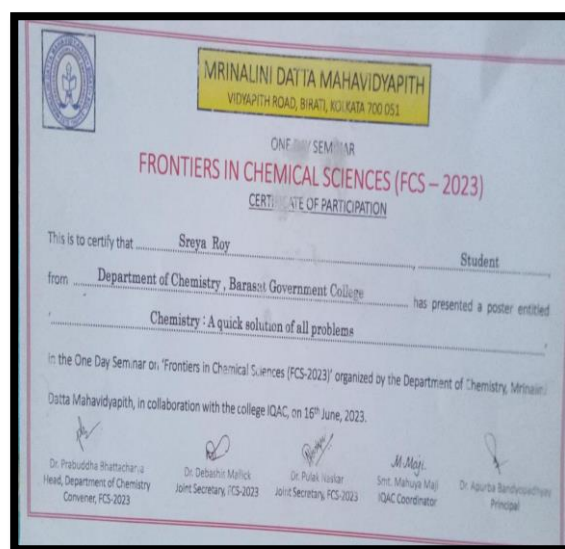
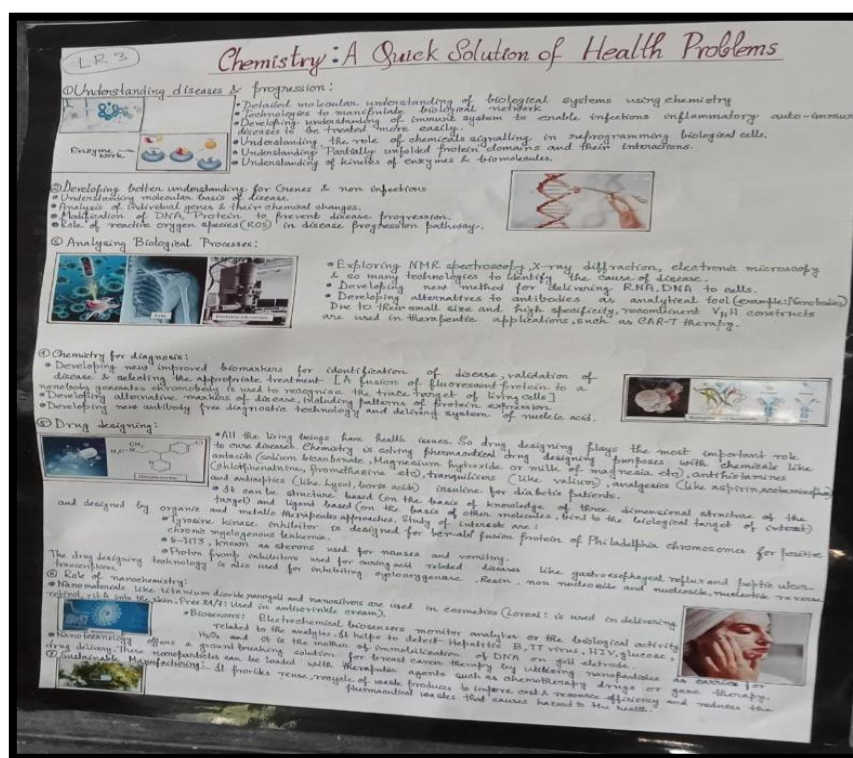


STUDENT PARTICIPATION IN POSTER AND QUIZ COMPETITIONS

A. Poster competition held at Mrinalini Dutta Mahavidyapith on 16th June, 2023

Team 1 Sreya Roy, Dipanjana Bhattacharyya, Sem VI (Chemistry Hons)



Team 2. Nelov Mallick, Esha Paul, Sem VI (Chemistry Hons)

COMPUTATIONAL NANOTECHNOLOGY

Computational Drug Designing

Briefly introducing the computational chemistry in a nutshell. Computational chemistry just prescreen our library of compounds before we actually go into the lab and synthesize them and spend inordinate amount of times trying to make them and finally test them.

Step 1. de novo Molecular Design
So to do this we use computer models for drug discovery. It starts off with de novo molecular design (design of compounds, with proper therapeutic Properties) which is almost analogous to the analog design of the traditional drug discovery process and it's where we figure out what we want to screen.

Step 2 . DFT
Then we go to something called Density Functional Theory (DFT) (Quantum mechanical structure Optimization). We just plug in the molecule and through there and it completely optimized like it would be in the real environment.

Step 3. Molecular Docking
Then after that we can use "Molecular Docking" (thermodynamics of Protein-ligand interaction) where we can see how, secondly can tell us how well this compound would bind to the protein and that's really powerful because if our compound binds really well to that protein then it will be worth synthesizing. But if it doesn't bind much well to the protein in the first place we don't want to be spending those years making the nonsense.

Step 4. Protein Simulation
Finally there comes "Molecular Dynamics simulation" (Protein Simulation) this shows a real time simulation of the protein against the compound. All of these just shows so many computational techniques to help to refine the drug designing process.

Conclusion:
The future of medicine is bright and hopeful with the latest technologies particularly nanotechnology emerging to give us an optimistic view of solutions relating to diseases and their dilemmas.

Nanotechnology for Modern Medicine: Next Steps towards Clinical Translation


Biological drugs are revolutionizing medicine. Our understanding of how biological systems target the outside of cells curtailed a pandemic saving millions of lives. But even the most capable medicine at that time failed successfully.

Nanorobots
Nanorobots are nano devices used for the purpose of protecting the human body against pathogens. Nanorobots are built by many elements or parts like actuators, sensors, power, control, communication and by interfacing cross-scales between organic inorganic systems.

Application of Nanorobotics

- 1. Nanorobotics in Surgery**
Surgical nanorobots act as semi-autonomous on-site surgeon inside the human body and are programmed or directed by a human surgeon. This surgical nanorobots performs the varied functions like find out the pathogens, and then kills them or diagnosis and correction of lesions by nano-manipulation synchronized by an on-board computer while conserving and contacting with the supervisory surgeon through coded ultrasound signals.
- 2. Molecular imaging**
A powerful tool to visualize molecular events of an underlying disease. The merging of nanotechnology with molecular imaging provides a versatile platform for the novel design of nanoprobes that will have potential to increase the sensitivity, specificity and signalling capabilities of various biomarkers in human diseases. An MRI with Magnetic hybrid nanoprobes and adenovirus can detect target cells and monitor gene delivery and expression of green fluorescent proteins optically.
- 3. Nanorobots in Cancer Detection and Treatment**
The current stages of medical technologies and medical care tools are used for the successful treatment of cancer. The vital side to attain a successful treatment is based on the improvement of economical drug delivery to decrease the side-effects from the chemotherapy. Nanorobots in Cancer Detection and Treatment. Nanorobots with embedded chemical biosensors are used for detecting the tumour cells in early stages of cancer development within patient's body.

Created By
Esha Paul & Nelov Mallick
(Barasat Government College)



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VIDYAPATH ROAD, BIRATI, KOLKATA 700 051


ONE DAY SEMINAR
FRONTIERS IN CHEMICAL SCIENCES (FCS – 2023)
CERTIFICATE OF PARTICIPATION


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
from Department of Chemistry, Barasat Government College has presented a poster entitled


Computational Nanotechnology revolutionizing the era of medicine


In the One Day Seminar on Frontiers in Chemical Sciences (FCS-2023) organized by the Department of Chemistry, Mrinalini Datta Mahavidyalaya, in collaboration with the college IQAC, on 16th June, 2023.


Dr. Prabuddha Bhattacharya
Head, Department of Chemistry
Convener, FCS-2023


Dr. Debashis Mallick
Joint Secretary, FCS-2023


Dr. Pulek Naskar
Joint Secretary, FCS-2023


Smt. Mahuya Maji
IQAC Coordinator


Dr. Apurba Bandyopadhyay
Principal



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
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FRONTIERS IN CHEMICAL SCIENCES (FCS – 2023)
CERTIFICATE OF PARTICIPATION

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from Department of Chemistry, Barasat Government College has presented a poster entitled


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IQAC Coordinator


Dr. Apurba Bandyopadhyay
Principal

Team 3 : Pallbita Ghosh , Adrita Paul Sem II (Chemistry Hons)

SYNTHESIS OF AMMONIA

Abstract

Ammonia synthesis is a vital industrial process that converts nitrogen (N₂) and hydrogen (H₂) into ammonia (NH₃) gas developed by Fritz Haber and Carl Bosch in the early 20th century. This process plays a crucial role in various industries, from fertilizers to chemical manufacturing. The production through the Haber-Bosch process revolutionized the global economy and transformed the modern society.

Ammonia's role in Human Body

Ammonia is not essential for the human body directly. Instead, high levels of ammonia are harmful for human body. But Nitrogen is a crucial element for the synthesis of proteins and other molecules.

Each protein is a polymer of amino acid and amino acid contains N₂. They are essential for building and repairing tissues, producing enzymes and hormones. When proteins are broken down, ammonia is converted into a less toxic compound called urea in the liver through a process called urea cycle. Urea is eventually excreted from the body through urine and by this process ammonia balance the amount of nitrogen (N₂) in our human body.

Respiration and Air Conditioning

Ammonia has excellent thermodynamic properties and it acts as an excellent refrigerant. It is commonly used in industrial refrigeration systems, cold storage facilities and large scale air conditioning systems. Ammonia based refrigeration is preferred over its counterparts because of its high energy efficiency.

The Haber-Bosch Process

The Haber-Bosch process is a chemical method of ammonia synthesis. The process takes place under high pressure (100-200 atm) and temp (400-500°C), using an iron catalyst. Nitrogen gas and hydrogen gas are compressed and fed into a reactor, where they undergo a series of reactions to produce ammonia. The reaction is exothermic, i.e., it releases heat. The balanced equation for Haber-Bosch process is:

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

Fertilizer

Ammonia is widely used in the agricultural industry as a key ingredient in fertilizers. It provides a nutrient for plant growth. Ammonia based fertilizers, such as ammonium nitrate (NH₄NO₃), urea (CO(NH₂)₂), and ammonium sulfate ((NH₄)₂SO₄). These help improve crop yield and promote healthy plant development.

Water Treatment

Ammonia is used in water treatment processes, particularly in the removal of ammonia like chloramines. It reacts with chlorine to form chloramines, which are less harmful and milder than chloramines. Ammonia is also used as disinfectants in swimming pools and drinking water treatment facilities.

Disadvantage:

- The process requires high temp & pressure, which demand huge energy inputs. This makes it an energy-intensive process, contributing to high production cost and environmental concerns associated with energy consumption.
- The release of the production of H₂ gas, mainly derived from fossil fuels, which leads to the release of CO₂ and other harmful greenhouse gases.

Industrial-Manufacturing

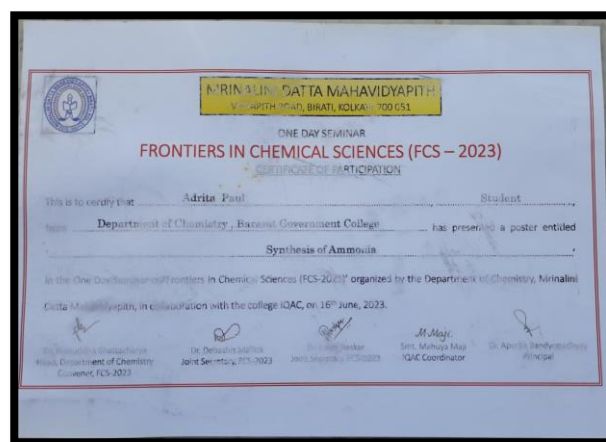
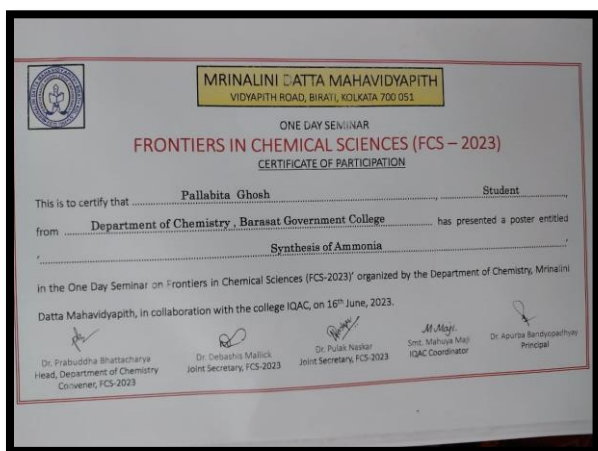
Ammonia is a vital raw material in the production of various chemicals and materials. It is used in the manufacturing of fertilizers, plastics, fibers, explosives, pharmaceuticals, and cleaning agents. Ammonia is also employed in the production of nitric acid (HNO₃), which is used in the manufacturing of explosives and other chemicals.

Disadvantage:

For ammonia synthesis, we have to overcome special infrastructure like large scale industrial plants, high-pressure vessels and complex catalyst systems. Moreover, ammonia is a toxic and hazardous substance and its handling requires special precautions. Ammonia leaks cause health risk to humans and nearby communities. Additionally, ammonia is flammable and can form explosive mixtures with air, increasing the chances for accidents.

Conclusion:

Ammonia has large applications in our daily life. It is used in various plants from our daily life in different industries. Research and development efforts are underway to improve the yield of ammonia synthesis. These include, but not limited to, the energy consumption & to minimize the environmental impact.



B. Quiz program held in Presidency University on 31st March, 2023

Team Members: Nelov Mallick, Arkadip Mondal, Prerana Chowdhury

