INDIAN INSTITUTE OF TECHNOLOGY PATNA

THC TRIBUNE

Vol. 8

A MAGAZINE FOR CHEMICAL COMMUNITY

Magazine Fabricated by :
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Apr 16, 2017

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1 ALL AROUND THE WORLD

1.1 X-ray study reveals long-sought insights into potential drug targetCatalytic reaction also reduces pollution!!

Researchers hope to design a new generation of drugs against an array of deadly diseases. One of the key challenges is understanding a particular class of proteins adorning cell surfaces, which are the targets of the majority of pharmaceutical drugs. Scientists have now examined one promising drug target in luminous detail, using a device known as an X-ray free electron laser, or XFEL.
Link : https://www.sciencedaily.com/releases/2017/04/170405131021.htm

1.2 Mini brains from the petri dish!!

A new method could push research into developmental brain disorders an important step forward. This is shown by a recent study in which the researchers investigated the development of a rare congenital brain defect. To do so, they converted skin cells from patients into so called induced pluripotent stem cells. From these jack-of-all-trades cells, they generated brain organoids small three-dimensional tissues which resemble the structure and organization of the developing human brain.
Link: https://www.sciencedaily.com/releases/2017/04/170404124406.htm

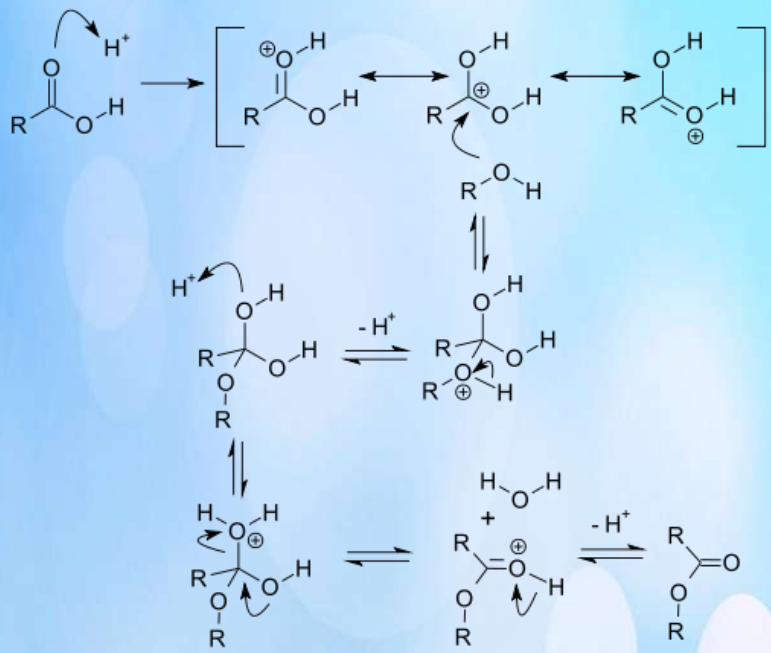
1.3 The dynamic surface tension of water!!

The surface tension of a liquid is a measure of the cohesive forces that hold the molecules together. It is responsible for a water drop assuming a spherical shape and for the effects of surfactants to produce bubbles and foams. The value of the surface tension of water at room temperature is known accurately to four significant figures and is recommended as a standard for the calibration of other devices. New research shows that this value is not as universal as previously believed.
Link : https://www.sciencedaily.com/releases/2017/04/170403140252.htm

2 LEARNING ZONE

2.1 Fischer-Speier Esterification

Fischer esterification or FischerSpeier esterification is a special type of esterification by refluxing a carboxylic acid and an alcohol in the presence of an acid catalyst. The reaction was first described by Emil Fischer and Arthur Speier in 1895. Most carboxylic acids are suitable for the reaction, but the alcohol should generally be a primary or secondary alkyl. Tertiary alcohols are prone to elimination.



The reaction mechanism for this reaction has several steps:
1: Proton transfer from acid catalyst to carbonyl oxygen increases electrophilicity of carbonyl carbon.
2: The carbonyl carbon is then attacked by the nucleophilic oxygen atom of the alcohol.
3: Proton transfer from the oxonium ion to a second molecule of the alcohol gives an activated complex.
4: Protonation of one of the hydroxyl groups of the activated complex gives a new oxonium ion.
5: Loss of water from this oxonium ion and deprotonation gives the ester.

3 INFORMATION ZONE

3.1 National Aluminium Company Limited

NALCO is the reputed known name of the National Aluminium Company Limited. Formerly NALCO was called as National Aluminium Company Limited. Applicants can get more information about NALCO Recruitment Through GATE 2017 such as eligibility ,application ,procedure ,selection process and much more in the below article.

Figure 1: NALCO

Description of NALCO :-

National Aluminium Company Limited, abbreviated as NALCO, (incorporated 1981) has units in Odisha at places like Angul and Damanjodi. It was incorporated as a public sector enterprise of the Ministry of Mines, Government of India in 1981. It is Asias largest, and the sixth largest, integrated aluminium complex, encompassing bauxite mining, alumina refining, aluminium smelting and casting, power generation, rail and port operations.

The main units of NALCO are at Damanjodi (Mines and Refinery complex) and Nalconagar, Angul (Smelter and Power Plant Complex). The Bauxite mines called Panchpatmalli Mines is situated atop a set of five mountains called Panchpatmalli. These mines are open cast mines. The refinery complex for producing bauxite is located in Damanjodi. The smelter unit of NALCO is located in Nalconagar, Angul. The companys headquarters are located in Bhubaneswar, which is the capital of the Indian state

of Odisha.

Candidates should have a bachelor degree in Mechanical, Electrical, Electronics, Instrumentation, Metallurgy, Civil, mining, Chemical or Computer science engineering discipline.
Candidate must have qualified in GATE 2017.

Age Requirement :-

General Candidates : 30 years
OBC candidates (Non Creamy Layer) : 33 years
SC/ST candidates : 35 years
PwD candidates :
PwD General candidates : 40 years
PwD OBC : 43 years
PwD SC/ST : 45 years

Selection Process of NALCO Recruitment 2017 :- Candidates will be selected on the basis of GATE 2017 Score Card. The final selection will be done after the completion of Personal Interview.

NALCO Recuitment 2017 Application :- Students have to fill first GATE 2017 application form.
Students must log on official web page of NALCO such as www.nalcoindia.com.

Pay Scale :-
Passed candidates pay scale will be Rs. 16,400-40,500/-

4 EXPLORE ZONE

4.1 Astrochemistry

Astrochemistry is the study of the abundance and reactions of chemical elements and molecules in the universe, and their interaction with radiation. The discipline is an overlap of astronomy and chemistry. The word "astrochemistry" may be applied to both the Solar System and the interstellar medium. The study of the abundance of elements and isotope ratios in Solar System objects, such as meteorites, is also called cosmochemistry, while the study of interstellar atoms and molecules and their interaction with radiation is sometimes called molecular astrophysics. The formation, atomic and chemical composition, evolution and fate of molecular gas clouds is of special interest, because it is from these clouds that solar systems form.

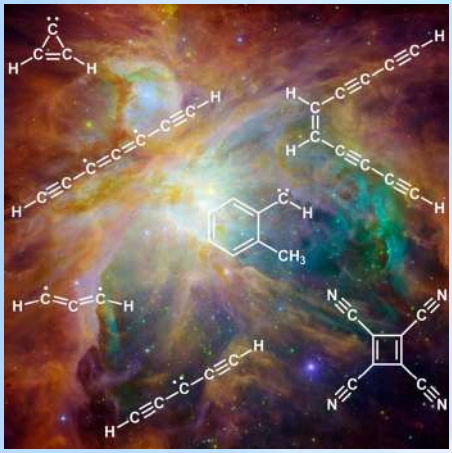


Figure 2: Astrochemistry

One particularly important experimental tool in astrochemistry is spectroscopy, the use of telescopes to measure the absorption and emission of light from molecules and atoms in various environments. By comparing astronomical observations with laboratory measurements, astrochemists can infer the elemental abundances, chemical composition, and temperatures of stars and interstellar clouds. This is possible because ions, atoms, and molecules have characteristic spectra: that is, the absorption and emission of certain wavelengths (colors) of light, often not visible to the human eye. However, these measurements have limitations, with various types of radiation (radio, infrared, visible, ultraviolet etc.) able to detect only certain types of species, depending on the chemical properties of the molecules.

Interstellar formaldehyde was the first organic molecule detected in the interstellar medium.

Perhaps the most powerful technique for detection of individual chemical species is radio astronomy, which has resulted in the detection of over a hundred interstellar species, including radicals and ions, and organic (i.e. carbon-based) compounds, such as alcohols, acids, aldehydes, and ketones. One of the most abundant interstellar molecules, and among the easiest to detect with radio waves (due to its strong electric dipole moment), is CO (carbon monoxide). In fact, CO is such a common interstellar molecule that it is used to map out molecular regions. The radio observation of perhaps greatest human interest is the claim of interstellar glycine,the simplest amino acid, but with considerable accompanying controversy. One of the reasons why this detection was controversial is that although radio (and some other methods like rotational spectroscopy) are good for the identification of simple species with large dipole moments, they are less sensitive to more complex molecules, even something relatively small like amino acids.

5 LET'S TALK CHEMISTRY

5.1 Chemistry in everyday life

How to make invisible ink?

You can play with your kids at home making invisible ink with basic products that you have in the kitchen. There are many methods to make invisible ink. These are some of the easiest ones.

Lemon juice method

- Ingredients: just lemon juice.

Write your message on a piece of paper with a brush or tootpick embedded in lemon juice. Let it dry completely.

To read the message heat the paper for a while (for instance hold it close to a light bulb) until the words become visible. Warning: do not hold paper too close to the heat and be careful not to let it get too hot!

- Chemical explanation: Lemon juice is a mild acid that weakens the paper upon contact. So when you heat the paper the part with the juice burns before the rest making your message visible.

Baking soda method - Ingredients: baking soda and water in same amount (for instance 30 mL of each).

Mix them and use a toothpick or brush to write on a piece of paper. Wait until it dries completely.

To read the message paint the paper with a brush or a sponge embedded in concentrated grape juice. The message should show up.

- Chemical explanation: You've made an acid-base reaction. The baking soda is a basic compound that reacts with the acid contained in the apple juice, forming a new compound that has a different colour, making your message become visible.

6 NOBEL LAUREATES IN CHEMISTRY

The Nobel Prize in Chemistry 2010 was awarded jointly to Richard F. Heck, Ei-ichi Negishi and Akira Suzuki "for palladium-catalyzed cross couplings in organic synthesis"

Figure 3: Richard Heck, Ei-ichi Negishi and Akira Suzuki

Great art in a test tube

Organic chemistry has developed into an art form where scientists produce marvelous chemical creations in their test tubes. Mankind benefits from this in the form of medicines, ever-more precise electronics and advanced technological materials. The Nobel Prize in Chemistry 2010 awards one of the most sophisticated tools available to chemists today.

2010 year's Nobel Prize in Chemistry is awarded to Richard F. Heck, Ei-ichi Negishi and Akira Suzuki for the development of palladium-catalyzed cross coupling. This chemical tool has vastly improved the possibilities for chemists to create sophisticated chemicals, for example carbon-based molecules as complex as those created by nature itself.

Carbon-based (organic) chemistry is the basis of life and is responsible for numerous fascinating natural phenomena: colour in flowers, snake poison and bacteria killing substances such as penicillin. Organic chemistry has allowed man to build on nature's chemistry; making use of carbons ability to provide a stable skeleton for functional molecules. This has given mankind new medicines and revolutionary materials such as plastics.

In order to create these complex chemicals, chemists need to be able to

join carbon atoms together. However, carbon is stable and carbon atoms do not easily react with one another. The first methods used by chemists to bind carbon atoms together were therefore based upon various techniques for rendering carbon more reactive. Such methods worked when creating simple molecules, but when synthesizing more complex molecules chemists ended up with too many unwanted by-products in their test tubes.

Palladium-catalyzed cross coupling solved that problem and provided chemists with a more precise and efficient tool to work with. In the Heck reaction, Negishi reaction and Suzuki reaction, carbon atoms meet on a palladium atom, whereupon their proximity to one another kick-starts the chemical reaction.

Palladium-catalyzed cross coupling is used in research worldwide, as well as in the commercial production of for example pharmaceuticals and molecules used in the electronics industry.

7 RESEARCH BY PROFESSORS AT IITP

Size dependent effect of new organometallictriptycene tectons on the dimensions ofself-assembled macrocycles

This is one of the project work of Associate Professor Mr. Neeladri Das along with the research scholars Sourav Chakraborty and Sourav Bhowmick.

Figure 4: Neeladri Das

Abstract

The design, synthesis and characterization of two new triptycene containing ditopic Pt(II) organometallic complexes is being reported. These complexes comprise of two peripheral bis(trans-trialkylphosphine)-platinum units either directly -bonded to the central triptycene moiety or connected via bridging ethynyl spacer linkage. The potential utility of these organometallic complexes as ditopic acceptor build-ing blocks for the construction of neutral metallasupramolecular macrocycles containing the triptycene motif is explored. Triptycene motif containing supramolecules were characterized using multinuclear NMR (including 1H DOSY), mass spectrometry (MALDI-TOF-MS) and elemental analyses. While the self-assembly of a longer acceptor linker with a terephthalate group results in the formation of a [3 + 3] self-assembled macrocycle, the use of a relatively shorter acceptor linker yields the corresponding [2 + 2]supramolecular framework. The shapes and dimensions of these supramolecular structures were also predicted by geometry optimization using PM6 semi-empirical molecular orbital methods and the results corroborate well with the experimental

observations. These two self-assembled macrocycles are uniqueexamples of triptycene-based neutral platinamacrocycles reported in the literature to date. An investigation as to how the shape and size of the resulting discrete supramolecular framework is affected upon changing the length and rigidity of the triptycene-based acceptor linkers is discussed.

Conclusion

In summary, we report the synthesis of two new triptycene-based organoplatinum complexes containing two Pt(II)centers in reasonably good yields. In these complexes, the trip-tycene core is either-bonded to the peripheral bis(trans-trialkylphosphine)platinum units directly orviaa bridgingethynyl spacer unit. These triptycene-containing ditopic PtII organometallic complexes and their corresponding nitratesalts were characterized using FT-IR, multinuclear NMR spec-troscopy, mass spectrometry and elemental analyses. The presence of a triptycene or ethynyltriptycene backbone imparts rigidity to these organometallic complexes. Moreover, the separation of the Pt(II) centers has been spatially tuned by the inclusion or exclusion of ethynyl groups. Further, the potential of these organometallic tectons as supramolecular acceptor synthons in coordination driven self-assembly protocols has been tested/explored. In this regard, two neutral nanoscalar metallamacrocycles (5 and 6) have been constructed usingthese triptycene-based organoplatinum complexes in conju-gation with a dicarboxylate anion (terephthalate). Multinuclear NMR spectroscopy, including 1H DOSY, of these supramolecules (5 and 6) ruled out the formation of multiple oligomeric species and suggested the formation of single highly symmetrical discrete moieties. The chemical compositions of these macrocycles were determined from mass spectrometric(MALDI-TOF-MS) analysis, which indicated the formation of a[3 + 3] self-assembled metallamacrocycle (6) in cases where the longer acceptor linker4was used, while the use of the relatively short linker 3 yields the [2 + 2] supramolecular frame-work 5. The formation of the entropically disfavoured [3 + 3]self-assembled adduct in the case of linker 4 was further sup-ported by results obtained from computational calculations.The comparison of the stabilization energies, optimized using the PM6 semi-empirical molecular orbital method, suggests the preferential formation of the [3 + 3] adduct over the corresponding [2 + 2] adduct in the case of linker 4 as experimentally observed from MALDI-TOF-MS analysis. The shapes and dimensions of these nanoscalar frameworks were also pre-dicted from molecular simulations using PM6

semi-empirical molecular orbital methods. To the best of our knowledge, theself-assembled macrocycles 5 and 6 are unique examples of triptycene based neutralplatinamacrocyclesto date. To summarize, a facile and efficient synthetic protocol for the construction of neutral metallasupramolecular frameworks containing a triptycene motif has been described. Additionally,the effect of changing the dimension of the triptycene-based acceptor building blocks on the shape and size of the resulting supramolecular framework was studied. Triptycene-based organometallic acceptors, as described in this manuscript,have immense potential for the design of new self-assembled Supramolecular Coordination Complexes (SCCs) and MetalOrganic Frameworks (MOFs). The platinamacrocycles reported in the literature are known to be very stable and have several applications in terms of hostguest chemistry. Due to the presence of the large void space in their cavities, the newly synthesized platinamacrocycles reported herein may also have interesting hostguest properties. Studies are currently being undertaken in our laboratory in this direction.

8 Q AND A ZONE

Hello Readers! As it says "Work until you no longer have to introduce yourself". The two person we have with us today don't need any introduction. They never hesitated in contributing to the college in the past and are once again doing the same. We have Ms. Nidhi Garg and Ms. Charu Meena, who shared with us their amazing internship experiences of last summers and the do's and don't while applying for one.

ThC: Please tell us about the internship you both did in your last summers.

Nidhi and Charu: We did our summer training at National Fertilizers limited, Bathinda. It is India's second largest urea manufacturing unit. We had a 6 weeks training where we were exposed to four sub-sections of the enterprise namely : Steam generation and captive power plant, urea manufacturing plant, ammonia manufacturing plant and Offset and utilities plant.Intially we had no idea about the chemical processes and the unit operations involved in chemical engineering. The very first day we were called by the chief manager at Ammonia plant, Mr. SK Jha. We were asked few questions regarding fluid mechanics and other operations. We could answer only a few of them. He suggested us some books to read and quite a number of topics to be done till a week. We were supposed to know the mechanisms and workings of Cooling tower,different types of pumps, distillation columns, basic mass transfer knowledge, heat exchangers. The books were Mccabe Smith (for unit operations), BK Dutta (for mass transfer).

We spent a week learning about above mentioned topics. We were then made to join the steam generation and captive power plant after exactly a week. We learnt a lot there :working of boilers, electrostatic precipitators, turbines, heat exchangers,how flue gas was formed etc. We saw a pyrometer which was used by an engineer there for measuring the temperature of boiler with the feed of coal as fuel. We were amazed by the technology. The temperature detected was 1250 degrees.

After 10 days we were transferred to Urea manufacturing plant. We were made to learn the reactions involved in the manufacturing, the flow chart of the whole plant, transportation of urea, coating etc. We were taken to

a 65 m tower. We had no clue what was the tower made for. But it the most amazing thing we had ever seen in our entire life till then. It was a magical tower which was called "prilling tower" by those people. It was surprizing to experience urea precipitating.
Similarly,we went to Ammomia and Offet and utilities plant. We learnt the overall functioning of the whole unit in Ammonia plant. According to us, a chemical and mechanical engineering student should visit ammonia plant as it involves each and every mechanical operation in chemical processes. The time was not enough for us to grasp each and every process going on in that plant. Still we managed to cover maximum we could.

ThC: Both of you must have found it difficult to get an internship in 2nd year itself. Tell us about the problems you came across while you were applying.

Nidhi and Charu: We wanted to do an industrial internship in 2nd year. We searched for all the best companies in every area. We did not know much about any field and so learning anything was a bonus for us. We used to mail HR of the companies of which we had contacts. We didn't get replies. We had a personal contact of chief manager at NFL,Bathinda. We read about the company from its official site and quora. Looking at the experiences of people and talking to few of them, we felt it will be a good place to learn. We mailed the concerned person and got a reply within hours.

ThC: did the presence of each other helped you in a new place?

Nidhi and Charu: We both were aliens to that place. We weren't provided accomodation initially. So we used to search for a place to live every evening. It was hard but turned to be fun because we were "WE". Then we got permission to stay at NFL guest house. The campus was big and it was 5 kms away from office. We had no means of transport and so used to ask for lift everyday. It used to be embarassing but it was fun because we were "WE". Also, we needed to go to cyber cafe for downloading the required materials for studies as we could not access their wifi. Being together helped us for doing initial formalities(affidavit, passes, insaurance, forms, etc.) easily. Right from hesitating to join the first plant to submitting final project reports, we had an additional support because we were "WE".

ThC: What, according to you, are the most important things one should keep in mind while applying especially in 2nd year?

Nidhi and Charu:Usually in second year, we don't have significant amount of knowledge to decide our career field. And it is perfectly fine if it is the same case with you. Doing internship in second year is actually beneficial in a way that you get to know about things, how actually things go, what are the options you can have for your life. Applying at different places let you know about many areas and about the limitless scope in the courses you have opted. You just need to decide the best path open for you at that time.

ThC: What is your opinion at present about the work you both did? Is it helping you to explore more in the respective field?

Nidhi: Yes, I will be working on process designing this summer. My last intern is a base for the same. If I hadn't done it, I would have never seen and known about the pumps, motors, reactors, distillations columns etc. which I will be using to design my desired process this summer. I would have never actually seen the process controlling part of a manufacturing unit which I will need in my project of process designing. It made me to know various sub-branches of chemical engineering which will definitely be useful for me if I will be appearing for higher studies. The things they taught me were general and are important components of each and every chemical industry. They used to give us some problem statements for increasing efficiency and optimizing processes to which I still think about when I read related topics in class.

Charu: I belive that learing anything can never go in vain. The things that we learned during our internship helps me a lot during my classes. It's usually said that theoritical knowledge is more important but after learning things at NFL I realized practical knowlege is very important. The processes that we learn even in our lab are different than the processes that take place in actual plants. Personally, it takes time for me to imagine how things actually work and practical knowledge that I had during my internship helped me to overcome that problem. I am interested in opting for job after my undergraduate course and my experience in internship helped

me a lot in clarifying my thoughts for the same.

ThC:Please give your valuable suggestions to your juniors!!

Nidhi and Charu: "Dreams don't demand tax, infact they can become the best reason for you to pay huge taxes". This is the only time you get to explore, learn and implement things. Don't waste even a day of your college life sitting idle inside your rooms. Trust us, working is the easiest thing which helps you to groom yourself. You learn a lot of managerial skills during this period. Try to observe your interests and work upon them. Talk to concerned people, never be hesitant to clear your querries and doubts. Get as much as practical knowledge you can. Never drop your ideas without giving them complete thought. Everybody know their lags,we just need to accept them and work upon them. At the end, you will be what you chose to become.

ThC: We thank both of you for sparing some precious time for us from your busy schedule and wish you a very bright future.