naziya Fathima**	605818489010	BSc-BtZC-III	2020-21	**Stereoisomerism**	https://www.youtube.com/watch?v=4Zz6opXLeXc
40	**Patel Shivani**	605818489012	BSc-BtZC-III	2020-21	**Phase Rule**	https://youtu.be/Nxk2WOFXh88
41	**Peddapuram Akhil Teja**	605818489013	BSc-BtZC-III	2020-21	**Coordination Compounds –II**	https://youtu.be/0vN4Qh666Cw
42	**Rahul Rathod**	605818489014	BSc-BtZC-III	2020-21	**Heterocyclic Compounds**	https://youtu.be/bl1bh9laxks
43	**Sumera Jabeen**	605818489015	BSc-BtZC-III	2020-21	**Theories of bonding in metals**	https://youtu.be/X1VdgZ1N0_Q
44	**Gonguluri Swarna Latha**	605818458005	BSc-MBC-III	2020-21	**Molecular spectroscopy**	https://www.youtube.com/watch?v=PYj7UNayfsg
45	**Gumasta Sai Bhargavi**	605818458006	BSc-MBC-III	2020-21	**NMR and Mass Spectrometry**	https://www.youtube.com/watch?v=EYbLXAhTJQ0
46	**Kurva Swetha**	605818458007	BSc-MBC-III	2020-21	**Enzymes and Receptors**	https://youtu.be/SqjVB8WT1xo
47	**Alugulla Mamatha**	605818578001	BSc-MCCs-	2020-21	**Synthesis and Therapeutic Activity of**	https://youtu.be/IIlgkYAWz0w

			III		**Drugs**	
48	**Babugonda Rammohan**	605818578002	BSc-MCCs-III	2020-21	**Inorganic reaction mechanisms**	https://www.youtube.com/watch?v=3mwmsGm54I4
49	**Bhamini Anupama**	605818578004	BSc-MCCs-III	2020-21	**Pericyclic Reactions**	https://youtu.be/9VpCOr3WNYI
50	**Golla Nithish Kumar**	605818578015	BSc-MCCs-III	2020-21	**Polymers**	https://www.youtube.com/watch?v=T4bpT_b0Zc8
51	**Bisa Sravani**	605819578006	BSc-MCCs-III	2021-22	**Chemistry of Zero group elements**	https://www.toppr.com/ask/question/draw-the-structures-of-the-following-xef4/
52	**Chembeti Srinivas**	605819578008	BSc-MCCs-III	2021-22	**Halogen compounds**	https://www.khanacademy.org/science/organic-chemistry/substitution-elimination-reactions/sn1-sn2-tutorial/v/sn1-vs-sn2-summary
53	**Kammari Manasa**	605819578015	BSc-MCCs-III	2021-22	**Coordination compounds - I**	https://youtu.be/PpuPUMfr91Y
54	**Shankarampet Alekhya**	605819578028	BSc-MCCs-III	2021-22	**Evaluation of analytical data**	https://study.com/learn/lesson/accuracy-precision-in-chemistry-difference.html
55	**Singitham Shirisha**	605819578029	BSc-MCCs-III	2021-22	**Carbanions-II**	https://www.youtube.com/watch?v=ABNL-5ZS3fE
56	**Talelma Prasannalaxmi**	605819578031	BSc-MCCs-III	2021-22	**Carbohydrates**	https://youtu.be/Z7sUuoAlRrE
57	**Thammali Chandana**	605819578032	BSc-MCCs-III	2021-22	**Photochemistry**	https://youtu.be/_cu7jq0Dbww
58	**Thammalitho ta Pranay Kumar**	605819578033	BSc-MCCs-III	2021-22	**Boranes and Carboranes**	https://www.youtube.com/watch?v=S5j4iyyCy7U