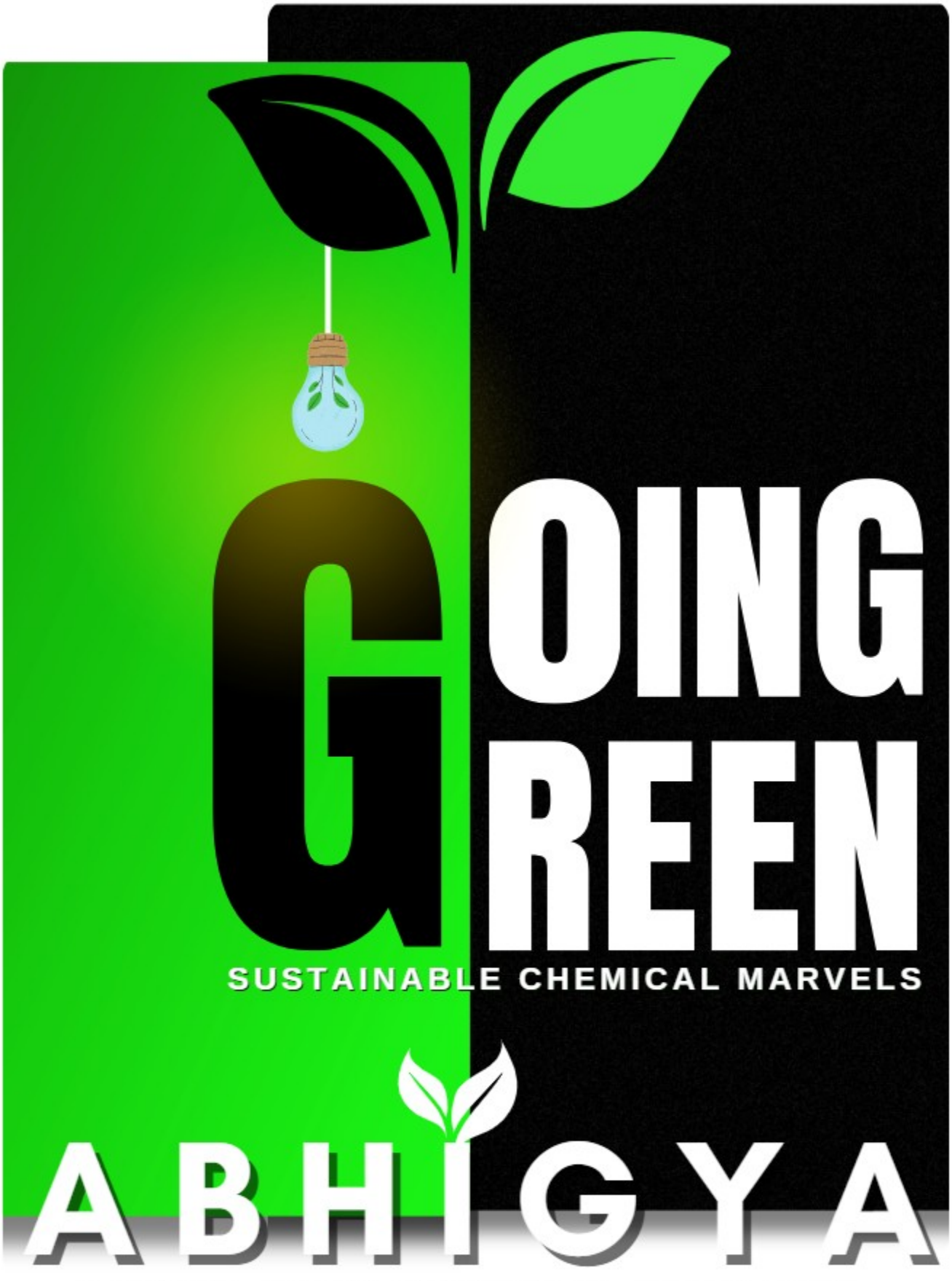



# ABHIGYA

ANNUAL DEPARTMENTAL MAGAZINE

2023-24

**DEPARTMENT OF CHEMISTRY**
SRI VENKATESWARA COLLEGE
UNIVERSITY OF DELHI

# ABOUT THE THEME

In the current edition of "Abhigya," our student-focused magazine, comes up with a spotlight on Green Chemistry. As young minds eager to make a difference, it's crucial for us to understand how chemistry can contribute to a cleaner, more sustainable world.

In this issue, we present accessible articles and features that demystify Green Chemistry concepts and highlight their real-world applications by discussing eco-friendly synthesis methods to exploring the impact of chemical pollution on our environment. Here, we aim to empower students with knowledge and insights that can drive positive change.

Through the stories of innovative green initiatives, we inspire our students to consider the environmental implications of their future careers in chemistry. We also emphasize the importance of incorporating Green Chemistry principles into our studies and research endeavors, encouraging a mindset of responsibility and innovation.

The students of chemistry are the future generation of scientists, engineers, and leaders, it's our responsibility to advocate for greener practices in all fields and champion sustainability. Let's embark on this journey together, armed with the knowledge and determination to build a brighter, more eco-conscious future through Green Chemistry.

# ABHIGYA
## 2023-24

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# PRINCIPAL'S DESK



I am pleased to announce that the Department of Chemistry has come up with the latest edition of Annual Magazine 'Abhigya 2024' with the most needed themes of the present time, 'Going Green: Sustainable Chemical Marvels'. The magazine focuses on promoting eco-friendly practices and sustainable solutions in line with our commitment to environmental sustainability. Green chemistry, with its emphasis on minimizing environmental impact, is crucial for our collective responsibility as stewards of scientific innovation. Through waste reduction, energy efficiency, and renewable feedstocks, we can make significant strides toward a greener future.

This magazine showcases insightful articles and thought-provoking pieces that highlight the importance of embracing sustainability. It represents a proactive step taken by our students and faculty members in fostering environmental consciousness within our college community. I extend my heartfelt appreciation to everyone who has contributed in making this magazine a reality. Your hard work and commitment are commendable.

Congratulations to all on the release of the departmental annual magazine, and thank you for your continued support in championing sustainability. Let's work together towards a more sustainable future where scientific ingenuity benefits both humanity and our planet.

16/4/24

Prof. V. Ravi

# CONVENOR'S DESK



In this edition of "Abhigya," themed "Going Green - Sustainable Chemical Marvels," we delve into a topic crucial for our collective future: Green Chemistry. Understanding and promoting Green Chemistry is a journey driven by the knowledge of molecules and their role in life processes. As students passionate about science, it's essential for us to grasp how chemistry shapes our environment and society. Green Chemistry offers a promising framework for addressing environmental challenges. By designing chemical products and processes that minimize waste and prioritize sustainability, it paves the way for a cleaner, healthier planet.

Bringing this issue to light was a delightful experience. We witnessed budding writers showcase their talent not just in articles but also in puzzles, quizzes, and graphic design. I extend my sincere thanks to everyone who supported us in publishing this magazine. Firstly, I express my gratitude to our principal for his unwavering support. I also appreciate the contributions of student authors and faculty members, whose insights enriched this issue. Additionally, I acknowledge the hard work of the Editorial Board in enhancing the magazine's perfection and beauty.

Through education, innovation, and advocacy, we can shape a sustainable future. I hope this edition of "Abhigya" serves as both an enjoyable read and a catalyst for discussions and actions toward a world where science and sustainability coexist harmoniously.

Dr. Shefali Shukla

# EDITOR'S NOTE



**NIHAL OJHA**
EDITOR
B.SC. (H) CHEMISTRY, III YEAR



**PREETI & MUSKAN**
DESIGNING HEADS
B.SC. (H) CHEMISTRY, II YEAR

The genesis of our departmental magazine stemmed from a simple yet powerful aspiration: to ignite a deeper appreciation for chemistry. Recognizing the need for a structured approach, we begin with crafting a well-thought-out layout, and prepared the blueprint. We then called for contributions, inviting articles to fill its pages. With content curated, our focus shifted to the collaborative efforts of the editorial and design teams, supported by our dedicated teachers.

This endeavor was a collective journey, with each contributor's sincerity and the invaluable guidance of our mentors propelling us toward our final goal. Our magazine, ABHIGYA, now stands as a testament to the collaborative spirit and passion for chemistry that unites us.

Presenting our annual departmental magazine, themed "**GOING GREEN: SUSTAINABLE CHEMICAL MARVELS**" a culmination of our collective dedication and enthusiasm for the subject. Through its pages, we hope to inspire and inform, fostering a deeper connection with chemistry and its potential to create a sustainable future.

In this collective accomplishment, we celebrate the power of teamwork and the enduring impact of our joint efforts.

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# CELLULOSE TO CYRENE

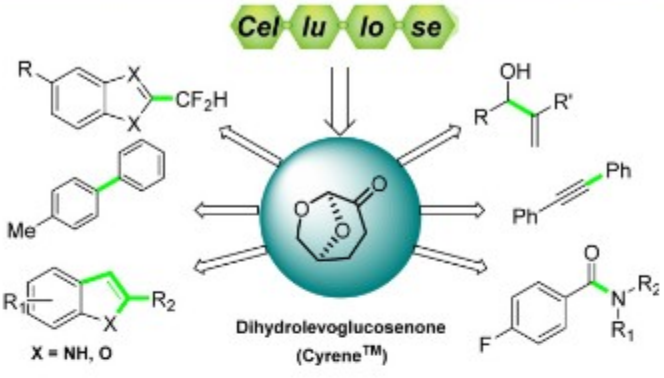
## A GREENER, SAFER, AND SUSTAINABLE SOLVENT

*Harsh Pahuja, B.Sc. (H) Chemistry, 2nd Year*

Solvents have critical roles to play in any chemical reaction. Solvents dissolve the reactants and form stable intermediates which aid the course of the reaction. Solvents like dimethylformamide (DMF) which are used in the production of plastic and N-methy-2-pyrrolodone (NMP) exercised in material and electronic manufacturing are harmful organic solvents because of their mutagenic toxicity and can harm our health.

Cyrene is a bicyclic ketone that bears an intramolecular acetal functionality, synthetically accessible through two-step processes starting from biomass Cellulose undergoes a pyrolysis process, affording levoglucosenone which, by catalytic hydrogenation, is converted into dihydrolevoglucosenone (Cyrene).






Cyrene is a non-mutagenic, bio-renewable, biodegradable, and non-reprotoxic, colorless viscous liquid. It is an optically active ketone composed of two fused rings, which form a cyclic acetal. Interestingly it has high miscibility with water owing to which it can easily be extracted from the reaction mixture and reused; hence it can be employed in industrial reactions. Cyrene has various advantages over traditional-based solvents as it not only has a lower carbon footprint of 1.4 kg CO2e, but it also creates less corrosive end products at the end of life since it does not contain any heteroatoms like sulfur and nitrogen. The carbonyl group in cyrene favours the formation of cyclic ketal with ethylene glycol and provides polymerized derivatives with basic conditions under aldol condensation. It also undergoes Claisen Schmidt reaction forming spiro-derived exocyclic enones by the double addition of aldehydes.

The amide functional group is special in organic chemistry since it occurs frequently in biologically active molecules. Wilson and co-workers investigated the conversion of carboxylic acid to amide using cyrene which resulted in good yields. Cyrene was used for the synthesis of isothiocyanates and urea yielding corresponding products in high yields. The carbon-carbon coupling reactions are of utmost importance due to their applications in the medicinal industry. Cyrene was employed for the Sonogashira reaction, Suzuki-Miyaura, and Baylis-Hillman reactions gave promising results.

Cyrene was also employed for the preparation of poly(lactic-co-glycolic acid) nanoparticles (PLGA-NPs) which was very effective since cyrene was found to be rapidly diffused to the water phase owing to its high solubility because of the presence of an equilibrium between keto and hydrate form. Later on, an anti-inflammatory derivative of the natural product indirubin was developed with the same strategy.

Cyrene is a promising solvent that combines sustainability, performance, and versatility. Its renewable nature and reduced environmental impact make it an attractive choice for industries looking to adopt greener practices. As the demand for sustainable solutions continues to grow, Cyrene stands as an example of how innovation can lead us towards a more environmentally conscious future.

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1. I'm essential for life, yet too much of me can be deadly. What am I?
2. I'm made from trees, but I'm not alive. What am I?
3. I can be melted, boiled, or frozen, but I always come back the same. What am I?
4. I'm found in oceans, lakes, and rain, yet I have no taste, smell, or color. What am I?
5. I'm a substance that can be recycled endlessly without losing my properties. What am I?



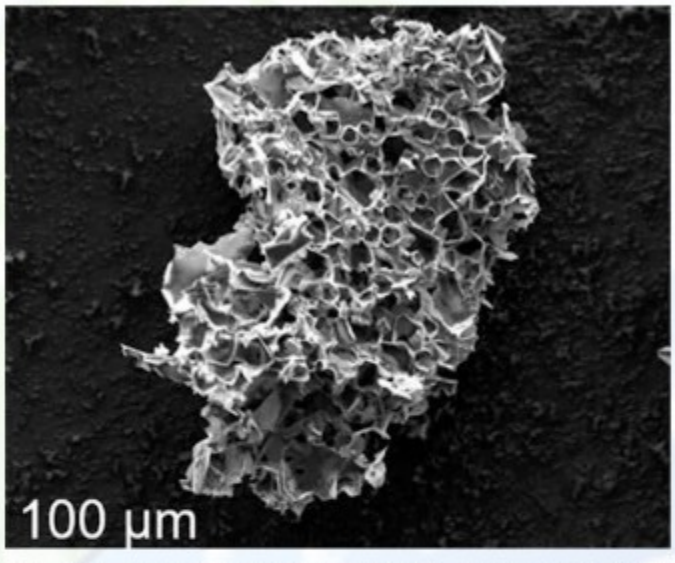

**Cyrene is made from plantation radiata pine. It is used as a green solvent in pharmaceutical industries for the production of drugs and other pharmaceuticals.**

Answers: 1. Oxygen 2. Paper 3. Water 4. Water 5. Glass

# PLASTIC ALCHEMY

## CONVERTING PLASTIC INTO CARBON SORBENT

*Komal Pandit, B.Sc. (H) Chemistry, 2nd Year*




As the world grapples with environmental challenges, two intertwined issues have emerged as urgent priorities: the proliferation of plastic waste and the escalating carbon footprint. From single-use plastics clogging our oceans to the relentless burning of fossil fuels, these intertwined issues pose an existential threat to our environment and future generations.

But what would be better than Achieving dual purposes in a single action. Is there a way we can combat these two problems by a single solution. This is possible because of Rice University lab's newly discovered chemical technique to turn waste plastic into an effective carbon dioxide sorbent for industry. An experiment conducted in April, 2022 by Chemists of Rice University gives a chemical technique to turn waste plastic into an effective Carbon dioxide sorbent (which can absorb or adsorb carbon dioxide) for industry. This was reported by Rice chemist James Tour and co-lead authors Rice alumnus Wala Algozeeb, graduate student Paul Savas and postdoctoral researcher Zhe Yuan in the American Chemical Society journal ACS Nano. It involves heating plastic waste in the presence of potassium acetate in inert atmosphere to produce particles with pores in nanometer scale that can trap carbon dioxide molecules.

The procedure involves converting waste plastic into powder and mixing with potassium acetate and which is then heated at 600°C for 45 minutes. This gives particles with pore size 0.7 nm wide. These particles are very effective at trapping airborne carbon dioxide molecules. Higher temperature leads to wider pores.

In this process, a wax byproduct is also produced which can be recycled into detergents or lubricants. These particles can be heated again at around 75°C to release the trapped carbon dioxide molecules, which can then be used in production of products like fuels or building materials. And the sorbent particle can also be reused as releasing the trapped carbon dioxide molecules, regenerates about 90% of the material's binding sites, and thus the particle can again be used as carbon sorbent. So there is almost no waste produced by this method.

It is better than the conventional method to pyrolyze plastic (i.e. in absence of Potassium acetate known as chemical recycling) . As the conventional method produces products like oils, gases and wax and also a carbon byproduct which is of no use. But Pyrolyzing in presence of potassium acetate does not produce any such waste and instead gives porous particles which can absorb carbon dioxide molecules. The porous particles produced are able to hold up to 18% of their own weight in carbon dioxide at room temperature and thus act as good carbon sorbent.

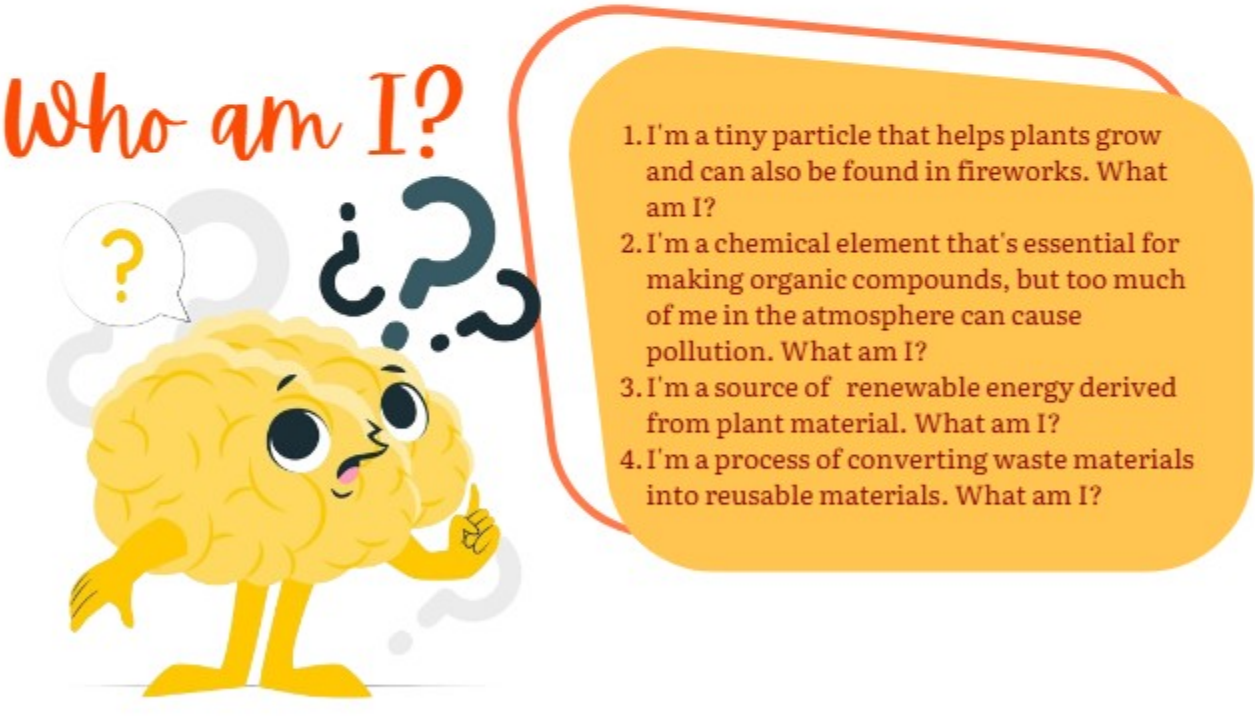


Also another plus point is that this method of removing carbon dioxide costs much lesser as compared to the conventional method using amines, to absorb or adsorb carbon dioxide, approximately 4 times less. And even lasts longer. Also commonly used plastics such as polypropylene or high or low density polyethylene are difficult to recycle by chemical recycling method but are ideal for conversion to the carbon dioxide capturing particles. This provides a huge help to solve the problem of single use plastic waste. It Is a great way to address two problems: plastic waste and CO2 emissions. This experiment gives a win- win situation to deal with the two above major problems.

The approach of converting plastic waste into carbon sorbent provides an innovative solution and paves a way for circular economy where waste becomes a valuable resource and , also towards a cleaner and greener future.

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Answers: 1. Nitrogen 2. Carbon 3. Biomass 4. Recycling

# PHA Unleashed

## Biodegradable Marvels Paving the Path to Plastic-Free Living

*Tanya Virmani, B.Sc. (H) Chemistry, 2nd year*

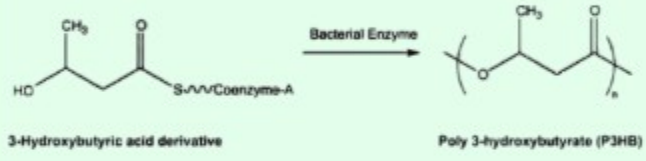



The gradual rise in plastic pollution is a major concern nowadays as it deteriorates the environment significantly. These petroleum-based plastics are not biodegradable and their long-term persistence in the environment has drawn the attention of researchers towards the development of sustainable polymers from the natural resources. In recent years, the increasing awareness about environmental sustainability as well as green chemistry has played a significant role in the development of various alternatives and one of these is Polyhydroxyalkanoates (PHAs).

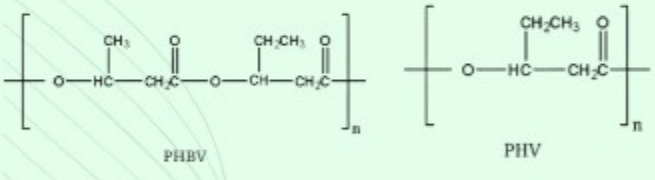
PHA is a biodegradable, biocompatible and bio responsive polymer that can be synthesized by various microorganisms such as fungi, algae and bacteria. The production of PHA also relies on renewable feedstocks such as vegetable oil, plant sugar, etc. It is a bioplastic that acts as a promising sustainable alternative to synthetic plastic and is eco-friendly. It is considered one of the best alternatives to traditional plastics due to its chemical diversity, biocompatibility, thermoplastic and biodegradable nature. It doesn't release toxic products after degradation and this makes it an attractive solution for the reduction of plastic pollution.

Among the various PHAs, poly(3-hydroxybuty-butyrate)/polyhydroxybutyrate known as P3HB/PHB was first reported in different microbial strains, and subsequently, other monomer constituents were discovered (Albuquerque and Malafaia, 2018). About 150 different monomers constitute various PHAs. (Sharma et.al., 2021)

### Basic structure of PHA




The basic structure of polyhydroxyalkanoates consists of repeating units known as monomers. Its fundamental structure involves monomer units of (R)-hydroxy fatty acid and these monomers are linked together by ester bonds. Each monomeric unit has unsaturated or saturated alkyl group, branched and substituted alkyl group.




### Properties of PHA

PHAs possess a variety of properties that contribute to its utility and versatility. These are mainly based on the type of PHA and its production process. The natural degradation of these polymers occurs through the action of various microbes under aerobic conditions, leading to the release of water and carbon dioxide.

### Biosynthesis of PHA

Although both chemical and biological approaches can be applied for PHA synthesis, PHAs with higher molecular weight can be

produced by biological means compared to chemical approaches (Chen, 2010). These biopolymers cab be synthesized in both exponential as well as stationary phase of microbial growth.

## Applications of PHA

PHA is proving to be a sustainable alternative for single-use packaging materials including containers, bags etc. and thus, it is widely used to reduce plastic waste. PHA is also proving to be a biodegradable alternative to synthetic fibers and is a boon for the textile industry. PHA-producing bacteria are also being studied for their potential application in waste water treatment process. Researchers are also exploring its application in electronic devices as well. Therefore, PHA polymers continue to emerge as a biodegradable marvel that is significantly contributing to a plastic-free living. Its innate ability to break down naturally along with many other properties positions PHA at the forefront of eco-conscious solutions. It is continuously paving the path to eco-friendly environment.

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**DID YOU KNOW?**

**Studies have shown that 85% of PHAs were degraded in 7 weeks. PHAs have been reported to degrade in aquatic environments (Lake Lugano, Switzerland) within 254 days even at temperatures not exceeding 6 °C.**

# Quantum Dots
## A Versatile Tool for Green and Sustainable Chemistry

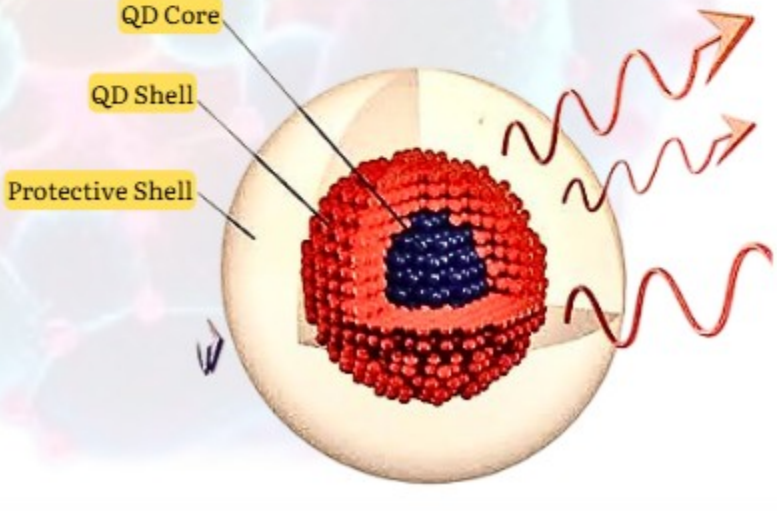
*Pratha Dhingra, B.Sc. (H) Chemistry , 1st year*

Quantum Dots (QDs) are nanoscale semiconductor particles that exhibit unique electronic and optical properties due to their size and quantum confinement effects. These tiny structures, typically 1 to 10 nanometers, bridge the gap between bulk materials and individual molecules. Quantum dots have gained significant attention and found diverse applications in various fields, from electronics to medicine. Some of the key features of QDs include their size-dependent properties, tunable emission spectrum, high quantum yield, versatility in composition, photostability etc.

The role of quantum dots in green and sustainable chemistry is significant, as these nanoscale semiconductor particles offer unique properties that can contribute to environmentally friendly and resource-efficient practices. Quantum dots find applications in various areas of green and sustainable chemistry, leveraging their distinctive features to address challenges and promote more eco-friendly solutions. Quantum dots enable the design of more efficient and selective catalysts, reducing the amount of raw materials required for chemical processes. This aspect aligns with the principle of green chemistry, which aims to minimize waste and resource consumption. Quantum dots can also be employed in the photocatalytic degradation of pollutants in wastewater. Their ability to generate reactive oxygen species under light exposure helps in breaking down organic compounds, contributing to the development of sustainable wastewater treatment methods. Their small size and tunable optical properties enable precise tracking of drug delivery within the body. This targeted approach minimizes the amount of medication needed, reducing potential side effects and improving overall sustainability in healthcare. Moreover, their high sensitivity and selectivity make them valuable for detecting pollutants and contaminants in air, water, and soil. This can aid in early detection and mitigation of environmental hazards. QDs-based LEDs offer enhanced color purity, lower energy consumption, and longer lifespans. This contributes to reducing the environmental impact associated with the manufacturing and disposal of electronic devices. Foremost, quantum dots are employed as catalysts in various chemical reactions, enabling more sustainable and efficient processes. In particular, photocatalysis utilizes quantum dots to harness solar energy for chemical transformations, reducing the reliance on traditional energy sources.

Despite their promising applications, challenges associated with the toxicity of certain quantum dot materials need to be addressed. Heavy metal-based quantum dots, such as those containing cadmium, can pose environmental and health risks.

Research efforts are directed toward developing non-toxic alternatives and sustainable synthesis methods to ensure the responsible use of quantum dots in green and sustainable chemistry. It can also be concluded that the unique properties of quantum dots position them as versatile tools in advancing green and sustainable chemistry. Their applications span across various fields, contributing to more efficient and environmentally friendly processes, and ongoing research aims to address challenges and optimize their use for a sustainable future.



# LIQUID GOLD
# NAVIGATING GREEN ROADS WITH BIODIESEL

Ojal Awasthi, B.Sc.(H) Chemistry, 2nd year

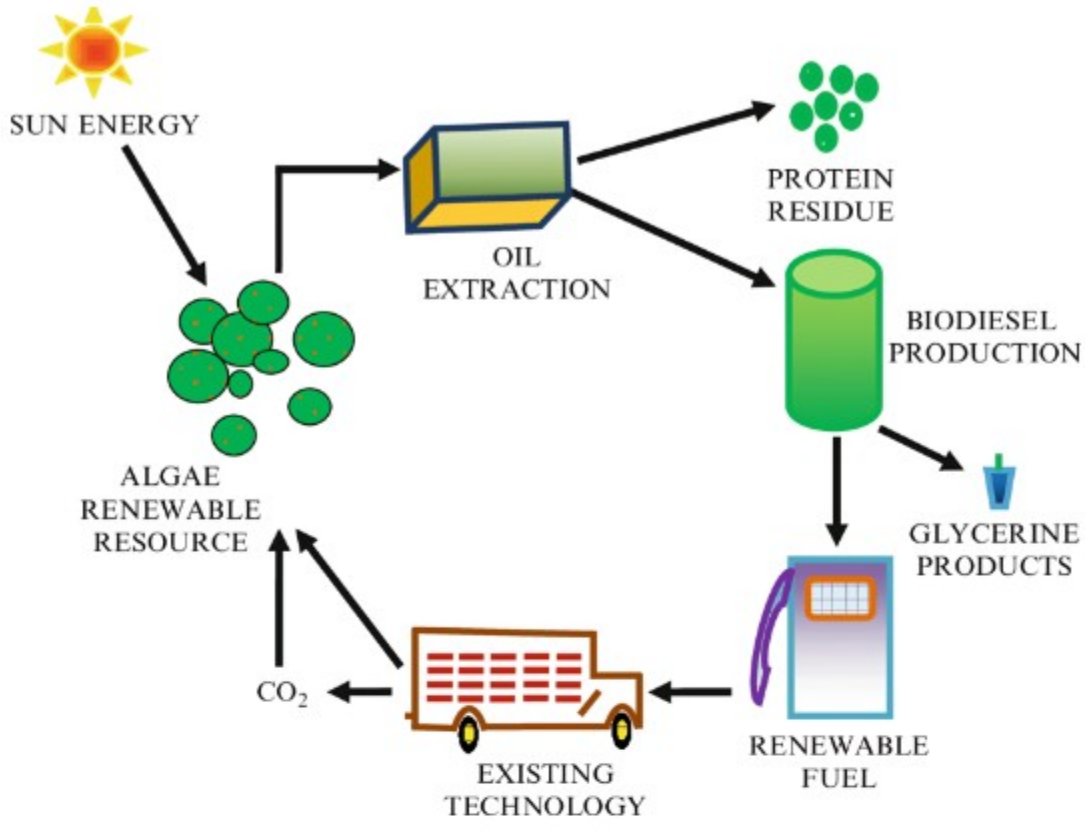
## Introduction

**Energy** is one of the most vital resources for human civilization and advancement. Nowadays, energy crisis become one of the major global issue we're facing because of the increasing demand for energy and the limited availability of traditional resources. Fuels are of great importance because they can produce significant amount of energy. Fossil fuel contributes 80% of the world's energy needs as they are the driving force behind countless aspects of everyday life like the transportation of people and goods. Main energy resources come from fossil fuels such as petroleum, coal and natural gas. In the transportation sector, private vehicles, buses, trucks, and ships also consume significant amounts of diesel and gasoline which leads to strong dependence on fossil fuels. Also, the increasing population has led to a surge in demand for fossil fuels. However, the process of forming fossil fuels takes years. it takes millions of years for organic matter to transform into coal, petrol, diesel, etc. Hence there's a need for alternative bio-fuels because they can help reduce greenhouse gas emissions and dependence on fossil fuels and they can be produced from organic materials like plants and algae.

## Microalgae to biodiesel conversion

Microalgae-based biodiesel production offers an innovative renewable energy solution utilizing small, single-celled organisms known as microalgae. These microalgae transform sunlight, carbon dioxide, and nutrients into organic compounds such as lipids that can then be used to make biodiesel. Microalgae cells exhibit a lipid composition exceeding 30% higher than conventional sources like soybeans and palm oils. Moreover, diverse wastewater sources from industrial or sewage origins, rich in nutrients such as phosphorus and nitrogen, offer an untapped resource for microalgae cultivation without the need for supplemental nutrients. Significantly, microalgae species possess inherent resilience to thrive in challenging environments, including coastal seawater or brackish water, thereby surpassing the limitations of traditional biofuel feedstocks. This research endeavours to elucidate the intricate process of producing biodiesel from microalgae, providing a comprehensive understanding of each stage involved.

The cultivation phase is pivotal, emphasizing the creation of optimal growth conditions encompassing factors like light exposure, temperature regulation, and nutrient provision. By fine-tuning these variables, researchers aim to maximize microalgae productivity, laying the groundwork for efficient biodiesel production. Following cultivation, harvesting methods come into play, employing diverse techniques such as centrifugation, filtration, and flocculation to separate microalgae from their growth medium. This step is crucial for obtaining a concentrated biomass ready for further processing. Subsequently, microalgae cell disruption techniques are employed to break open cells and access their intracellular components, including lipids essential for biodiesel production. Mechanisms for cell disruption span mechanical, chemical, and biological methods, each with its advantages and challenges, all contributing to the complexity of the overall process. The final stages of biodiesel production involve lipid extraction from microalgae and subsequent transesterification, where microalgal oil is converted into biodiesel through chemical reactions.




This transformation process is integral to biodiesel production, as it converts triglycerides present in microalgal oil into fatty acid methyl esters (FAMEs), the primary constituents of biodiesel. The forecast for biodiesel production indicates a significant surge in the forthcoming years. With its potential to enhance energy security, boost economic growth, stimulate agricultural development, and mitigate pollutant emissions, biodiesel emerges as a promising renewable fuel option. However, despite its myriad advantages, biodiesel still grapples with several challenges that necessitate resolution to enhance its appeal as a viable alternative to petroleum diesel. In summary, biodiesel stands out for its abundance of raw materials, favorable dynamic properties, and environmental friendliness, garnering significant attention globally. These attributes ensure a sustained market demand for biodiesel as a compelling alternative to conventional petroleum diesel fuel. However, the commercial landscape poses challenges, with the traditional petroleum industry potentially favoring non-ester renewable diesel fuels over biodiesel. This preference presents a notable hurdle to widespread biodiesel adoption in the future.

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- *Microalgae cultivation and harvesting: Growth performance and use of flocculants - panelVictor Okoro a, Ulugbek Azimov a, Jose Munoz b, Hector H. Hernandez c, Anh N. Phan d renewable and sustainable energy reviews volume 115 , November 2019 , 109364*

# Making Jeans Green
## Linking Sustainability, Business & Fashion

Nancy, B.Sc. (H) Chemistry, 2nd year

**Denim** is one of the most popular and resource-thirsty fabrics in the world. Everybody loves denim. In fact, we love it so much that we spend $92.8 billion on denim products every time. Thousands of liters of freshwater, dangerous chemicals and energy go into the conventional product of a brace of jeans , leaving not only the terrain but also business vulnerable for the future.



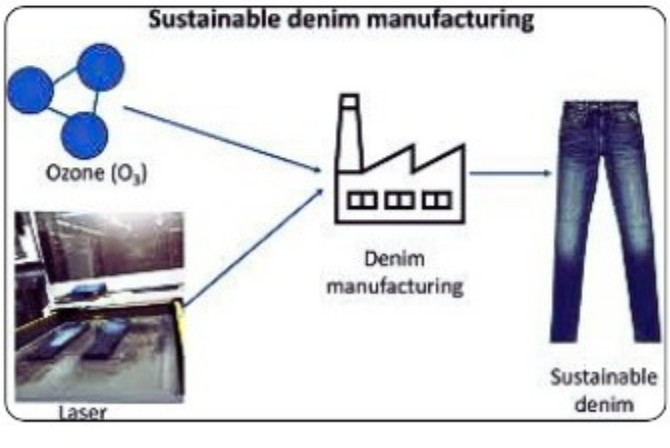

In recent times, sustainability has surfaced as a pressing issue across a wide range of diligence and fashion assiduity is no exception. Denim fabrics are being damped and exposed to the ozone for the treatment and the bleaching position can be achieved in around 15-20 minutes. This method is veritably simple and terrain friendly because, after laundering, ozonized water can fluently be deozonized by ultraviolet radiation.

The use of ozone for the medication of denim is the one way for a drop in discharged wastewater. The oxidation eventuality of ozone in bleaching is 2.07 electron- volts, that's further than the generally used dulling agent, hydrogen peroxide (1.77 eV). The outfit used in ozone-bleaching is divided into three factors which are ozone creator, ozone applicator, and ozone destroyer. In force of significant concentrated quantum of ozone- oxygen admixture by the creator to an applicator which is a spherical glass tube consisting of a diffuser in its bottom.

The product of ozone is carried out by feeding 20%oxygen, which is present in the air, for pressurized swing adsorption for raising ozone attention which is further applied by a tube system for generating ozone. Ozone fading can also be achieved by a tube outfit. Under the tube treatment, high-energy electrons are formed. Some of the high-energy electrons reply with humidity in the air and an admixture of radicals is generated.

$$3O_2 \rightarrow 2O_2 + 2O \rightarrow 2O_3$$

During the generation of ozone tube, a combination of charged patches, free radicals and UV light is generated. The UV light, which is the by-product of the tube treatment process, also contributes to product of the OH radical. The hydroxyl radical, OH is the most oxidative radical among radicals generated in the tube process and is the main radical responsible for declination of indigo color in cloth accoutrement. The OH can oxidize indigo color motes (RH), producing organic radicals, R, which are largely reactive and can be further oxidized. As a result, the color fading effect of the Indigo painted cloth is achieved.



# GREEN SYNTHESIS OF ANTIVIRAL DRUG MOLNUPIRAVIR

Nandini, B.Sc. (H) Chemistry, 2nd year

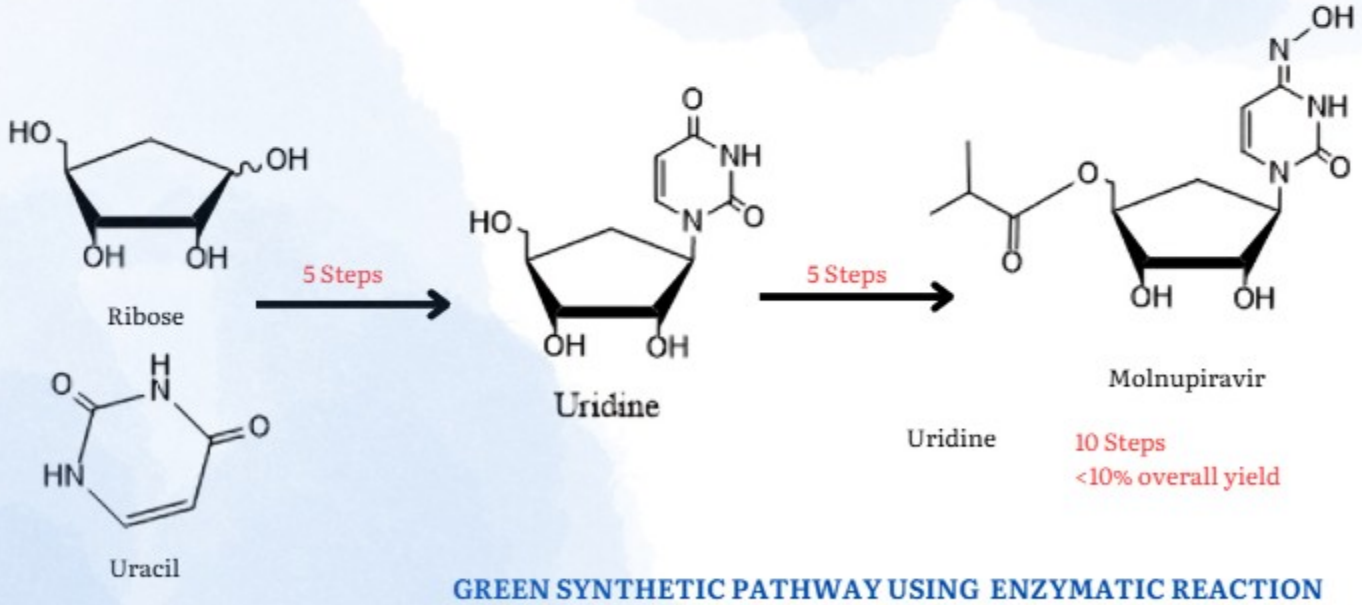
Chemical and pharmaceutical industries produce large chemical wastes along with useful chemicals and chemical products that affect the environment and living things. The production of undesirable and toxic substances and the use of toxic chemicals in the process pose a great life and environmental threat. Handling these chemical wastes is very difficult and expensive. To deal with these issues, a new branch of chemistry was established and postulated by Paul Anastas and the new branch is called Green Chemistry and governed by its 12 principles. "Green chemistry is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances".

## ORIGINAL SYNTHETIC ROUTE FOR MOLNUPIRAVIR

Initially, the Molnupiravir was synthesized from uridine in five steps, including the presence of organic solvents, derivatizations, and protections. Five-step synthesis displayed two major limitations, the first one is the acylation of 5'-OH from ribose and the second is the formation of the oxime on the pyrimidine ring. The biocatalytic and biosynthetic nucleoside pathways resulted in inefficient isolation of cytidine (unstable compound) from water and effective recovery of this compound didn't occur from enzymatic reaction.

Cytidine can undergo side reactions leading to the formation of undesired by-products or decomposition. These side reactions can decrease the amount of recoverable cytidine and decrease the overall yield.

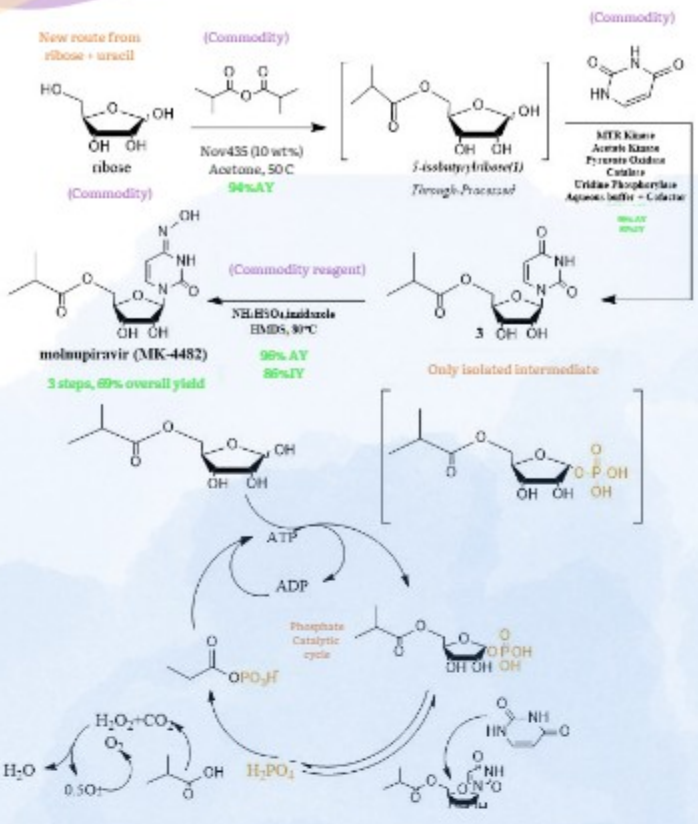
Also, the use of novozyme-435 in the esterification process caused several problems such as catalyst recycling, enzyme leaching and mechanical fragility. Overall, uridine was considered to be a non-optimal starting material for large-scale manufacturing.




## GREEN SYNTHETIC PATHWAY USING ENZYMATIC REACTION

There was a need to improve the synthesis and therefore a simplified three-step synthesis of Molnupiravir was developed from ribose. Three-step transformations included acylation of primary alcohol, nucleobase addition and installation of oxime. The preliminary studies revealed that cytidine and N-OH cytidine undergo deamination due to the addition of E.coli bacteria.

Using in vitro evolution, the bacterial enzymes greatly enhanced their activities. This route also included a phosphate recycling strategy and a mild dehydration reaction, compared to the initial process; it was 70% shorter and had a seven-fold higher overall yield than the original route. The strategy of drug synthesis using nucleoside-based therapeutics highlights the growing strength to discover and implement novel enzymes on an industrial scale. The Merck team is still developing a greener way to make Molnupiravir and in 2022, the US Environmental Protection Agency recognized their work Greener Reaction Conditions Award.





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## Who am I?



1. What is black when you buy it, red when you use it and gray when you throw it away?
2. I'm a molecule made from carbon, hydrogen, and oxygen, essential for life and found in fruits and vegetables. What am I?
3. I'm a type of pollution caused by excessive nitrogen and phosphorus in water bodies. What am I?

1. Answers: 1. Coal 2. Glucose 3. Eutrophication

# MOLECULES ON A MISSION
# SUSTAINABLE CHEMICAL MARVELS

Gaurav, B.Sc. (H) Chemistry, 1st year

Molecules are emerging as unsung heroes on a quest to transform the chemical environment in a world where sustainability is at the forefront of innovation. Chemical innovations that are sustainable, such as those listed below (refer to figure 1), have a big impact on creating a future that is more environmentally friendly. This article explores the innovative world of eco-friendly chemistry, showcasing how molecules are leading the charge towards a more sustainable future.




### 1) Bio Polymer

Traditional plastics have long been a menace to the environment, but bio-based polymers are emerging as sustainable alternatives. These polymers are derived from renewable raw materials, for example, corn or sugarcane. They offer the same versatility as traditional plastics but don't contribute to the global plastic pollution crisis.

Many new bio-based polymers eg. bio-based polyethylene have been commercialized. A bio-based polycarbonate-isosorbide can potentially be used as an alternative to petroleum-based polycarbonate. Corn-based isosorbide is used as a replacement for bisphenol A (BPA) monomer. Bio-based polymers are revolutionizing industries such as packaging and textiles with their eco-friendly footprint.

### 2) Carbon Capture Technologies

Carbon capture and storage (CCS) is a way of reducing carbon emissions, which could be the key to tackle global warming. CCS has been in operation since 1972 in the US, where several natural gas plants in Texas have captured and stored more than 200 million tons of Carbon dioxide underground.

There are three steps to the CCS process:

- Capturing the carbon dioxide for storage. The carbon dioxide is separated from other gases produced in industrial processes.
- Transport:-The carbon dioxide is then compressed and transported via pipelines, road transport or ships to a site for storage.
- Storage :-Ultimately, the carbon dioxide is injected into rock formations deep underground for permanent storage. Saline aquifers and depleted oil and gas reservoirs are two potential locations for carbon emission storage; these locations must normally be at least one kilometer below the surface.

### 3) Sustainable Solvents

Traditional solvents often pose risks to human health and the environment. Solvent losses represent a major portion of organic pollution, and solvent removal represents a large proportion of process energy consumption. Sustainable solvents, however, are changing the game by offering safer alternatives. For example, Ethyl lactate, is a solvent derived from processing corn and can be used in the paints and coatings industry. It has numerous attractive advantages including being 100% biodegradable, easy to recycle, non-corrosive, non-carcinogenic, and non ozone-depleting. The use of ethyl lactate has replaced solvents like xylene, acetone, and toluene, making the workplace far safer. These sustainable solvents are helping to create a greener and cleaner chemical industry, whether they are made from biomass or have minimal environmental impact.

### 4) Smart Agriculture with Precision Molecules

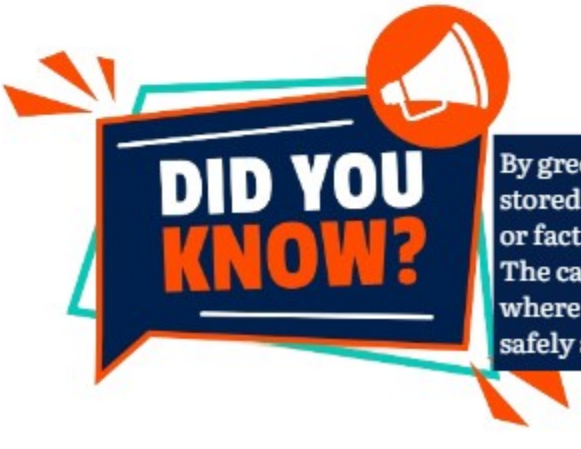
The coatings industry finds ethyl lactate to be very appealing due to its high boiling point, low vapour pressure, low surface tension, and strong solvency power. It is a highly effective graffiti remover and a desirable coating for metal, wood, and polystyrene. The use of ethyl lactate has replaced solvents like xylene, acetone, and toluene, making the workplace far safer.
These sustainable solvents are helping to create a greener and cleaner chemical industry, whether they are made from biomass or have minimal environmental impact.

## Conclusion

In conclusion, the scientific community is getting closer to a future in which innovation coexists quietly with the environment, opening the door to a more optimistic and environmentally conscientious future, as we continue to explore the potential of sustainable chemical marvels. As we continue to unlock the potential of sustainable chemical marvels, we inch closer to a world where innovation coexists harmoniously with the planet, paving the way for a brighter and more eco-conscious tomorrow.

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**By green method, Carbon dioxide can be safely and permanently stored underground. Carbon dioxide emissions from a power plant or factory are captured so they are not released into the atmosphere. The captured carbon dioxide is sent through a pipeline to a place where underground rock formations can store the carbon dioxide safely and permanently.**

# Electrode-Less Platinum Recycling via Induced Surface Potential



Ritu Singh, B.Sc. (H) Chemistry, 2nd Year

## Introduction:

Platinum recycling is crucial in modern industry and energy sectors, unfortunately the conventional methods use a lot of reagents and cause environmental issues. In this article, we explore a new methodology to recycle the Pt via the electrode-less process. This process excludes the need for external current or electrodes. This method is not only effective but also non-toxic for recycling the industrial catalysts such as Pt.

## On-line Electrode Potentials and Dissolution Measurements:

The authors used a scanning flow cell (SFC) to monitor electrode potentials and Pt dissolution in a commercial Pt black catalytic system (a small-scale reactor) for practical application.

## Effect of Different Gases on Pt Surface Potential:

Their findings confirmed the distinct effects of various gases on the surface potential of Pt (**Fig. 1**). For example, ozone was observed to effectively oxidize Pt, elevating the surface potential, while CO acted as a reductive agent, reducing Pt-oxide and lowering the potential. Importantly, the amount of hazardous gases that evolved during these processes was minimal compared to conventional methods.

## Transient Nature of Pt Dissolution:

The dissolution of Pt exhibited a predominantly transient nature, closely corresponding to shifts in surface potential induced by gas exposure. Increased frequency of gas exchanges led to higher dissolution yields, indicating the effectiveness of this approach in enhancing Pt dissolution.

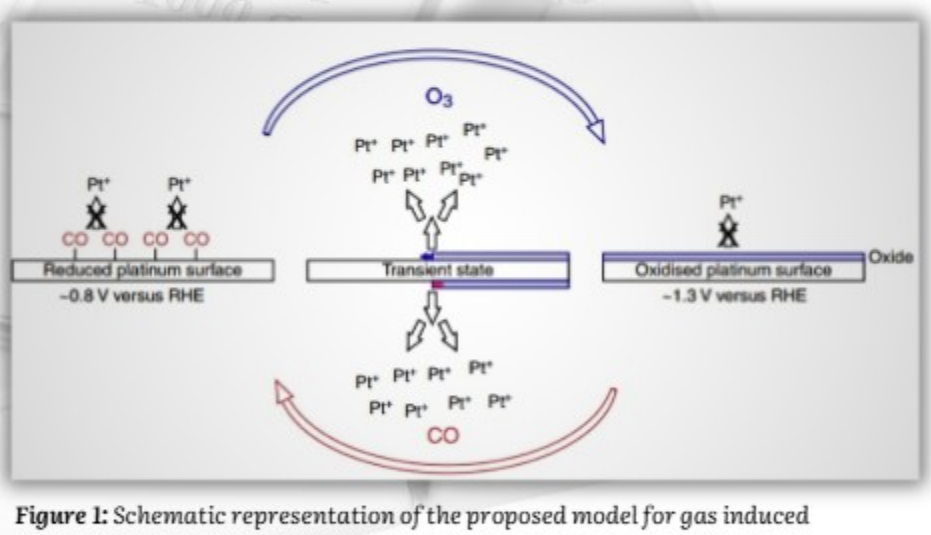



**Figure 1:** *Schematic representation of the proposed model for gas induced transient Pt dissolution.*

## Complete Dissolution Measurements:

The study of Pt dissolution in a controlled environment and a small-scale batch-type reactor was conducted to investigate the surface potential of the Pt black, using NaCl (to increase chloride concentration without raising HCl levels).

## Optimization of Electrochemical Potential Control:

To ensure precise control over the electrochemical potential in this new system, they monitored the OCP in real-time using a Pt wire electrode in the presence of Ozone and CO. The observed OCP variations are aligned well with the expected Pt oxidation and reduction processes.

### Effectiveness of Platinum Dissolution:

The concentration of dissolved Pt species in solution vs. the number of O3/CO cycles demonstrated that 20 cycles are sufficient to completely dissolve 10 mg of Pt black (**Fig. 2**). Additionally, there is a transformation of the initial black suspension of metallic Pt black into a yellow-coloured solution upon Ozone/CO cycling confirming the presence of hexachloroplatinic complex. These results corroborate the efficacy of their novel transient dissolution approach and validate the proposed mechanism.

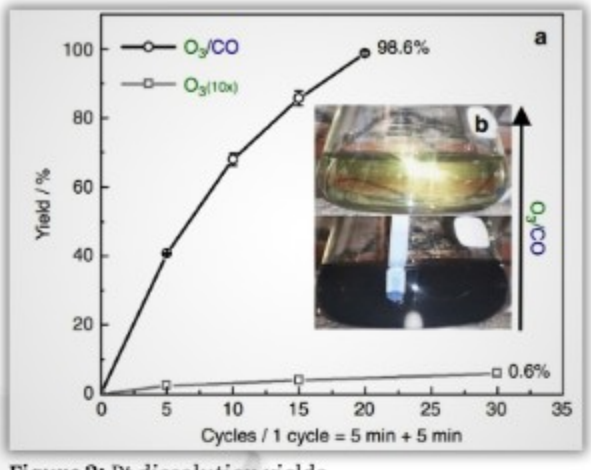


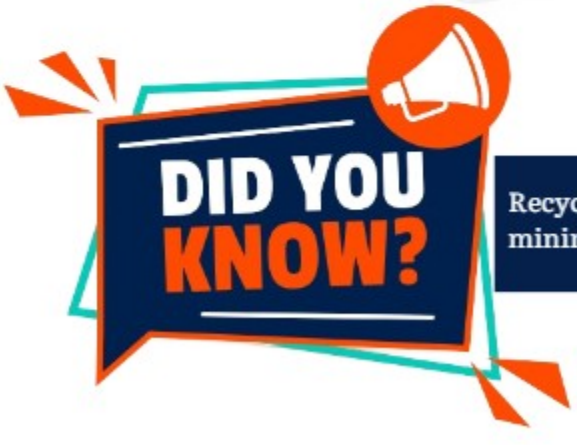

**Figure 2:** Pt dissolution yields.

### Literature Survey:

Lutsuzbaia et al. recently explored the concept of Pt transient dissolution for platinum recycling from proton-exchange membrane (PEM) fuel cells. However, their approach necessitates electrical contact through a potentiate, limiting its applicability to conductive catalytic systems on electrodes. In contrast, the ozone/CO cycling method has no such limitations. Conclusion and Future Directions: In this study, authors proposed an environmentally friendly, safe, cost-effective, scalable, and efficient method for platinum leaching/recycling. The technique, based on induced surface potential alteration without the use of external potential control, allows for platinum to leach and recycle under milder and safer conditions. They also suggest avenues for further optimization, including variations in sample treatment, gas choice, changing pH environment & chloride concentrations, reactor design, and degassing.

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**Recycling platinum produces about 1/20th of the emissions that mining for platinum does. This is a 95% reduction!**

# GREEN ENERGY REVOLUTION
## LEVERAGING RENEWABLE FEEDSTOCKS FOR RENEWABLE PRODUCTION

*Vaishnavi Bidhuri, B.Sc. (H) Chemistry, 2nd Year*

In an era marked by growing environmental concerns and the urgent need to transition towards sustainable practices, renewable feedstock emerges as a pivotal solution across various industries. From energy production to manufacturing processes, the utilization of renewable feedstock offers numerous benefits, including reduced carbon footprint, enhanced resource efficiency, and greater resilience to supply chain disruptions. Renewable feedstock is a resource that can replenish itself through natural processes and in a relevant amount of time. It is a kind of raw material that is used in chemical processes either in energy production or manufacturing other products that are used in the production. For example, biomass, wind, solar and geothermal energy offer a sustainable alternative to fossil fuels. An ideal renewable feedstock is one which possesses no harm to humans and the environment.

Renewable feedstock plays a significant role in reduction of greenhouse gas emissions and dependence on finite fossil fuel resources.

There are several types of feedstocks which can be utilized in various renewable production processes including the non-fossilized biodegradable organic matter from animals, plants, and micro-organisms. For example, Agro-based feedstock (food grain, cereals, manure, etc.), Terrestrial and Forestry residue (wood, wood waste, non-food plants etc.), Aquatic feedstocks (microalgae, macroalgae, seaweed, etc.) Wastes (Municipal solid waste; waste from paper, food, plastic, etc.). Renewable production processes use renewable feedstock to generate energy, chemicals, fuels, and other materials. Some common processes are Biogas generation, Hydroelectric power, Wind power and Solar photovoltaic systems.

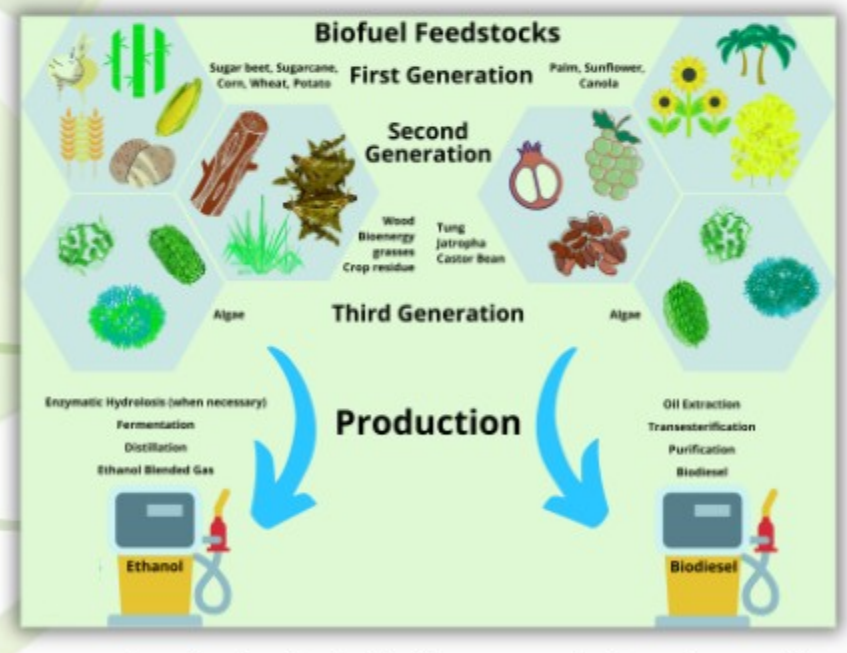



**Figure 1:**
*A schematic representation of the types and generation of biofuels.*

There are various technological advancements to enhance the processes, such as **biorefineries** which have enabled the integrated conversion of renewable feedstock into a wide range of products including biopolymers, biochemicals and biofuels; **Fermentation technology** employs the transformative power of microorganisms to convert renewable feedstock into valuable products and **enzymatic conversion** harnesses the remarkable abilities of enzymes to catalyze biochemical reactions, transforming renewable feedstocks into desired products with precision and efficiency.

Here are some of the major examples:

- The production of hexamethylenediamine from renewable feedstocks. There is an increased interest in the demand of biomass – derived chemicals rather than using petroleum – derived chemicals. While manufacturing nylon 66, hexamethylenediamine is used as an important intermediate. It can be produced by a catalytic system. There is no direct method to achieve this goal. With the advanced technologies many opportunities can be seen to develop hexamethylenediamine from biobased feedstocks.
- The **production of biodiesel** from renewable feedstocks have received considerable interest as an alternative fuel from plant origin such as plant oils. Both edible and non-edible oils are used among which edible is handier. Fuel is very important in our daily life and there is a huge demand by rapid population and industrialization growth. They are very commonly used for transportation. The mineral based fuels are exhausting the fossil fuels and the prices are increasing bit by bit. Also, these mineral based fuels are harming the environment by the emission of pollutants. Therefore, the introduction of biodiesel is an amazing alternative which reduces the number of pollutants emitted to great extent.
- **Adipic acid synthesis** from renewable feedstocks, is primarily for production of polyurethane resins, thermoplastic and nylon 66. Conventionally, it is prepared from benzene which is a non-renewable resource and hazardous. But recently a renewable feedstock, glucose is used to prepare adipic acid. It is environment friendly and biodegradable.



**Figure 2:** *Renewable feedstocks for biomass energy*

While renewable feedstocks present bright opportunities for sustainable energy production, several challenges must be addressed to realize their full potential. These include technological barriers, such as the development of efficient conversion processes and the scalability of production systems, as well as socio-economic considerations and resource allocation. The utilization of renewable feedstocks heralds a promising era in sustainable energy production. By tapping into the abundance of nature's resources, we can forge a path towards a cleaner, more resilient energy future. From biofuels derived from agricultural residues to biogas from organic waste streams and innovative algal biofuels, the potential for renewable feedstocks is vast and diverse. Embracing renewable feedstocks not only mitigates environmental degradation but also paves the way for greater energy security, economic prosperity, and a healthier planet for future generations. Together, let us harness the power of renewable resources to drive meaningful change and usher in a sustainable energy revolution.

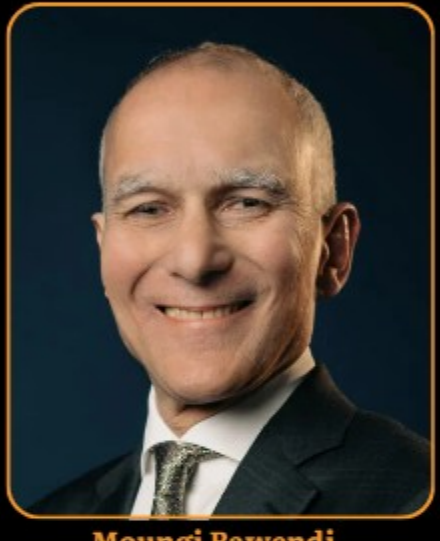
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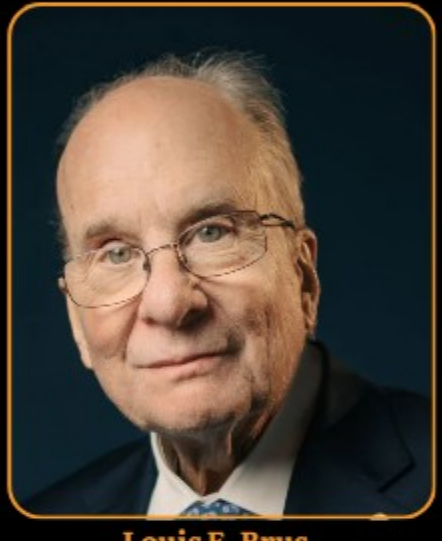



# The Nobel Prize
## Chemistry 2023

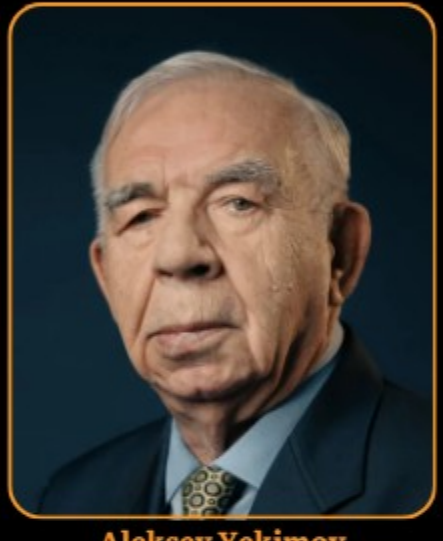
*Credit: Nitesh Kushwaha, B.Sc. (H) Chemistry, 2nd Year*



**Moungi Bawendi**
MIT, Cambridge
MA, USA



**Louis E. Brus**
Columbia University
New York, NY, USA



**Aleksey Yekimov**
Nanocrystals Technology Inc.
New York, NY, USA

**The Nobel Prize in Chemistry 2023 was awarded to Moungi G. Bawendi, Louis E. Brus and Aleksey Yekimov "for the discovery and synthesis of quantum dots"**

**Everyone who studies chemistry learns that an element's properties are governed by how many electrons it has. However, when matter shrinks to nano-dimensions quantum phenomena arise; these are governed by the size of the matter. The Nobel Laureates in Chemistry 2023 have succeeded in producing particles so small that their properties are determined by quantum phenomena.**

- Quantum dots are nanoscale semiconductor particles that exhibit unique quantum mechanical properties. They are typically composed of semiconductor materials like cadmium selenide (CdSe), cadmium sulfide (CdS), or indium arsenide (InAs), encapsulated in a shell to improve stability.
- The key characteristic of quantum dots is their size, which is on the order of nanometers (typically 2 to 10 nanometers in diameter). Due to their small size, quantum dots display quantum confinement effects, leading to distinct electronic and optical properties that differ from larger bulk materials. The most notable feature is the ability to tune their optical properties, such as the color of light they emit, by adjusting the size of the quantum dots.
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**Award category:**
**Greener Synthetic Pathways**

**Company/Academic name:**
**Solugen**

## DECARBONIZING THE PHYSICAL WORLD

Solugen is being recognized for developing the Bioforge™, a unique manufacturing platform that uses a chemical process to convert plant-derived substances into essential materials that have historically been made from fossil fuels—all without emissions or waste. A highly scalable and localized alternative to conventional chemical manufacturing processes, the Bioforge™ can produce a range of high-performance, cost-competitive, and sustainable solutions to meet the diverse needs of a wide range of markets including water treatment applications and detergents. An independent life cycle analysis indicates that this first-of-a-kind manufacturing platform eliminates over 20,000,000 lbs of hazardous chemicals and mitigates over 35,000 tpy of Carbon dioxide equivalences compared to traditional facilities.

**Award category:**
**Greener Reaction Conditions**

**Company/Academic name:**
**Captis Aire LLC**

## CHEMICAL ADSORPTION INNOVATION REDUCES EMISSIONS (CAIRE™) TECHNOLOGY

Captis Aire is being recognized for the patent pending CAIRE™ Technology that converts terpenes, a waste product produced during the wood manufacturing process, into valuable chemicals. Currently these terpenes – when above normal biogenic levels are an air pollutant and an irritant to eyes, lungs and skin – are burned as waste which releases greenhouse gases. The CAIRE™ Technology captures over 90% of the terpenes released from the wood products manufacturing process and converts them into many valuable chemicals including those used in products such as biofuels, flavors and fragrances.

**Award category:**
**Design of Greener Chemicals**

**Company/Academic name:**
**The Clorox Company**

## CLOROX ECOCLEAN™ DISINFECTING CLEANER

The Clorox Company is being recognized for designing Clorox EcoClean™ Disinfecting Cleaner, a Design for the Environment-certified disinfecting cleaner that can be used without personal protective equipment, will not bleach surfaces, is formulated without alcohol, and can be used safely on most surfaces. The product is a lactic acid-based, ready-to-use disinfectant cleaner that disinfects 99.999% of illness-causing germs in two minutes or less when used as directed.

**Award category:**
**Small Business**

**Company/Academic name:**
**Modern Meadow**

## MODERN MEADOW BIO-FREED™ POWERED BY BIO-ALLOY™

Modern Meadow is being recognized for developing a more efficient textile dyeing process called Bio-FREED™ Powered by Bio-Alloy™. Using the Bio-FREED™ platform, a bio-based protein foam can dye any type of fiber. This revolutionary process conserves 95% of water compared to traditional dyeing methods, reduces energy consumption by 75%, and utilizes 80% fewer dyes and chemicals. Bio-FREED™ does not require a separate step to fix the dye and requires one or even no washes at the end of the dyeing process, compared to 4-7 washes for traditional dyeing.

**Award category:**
**Specific Environmental Benefit-Climate Change**

**Company/Academic name:**
**Air Company**

## AIRMADE™ CARBON TECHNOLOGY

Air Company is being recognized for the development of a carbon dioxide removal technology that transforms the greenhouse gas carbon dioxide into larger molecules, which can then be used to produce other products such as fuels and fragrances. The only byproduct produced is oxygen gas. The technology both removes carbon dioxide from the air by using it as a chemical reactant and reduces the need for fossil fuels by transforming it into fuels, including aviation fuels.

**Award category:**
**Academic**

**Company/Academic name:**
**Professor Richard Laine**
**(University of Michigan)**

## UPCYCLING/VALORIZING A PLENTIFUL AGRICULTURAL WASTE

Professor Richard Laine from the University of Michigan is being recognized for developing multiple ways to refine agricultural waste into silica-based intermediates, which may be used in materials like lithium-ion batteries and lithium supercapacitors. Millions of tons of agricultural waste (e.g., rice hulls) are burned for fuel every year in the U.S. and worldwide. The resulting rice hull ash is a material containing large amounts of silica and relatively few impurities. Currently, silicon metal is typically produced by heating quartz with a carbon source such as coal. The process developed by Professor Laine operates at lower temperatures, requires less energy and emits less carbon than the current methods.

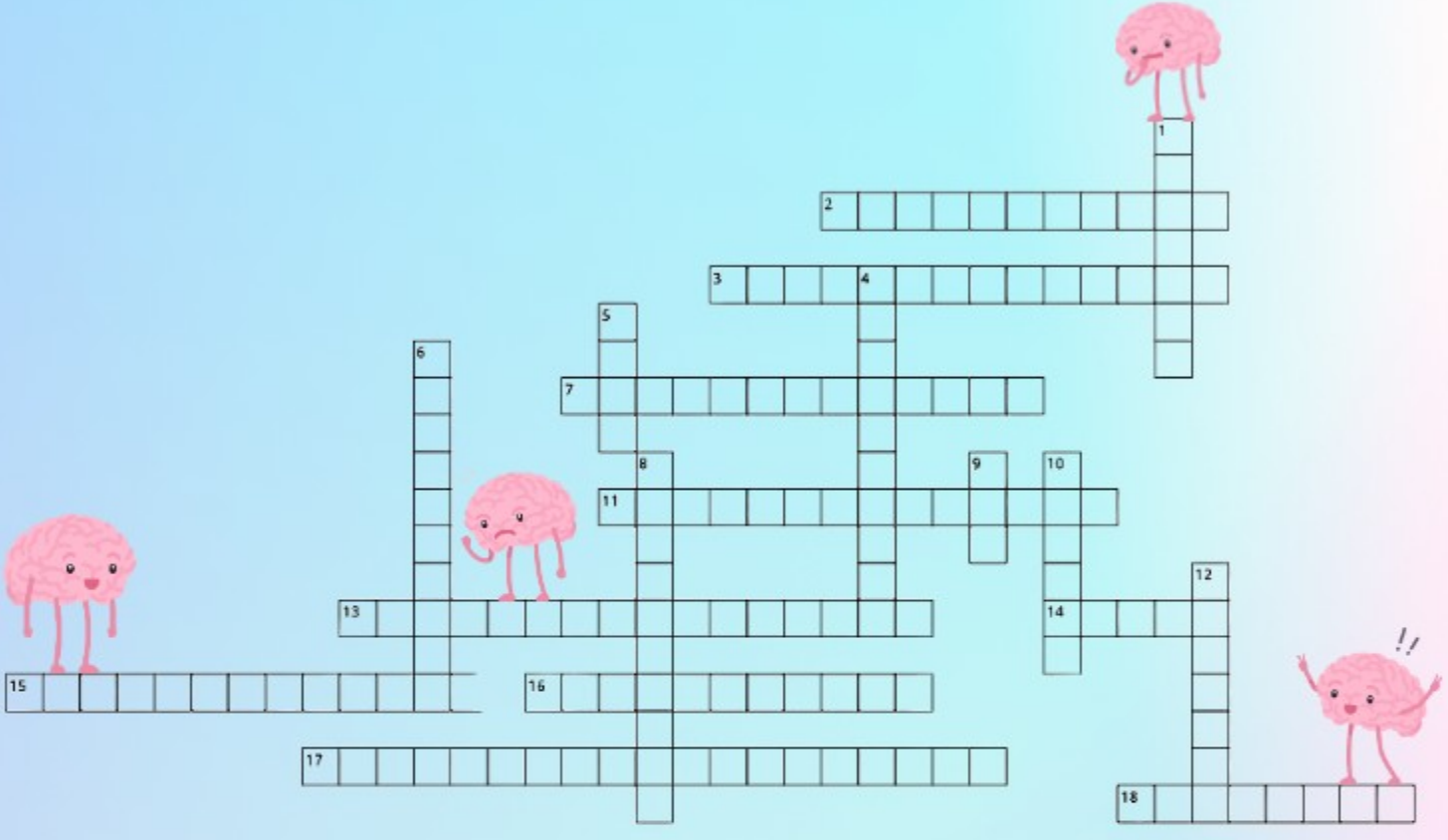
*Source: https://www.epa.gov/greenchemistry/green-chemistry-challenge-winners*



# CROSSWORD



**Credit: Astha, B.Sc. (H) Chemistry, 2nd Year**



**Across**

2. Father of green chemistry.
3. _____ is a goal to meet the needs of the present generation without compromising the ability of the future generations to meet their needs.
7. Dry ice at _____ state is a green alternative to PERC in the laundering industry.
11. Green chemistry prevents waste at the _____.
13. A bleaching agent that can be used as a Green solvent.
14. The chemical reactions are brought about by _____ waves.
15. _____ is a law of conservation of mass.
16. _____ a designer solvent.
17. The effect that rapidly reversing charges sets up a vibration that emits ultrasonic waves.
18. Designing safer chemicals by preserving the desired function while reducing their _____.

**Down**

1. It is a metric of the first principle of green chemistry.
4. This 'green' chemical can be used in household cleaning agent to remove stains and also used as a favorite salad-dressing.
5. It is a ubiquitous solvent and green solvent too.
6. _____ is 100% atom economy reaction.
8. Ability to measure a product or person's environmental impact.
9. It is a liquid polymer which can be used as a green reaction solvent.
10. _____ is the fourth "R" that is recently added to the traditional three "R"s green triangle.
12. Developer of recyclable carpets.

# RASAGYA: THE CHEMICAL SOCIETY
## AN INTRODUCTION

"RASAGYA", The Chemical Society has been the most actively engaged division of the Chemistry Department which organises several extracurricular activities including seminars, lectures, workshops, industrial visits, field trips, etc., all through out the year. Students are regularly given opportunities to update their knowledge on recent developments in science through interaction with outstanding chemists and researchers via lectures or seminars. Visits to reputed labs, institutions and industries each year provide students necessary scientific exposure to the real working world outside college. Moreover, various other extracurricular events are being conducted over the year for the students to improve their interpersonal skills, personality, and leadership potential simultaneously strengthening the bonding between students and teachers. Furthermore, the society routinely engages the students in the alumni interaction programme.

## THE CHEMICAL SOCIETY ACTIVITIES

### DR. V. KRISHNAMOORTHY EMINENT ALUMNI INTERACTION, 2023

An alumni interaction cum panel discussion on "Science of AI in Drug Discovery and Mapping your career journey in the field" was organised on 18th August, 2023 in which our students were given the opportunity to have an interaction with alumni of the chemistry department of our college Dr. Rohit Arora: Senior Application Scientist at Iktos, Greater Boston. Our students got useful information on their possible future career paths after completing their graduation from B.Sc.(H) Chemistry . A presentation was shown to students, along with the alumni showcasing his life story. Our talented and skilled alumni shared all the useful pieces of information he had gathered through his journey.





## INAUGURAL LECTURE

The Chemical Society celebrated its Golden Jubilee by organising inaugural lecture on 4th October, 2023 on the topic "Radiotheranostics for molecular imaging and precision nuclear medicine". Dr. Puja Panwar Hazari, Joint Director at INMAS, DRDO, an esteemed alumni of our college enlightened us with her knowledge and valuable insights. Her lecture started with brief introduction about importance of chemistry in various fields and everyday life followed by discussion on the event topic and question answer session. The students were enlightened by the information shared by her journey which will definitely act as a source of guidance and a ray of inspiration for all of them.





## DR. V. KRISHNAMOORTHY EMINENT ALUMNI INTERACTION, 2024





The Chemical Society organised the Dr. V. KRISHNAMOORTHY EMINENT ALUMNI INTERACTION, and a panel discussion on "Career prospects for graduates of chemistry" on 24th March, 2024. The esteemed alumni invited to the event were Dr. Rupashree Das, Dr. Pradeep Pant, Ms. Kirti Garg, Ms. Divya Gupta, Mr. Kashish Taneja, Ms. Anukriti Khare, Mr. Raj Pandey, Ms. Kanika Kamboj, Dr. Udita Bhattacharjee. The alumni interaction was fruitful and engaging thereby providing an opportunity for networking as well as insights. The students were enlightened by the information shared by their journey which will definitely act as a source of guidance and a ray of inspiration for all of them.

# JASHN-e-RASAYAN
## ANNUAL FEST, 2024

Rasagya, The Chemical Society, of Sri Venkateswara College organised its annual fest, **"Jashn-e-Rasayan"**, unfolded over two vibrant days, from 18.04.24 to 19.04.24, showcasing the enthusiasm and creativity of its members. With a lineup of seven captivating events, the fest was a celebration of chemistry in its myriad forms.




On the first day, the fest kicked off with an intellectually stimulating **"Chem Quiz"**, where participants showcased their knowledge. As questions flew like molecules in motion, participants showcased their mastery of the elements, demonstrating deep understanding of the science that binds our world together. The atmosphere was charged with excitement as teams competed for the coveted title of quiz champions.

Following the Chem Quiz, the atmosphere shifted gears as it was time for a friendly **"Departmental Cricket Match"** between students and teachers. The students and teachers found expression on the cricket field, where both sides battled it out in a spirited match. Laughter and camaraderie filled the air as players displayed their sporting prowess, fostering a sense of unity among all participants and students emerged victorious.







As the dawn of the second day illuminated the horizon, minds converged once again, this time in pursuit of a vision for a more sustainable future. The **"Speaker Session on Sustainable Chemistry"** served as a beacon of enlightenment, illuminating pathways toward a self-reliant Bharat. Prof. Sreedevi Upadhyayula from IIT Delhi shared insights and strategies, igniting a flame of innovation and stewardship that would guide us towards a greener, more resilient tomorrow.

With curiosity as their compass and imagination as their fuel, participants delved into the world of experimentation at the **"Mad Scientist's Playground"**. Here, the ordinary gave way to the extraordinary as dazzling reactions captivated the senses. It offered a hands-on environment where participants were engaged in various experiments, demonstrations and activities related to chemistry in a fun and educational way.



From the laboratory to the limelight, participants transitioned seamlessly into the **"AD-Mad"** competition, where creativity knew no bounds. From quirky jingles to captivating visuals, each ad left a lasting impression, demonstrating the power of effective communication. The event provided participants with a platform to unleash their creativity and marketing skills as they crafted captivating advertisements for chemical products.







Amidst all the creativity, the **"Treasure Hunt"** added an element of adventure to the fest, as participants embarked on a thrilling quest to uncover hidden clues scattered throughout the campus. Clues led teams on a journey of discovery, testing their problem-solving skills and teamwork along the way.



As the sun dipped below the horizon, the campus came alive with the rhythmic beats of the **"DJ and Paper Fold Dance"** event. Amidst laughter and cheers, the dance floor became a canvas of creativity, a celebration of spontaneity and joy.

With the prize distribution ceremony, Jashn-e-Rasayan'24 came to a close, leaving behind a tapestry of experiences and a renewed appreciation for the wonders of chemistry. As participants dispersed, carrying with them the spirit of discovery and celebration, they embarked on their own journeys, each step guided by the light of knowledge and the promise of a brighter future.

# MEET THE STAFF

## Teaching



**Left to right:**

**Top row:** Dr. Murali Mohan Achari Kamsali, Dr. Ravindra Kr. Upadhyay, Dr. Vinita Kapoor, Dr. Thoti Vasantha, Dr. Shikha Gulati, Dr. Meena Bisht, Dr. Neelam Kumari, Dr. Seella Ramanaiah, Dr. Ramavath Janraj Naik, Dr. Yenugu Veeramanohara Reddy,

**Bottom Row:** Mr. Harshvardhan Meena, Dr. Pooja, Dr. Rangarajan T.M., Prof. Sanjay Batra, Dr. Mercy Kutty Jacob, Prof. Sharda Pasricha, Dr. Vibha Saxena, Dr. Shefali Shukla, Dr. Pragya Gahlot, Dr. Rekha Yadav, Ms. Laisharam Saya Devi, Dr. Chandra Sekhar Tekuri

## Non-Teaching



**Left to right:**

**Top row:** Ramniwas, K C H Adinarayna, Anil Kumar, M Venkatpati Rao, Tersem, Vinod, Ashish Giri, Anil Kumar

**Bottom Row:** K Vasantha Rao, Shitla Prasad, Yogender, C H Venkateswara Rao, Sachin, Jatin, Nikhil, Neetu, Anjana, Baljeet, M Venkateswara Rao

# TEACHERS ACHIEVEMENTS




## BOOK CHAPTERS

| | |
|---|---|
| Dr. Shefali Shukla | 2 |
| Dr. Vinita Kapoor | 1 |
| Dr. Shikha Gulati | 13 |
| Ms. Laishram Saya Devi | 2 |

# STUDENTS ACHIEVEMENTS



**Anoushka Amar (3rd Year)**

- **Review Article:** Cyclodextrin-Based Nanosponges as an Environmentally Sustainable Solution for Water Treatment
- **Book Chapter:** General Synthetic Routes for Various Nanosponges
- **Book Chapter:** Introduction to Nanosponges



**Lakshita Chhabra (3rd Year)**

- **Book Chapter:** Green synthetic routes for various Nanosponges
- **Book Chapter:** Biocompatibility, Toxicity Concerns, Environmental and Safety Considerations, Legal and Commercialization Aspects of 2D Nanomaterials
- **Book Chapter:** Sustainability of nanomaterials: retrospects and prospects



**Riya Katiyar (3rd Year)**

- **Review Article:** Metal organic frameworks as effectual diagnostic and therapeutic tools for cancer



**Ankita (2nd Year) and Nandini Pabreja (2nd Year)**

- **Book Chapter:** Concluding Remarks and Future Perspectives of Nanosponges in Environmental Remediation
- Secured first position in "Think Green - Sustainable Practices for Better Tomorrow" event in "Jashn-e-Rasayan" the annual fest organised by Rasagya



**Vanshika Gulati (3rd Year)**

- Vice president - Nrityangana ( The Indian Dance Society), 2023-24
- Secured Ist position (five times), 2nd position (two times) and 3rd position (two times) in Inter College/University Group folk dance competitions



**Bhupendra Singh (2nd Year)**

- Selected in NIUS (Chemistry) camp at HOMI BHABHA CENTRE FOR SCIENCE EDUCATION (TIFR)



**Arjun Singh (3rd Year)**

- Appointed as Company Quarter Master Sergeant in NCC SVC



**Bikaramjeet Kaur (3rd Year)**

- **Research Paper:** Graphene based nanomaterials as potential candidates for environmental mitigation of pesticides
- **Book Chapter:** Cellulose- Based Nanosponges for Wastewater Remediation



**Divya (3rd Year)**

- General Secretary-Equal Opportunity Cell, 2023-24



**Ashish Kumar Jha (2nd Year)**

- Secured first position in "Think Green - Sustainable Practices for Better Tomorrow" event in "Jashn-e-Rasayan" the annual fest organised by Rasagya



**Gracy Parashar (3rd Year)**

- Vice President-Aurora:The Human Enhancement Club, 2023-24

# FRESHERS' 23






Every student looks forward to the fresher's celebration from the moment of admission. It's a thoughtful way for second and third-year students to extend a hearty welcome to newcomers. The freshmen party is the first chance for new students to meet seniors, form friendships, and become acquainted with the college. On October 07, 2023, the Department of Chemistry students hosted the Freshers Party 2023. Various games and events were planned for that day, and winners received exciting titles For a new student, it is one of the most unforgettable moments. That day, so many wonderful memories were made for everyone to live a lifetime, were captured.

# TEACHERS' DAY, 2023



In India, the teachers' day was first commemorated in 1962. The day was declared to honor Dr. Sarvepalli Radhakrishnan's birth anniversary. He served as India's second president and first vice president after independence. Our chemistry department enthusiastically celebrated Teachers' Day. The students planned the entire event. Some of the students also gave brief comments to thank the professors. On this unique occasion, students showcased their cultural talents through dance, and other performances. To keep the teachers entertained, the students also planned a few enjoyable games for them. The program was appreciated and enjoyed by all the teachers. As a whole, the entire event gave teachers fresh optimism to enjoy their career as educators. The main theme of the event was "Celebrating Teachers on Teacher's Day."



# VISIT TO VIGYAN BHAWAN
## ON THE OCCASION OF
# NATIONAL SCIENCE DAY




In India, National Science Day is usually observed to honor Indian scientist Sir C.V. Raman, who discovered the Raman phenomenon. With this discovery, Raman was awarded the 1930 Nobel Prize in Physics, marking a momentous milestone in the realm of physics. The purpose of National Science Day is to inspire people to interact with science and its tenets and to foster a scientific temper. To commemorate this day, science-related events like competitions, seminars, lectures, and exhibitions are planned all around the nation. This year, we have the good fortune to have been invited to the Department of Science and Technology's National Science Day ceremony, which will take place at Vigyan Bhawan on February 28, 2024. Second-year chemistry majors had the chance to network with national officials and scientists from throughout the nation. The main subject of the 2024 National Science Day event at Vigyan Bhawan was Indigenous Technologies for Viksit Bharat (hybrid mode). When the dignitaries arrived, the function got underway. The honorable minister of science and technology, Dr. Jitendra Singh, was invited as the main guest. The chief guest officially opened the display of concepts chosen under IRIS. Prof. Abhay Karandikar, Secretary, DST, and Dr. Rajesh S. Gokhale, Secretary, DST, gave welcome addresses to kick off the event.

Prof. Bhaskar Ramamurthi delivered the first lecture of the day on the subject of "Telecom technologies for making India a developed country." He gave an overview of Atmanirbhar Telecom's goals and present situation. A renowned scientist from the Raman Research Institute in Bengaluru, Urbasi Sinha, delivered the second lecture of the day on the subject of "Quantum technologies for Viksit Bharat." The panel discussion, in which a number of students took part, came shortly.

# GOING GREEN

IS NOT A **CHOICE**

IT'S A **RESPONSIBILITY**