

ELEMENTS

A Reactive Newsletter

Department of Chemistry, MG College, TVM.

A College with potential for excellence, accredited with 'A' grade (3.16) by NAAC

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Till Now... And From now...

A Detour into our teacher's thoughts of yesterdays and tomorrows.

By, Dr.M.R.SUDARSANAKUMAR.



It was 30 years ago when I was a UGC research fellow in the Department of Chemistry, the University of Kerala that I came close to this institution. The ornamental clock was visible from afar. The trees and landscape made me hope that I'd be part of this institution some day! In 1988, when I was appointed as lecturer in NSS services, I was Lecturer in NSS services, I was initially posted at NSS College, Ottapalam. The long seven years that I spent at Ottapalam unearthed the teaching talents in me. I loved to sit on the banks of 'Nila', ponder over many things and loved every bit of the 'Valluvanadan' life there.

In 1995, when I got transferred to University of Kerala, I thought I'd make it to this college at last. However, I was transferred to VTM NSS College. Dr.R.Sudhadevi, the present Head of the Department was posted in the vacancy created by my transfer. The daily travel to VTM NSS College in the van was full of fun and frolic. The students were also spontaneous in class room and laboratory. Ending the anxious wait, I was finally transferred to Mahatma Gandhi College in 1997.

Prof.M.Ramachandran Pillai was the Head of the Department then. Though he is no more with us, I have vivid memories of him. Though I was the junior most lecturer in the department, he gave me lot of freedom for innovation. Life has indeed come a full circle -his granddaughter, Gayathri Sankar, is the student editor of this publication!

Ours was a UG department then. In fact, ours was the only UG science department in the college two decades ago. So in 1998 when our college celebrated golden jubilee, I was entrusted to accompany Sri.T.N.Jayachandran, former Chief Secretary, to a function. On learning that I was from Chemistry department, he wondered, and rightly so, why our college was not yet offering M.Sc. Chemistry. We had a great reputation of research among affiliated colleges of the University. When most colleges were only involved in teaching, learning and evaluation, many of our faculty members were involved in research long ago. We had Physics, Botany, Commerce and Zoology as research centres then. Dr.R.Krishnan, the then Reader of the department, was an approved guide of the University and had guided many students for Ph.D.!

By the turn of the century, in 2001, we were finally elevated to a PG department. A long-cherished dream had finally come true. I still remember all the students of the first batch. Though we could start the class only late into the first semester, the first batch had 100% success rate! Our Department was elevated to a research centre in 2006.

Continued ...



The Editor's Column

Dr. RESMI RAGHUNANDAN

If it wasn't hard, everyone would do it. It's the hard that makes it great -Tom Hanks.

I am very delighted to present our second yearly issue of chemistry newsletter "Elements" for the year 2016-17. When I sit and look back to this by gone academic year, the Department has shown remarkable progress and achievements with a team of dynamic faculties, students headed by our new HoD, Dr. R. Sudhadevi and our Principal Dr M. R. Sudarsanakumar. Sudarsan sir and Sudha teacher have always stood as a great support and guide in all our departments' activities.

The newsletter starts with a wonderful memoir of Sudarsan Sir (our Principal) from his journey of thirty years and his expectations for the years to come under the column "Till Now and From Now". The newsletter also covers articles on Nobel laureates of Chemistry for the year 2016, Indoor air pollution, Cartoons and Bone!, Helium finds a partner, Nanospheres for Cancer treatment, Chemistry in Ancient India & Naming of the new kids of our family. Finally we have included a cartoon which depicts a chemical concept (a creative way of communicating science)... I would also like to place on record my sincere thanks to all my colleagues for their whole hearted support. I would like to thank all student writers & photographers, who have contributed to this newsletter and made it a big success. Their hard work has definitely paid off!

Last but not the least I would like to thank my whole editorial team for their immense support. On behalf of the faculty, editorial team and students, I wish each and everyone all the best. I hope you will enjoy reading the wonderful articles, achievements and activities of the whole chemistry team.....

**Thanking you,
Regards,
Staff Editor.**

Till Now... And From now...

We got recognition when our department was selected for SARD (Selective Augmentation of Research and Development) support of Kerala State Council for Science Technology and Environment and later FIST (Fund for Improvement of S&T Infrastructure) of Department of science and Technology, Government of India. In the decade since becoming a research centre. 10 students have completed their Ph.D. and 11 are enrolled at present. Dr.V.L.Siji , my first Ph.D. student is an Assistant Professor in All saints College now. Dr.V.S.Dhanya, my second Ph.D. student is an Assistant Professor in our department.

Our Institution also made its progressive march through these years. We got 'A' grade from NAAC (National Accreditation and Assessment Council) in 2004 and 2013 and bestowed with College with Potential for Excellence (CPE) by UGC in 2010. Now in 2016, we are selected for the second phase of CPE. I am honored to be back here as Principal, after a short stint at V.T.M.N.S.S College.

The administrative burden is relieved when I teach - and I really love big class rooms! When I started my career, pre-degree was a part of the college. It was a real thrill and challenge to teach the young 15-17-year-old kids, brimming with excitement and youthful vigor. Our college further molded me as a teacher, researcher, popular science writer, and administrator. I started associating with the college activities as a member of the Planning Board in 1997. I was convener of academic committee, coordinator of IQAC, president of science club, elected council member, and above all member of the discipline committee to name a few. The experiences from Sameeksha-2011, the mega science fest is still in my mind.

Through these years, the college has not grown in size. But the physical infrastructure has shown tremendous improvement. We need to create additional facilities when we look for reaccreditation in 2018. Let us all join together for that.

When I joined here, there were not many young faculties in the college. Now our college and department are brimming with energy and confidence of exuberant youth among the faculty. I have real expectation from them with their rich doctoral and post doctoral research experience. The institution is looking for a quantum shift towards excellence. We need a transition from 'College with Potential for Excellence' to 'College with Excellence'. New ideas from faculty and students can together make this dream come true.

If you ask me what life taught me through these years, it is simple. One need not be staid in his looks or words but really be serious in his actions. This is my philosophy and it has worked well for me.

End.



Onam, Christmas and Tripping, were so much fun! And these memories shall stay along ☺



കോതയാശ്വതി കോളേജ് സെന്റൽ വിഭാഗം പരിസ്ഥിതി ദിനാചരണം പ്രദർശനം ഡോ. എം. ആർ. സുരേഷ്കുമാർ ഉദ്ഘാടനം ചെയ്യുന്നു

പരിസ്ഥിതി ദിനാചരണം

തിരുവനന്തപുരം > കേരള ശാസ്ത്ര സാങ്കേതിക പരിസ്ഥിതി കൗൺസിലിന്റെ ധനസഹായം പ്രതിഷ്ഠി, കേരള സർവകലാശാലയിലെ പരിസ്ഥിതി വിഭാഗം അസിസ്റ്റന്റ് പ്രൊഫസർ ഡോ. ഇ. ജി.

MY WORLD, MY RESPONSIBILITY.

The year's environment day celebrations began with this thought, which was inaugurated by our beloved principal. He advised students and teachers not to use and bring plastic in the campus, and as the first step, the use of steel glasses instead of disposable glasses for the tea break was implemented the same day. The event was co-ordinated by Dr .Bindhu. P. Nair, with the funding from KSCSTE, which raised the slogan of the year to be: **MY WORLD, MY RESPONSIBILITY.** The inaugural ceremony had the presence of Dr. Oleena A.G, Dept of Malayalam, Dr. Balachandran S., IQAC Coordintor, Dr. Sudha Devi R. HoD, and Dr.Bindhu P. Nair addressing the gathering. The first lecture was by Dr.Pratish K.P, who was a former student from our college, now scientist at CSIR- NIIST Tvm, on 'Persistent organic pollutants'. Dr. Shaji E., Asst. Professor, Dept. of Geology UoK, then infotained the gathering with his lecture on 'Water resource management'. The poster presentation competition found participation from students of various departments, from which Ms. Niranjana S. of 1st BSc Psychology bagged first prize. In the afternoon session saplings were planted in the campus, and were also distributed to students to take home and nurture. The event was proved to be a success in delivering the message of the day.

Date of event: 6th of June 2016





Dr Sudha Devi R

From HoD's Desk

The Dept. of Chemistry has had a wonderfully productive academic year in 2016-17. The fields in which our students have reached out to the extend from arts, to sports, to academia and research. We are happy to have such achievements in interdisciplinary fields, as we need not just chemistry to survive in life but a combination of many other skills. A world like now demands you to be a jack of all trades and a master of one. The college has its portion of jack's trading skills to offer, were as we have the job at hand to make students the masters of chemistry, and the achievements this year says it all. We understand that making future chemists for the country is no just enough, but moulding bright and energetic responsible citizens is most important.

Are you a cognitive chemist?

We are all chemists and chemists in the making, but we are all just cognitive. Guessing what that is ? Well we just take in what we need for a university exam or NET exam, the rest of the chemistry once you get a job gets a goodbye. Even researcher forget at times the basic knowledge of chemicals. Thinking about it and frowning your face with a "NO", picturing the person who wrote this? Well here is something to think on. We all use shampoos and shower gels don't we? Ever read the back side? What are those chemicals? Do you know? Ever thought of googling about them? Or are you too sure of your company brand, just because it's brand ambasodor is your favorite actor. Well that's why I said we are cognitive. You would take precaution in your lab but not on the daily chemicals you use? Now that is absurd for a CHEMIST! For a start google on thioglycolic acid , Sodium laureth sulfate and tetrasodium EDTA. TRUST me they are present in almost all personal care products. Go verify for yourself if you are cognitive or not.

Meenu G. Nayar, 2nd MSc Chemistry.

Banana peel found to be very effective in purifying water

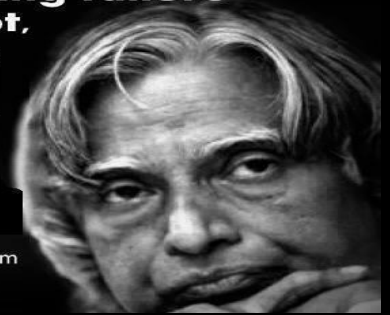
A JUGAD innovation: it is an innovative method of finding solutions to problems with already existing materials and techniques available to around us.

An interesting discovery has been recently made by a group of researchers from Brazil's Instituto de Biociencias de Botucatu at the Universidade Estadual Paulista led by Gustavo Castro. According to their report published in Industrial & Engineering Chemistry Research journal, minced banana peel can be used as a water purification material. In fact it considerably outperforms many other materials used to clean water. Researchers discovered that waste from industrial, mining and agricultural activities can have a serious negative impact on the condition of waterways. Components like lead and copper negatively influence health and the environment and ways of removing them can be rather costly and even destructive in the long run. This is why a lot of scientist attempted to discovered a chemical-free solution that could solve the problem. It is worth mentioning that previously researchers used coconut fiber and peanut shells to purify water, removing toxins from it. The latest discovery shows that minced banana peel has the potential of removing lead and copper from waterways quickly and effectively. The test that the research group carried out showed that a banana skin water treatment apparatus can be used to purify water up to 11 times. In addition, such method is not only natural, but also very cost-friendly.

Aparna G., 2nd DC Chemistry

"Dont fear for facing failure in the first attempt, because even the successful Maths starts with 'zero' only"

- A. P. J. Abdul Kalam



Cis-1,2-Mandaram

A Happy though space

Wondering what that is? Well that is the name the 2nd MSc students have given the *mandaram* they had planted, from among the saplings that were distributed during environment day celebrations from our department. You can find it at the front side of the MSc lab. The name came from the insight of stereochemistry that was a main topic then in the syllabus, and was suggested by Sarga. It was watered using an old broken burette at the beginning for a slow and constant nurturing, and this idea was engineered in the minds of Anandhu, Meenu and Nayana. It was attended to by all whenever they had a chance to. They are almost ready to say goodbye to the college as it's just a matter of 6 more months for MSc course to finish. They hope to see it blossom before they leave, and even if they don't they are satisfied in the fact that the future generation will get to see it and rejoice. Another far end possibility they foresee is them getting to meet under this mandaram, then grown huge and large, for a reunion were not just them but their kids and life partners too would gaze at it in nostalgia, love, amusement, happiness, wonder or pride. 😊

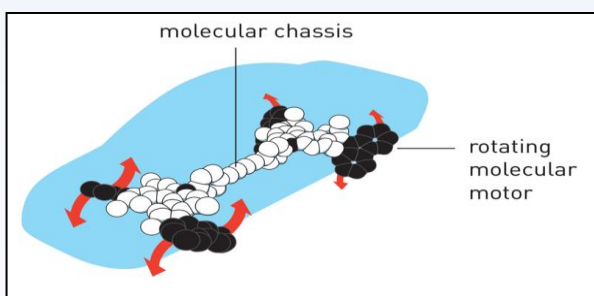


Chemistry NOBELS 2016- Molecular Vehicles

Dr.V.S. DHANYA, Asst. Professor, Dept. of Chemistry & Aryalekshmi J.S of 2nd BSc Chemistry.



Above Pencil Sketch by Aryalekshmi J., 2nd BSc Chemistry, From left: J.P.SAUVAGE, J.FRASER STODDART, BERNARD L.FERINGA. Below: A Molecular Vehicle.



The peerless prize of the modern world, 'Nobel Laurel' in 2016 for chemistry was shared by Jean Pierre Sauvage, Sir. J. Fraser Stoddart and Bernard L. Feringa for their work "The design and synthesis of molecular machines". They have developed molecules with controllable movements, which can perform a task when energy is supplied. The effort behind this work started years back in 1983 by J.P.Sauvage. He succeeded in linking two ring shaped molecules together to form a chain called 'catenane'. In the chain the molecules were linked by mechanical bonds. The work was continued by Fraser Stoddart and threaded a molecular ring onto a thin molecular axle and the ring was able to move along the axle. He called it 'rotaxane'. And finally a molecular motor was developed by B.L. Feringa in 1999. He was able to make a molecular rotor blade to spin continuously in the same direction. Using these molecular motors, he rotated a glass cylinder that is 10,000times bigger than the motor. In short 2016's Nobel laureates in chemistry have taken molecular systems into energy filled states in which their movements can be controlled. So we are in the beginning of molecular machines, let us wait and see where it is going to take us to in the coming years.

INDOOR AIR POLLUTION

Thought you were safe from all pollutants once inside home? Think again!

Sarga Sunil, 2nd MSc Chemistry writes on how this happens and on what we can do.

According to WHO air pollution may be defined as "substance spread into air by the activity of mankind into concentration sufficient to cause harmful effects on his health, vegetables, property or to interfere with the enjoyment of his property". The major source of air pollution has been particulate and gaseous matter which gets released by the burning of fossil fuels such as coal, petroleum etc. When you think about air pollution, you probably think of things like smog, power plants and emissions from cars and trucks. Those are all examples of outdoor air pollution, but air indoors can be polluted too. Pollutants are harmful contaminants in air, therefore indoor air pollution is when pollutants from things such as gases and particles contaminate the air indoors.

Indoor air pollution is very real and dangerous thing because indoor air is more concentrated with pollutants than in the outdoor air. It is estimated that 2.2 million deaths occurs in each year are due to indoor air pollution. There are many sources of indoor air pollution, but they are different for developed and developing countries.

Indoor air pollution has a greater impact on developing countries than that of developed ones because fuel such as wood, charcoal and animal dung is burned inside home for cooking and heating. For developed nations such as US, the two most dangerous indoor air pollutants are tobacco smoke and radon. Even if you are not a smoker, secondhand smoke can cause many of the same health problems by directly inhaling from cigeretts- like cancer, emphysema asthma and heart disease.

Common pollutants we never knew!

Secondhand smoke: It is a tobacco smoke which affects other people other than the 'active' smoker. Second-hand tobacco smoke includes both gaseous and a particulate phase, with particular hazards arising from CO and very small particulates which get past the lung's natural defences.

Radon: It is an invisible, radioactive atomic gas that results from the radioactive decay of radium, which may be found in rock formations beneath buildings or in certain building materials themselves. Radon gas is especially dangerous because it is both colourless and odourless, which makes it impossible to detect without special testing equipment.

Volatile organic compounds: It creates a variety of pollutants in indoor air. VOCs are carbon containing compounds that are released pretty much anything you can imagine-perfume, paint, plastic, household cleaners, adhesives, furniture carpets...even the nice 'new car smell is really just the smell of toxic chemicals being released! Not to forget carbon dioxide and monoxide!

What can we do? The top anti pollutants of indoor air pollution are the house plants. Some of the VOCs can be removed by planting certain plants. For example benzene is a VOC, it can be removed by planting English Ivy, Janet Craig, Chrysanthemum, Gerbera Daisy, Peace lily. Formaldehyde can be removed by planting spider plant, golden pothos, bamboo palm, chrysanthemum, mother-in-law's tongue etc. Trichloro ethylene can be removed by planting Gerbera Daisy etc. (END)



HELIUM FINDS ITS PARTNER

MIDHUN RAJ, 1st DC Chemistry

Finally, scientists has synthesised a compound of inert gas helium. An international research team has reported the synthesis of a helium-sodium compound that's stable at high pressures. Helium is generally understood to be chemically inert and this is due to its extremely stable closed-shell configuration, zero electron affinity and an ionization energy that is higher than that of all other elements. Helium is the second, after hydrogen, most abundant element in the Universe and it is present in significant quantities in normal stars and in gas giant planets such as Jupiter and Saturn.

To examine the scope of the element's low reactivity, scientist's have searched for years, but they have turned up very little :for example, unusual species such as the HeH⁺ radical, which is stable only at its charged form, and HHeF, a meta stable compound. Still, a team of researchers that includes Artem R. Oganov of Skolkovo Institute of Science & Technology and Hui-Tian Wang and Xiang-Feng Zhou of Nankai University continued searching for stable helium compounds. They used a computational strategy known as evolutionary structure prediction to scan the helium-sodium interaction landscape over an enormous range of pressures. The team concluded that Na₂He should be thermodynamically stable at pressures greater than roughly 115 GPa, which is about 1 million times as high as Earth's atmospheric pressure.

Then they used a diamond anvil cell to achieve this type of pressure and synthesized the compound. On the basis of X-ray diffraction and other methods, the team reports that Na₂He adopts a structure similar to that of the mineral fluorite and is electrically insulating. The material, which remains stable up to at least 1,000 GPa, is an electride- a type of crystal containing positively charged ionic cores and electrons that function as anions. Initially the Na₂He compound was found to consist of Na₈ cubes, of which half were occupied by helium atoms and half were empty. When they performed chemical bonding analysis of these structures, they found each 'empty' cube actually contained an eight-center, two-electron bond. This bond is what's responsible for the stability of this enchanting compound.

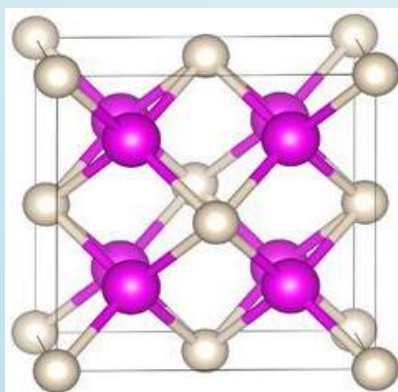


Fig 1: Crystal structure of Na₂He at 300 GPa

This study highlights how high pressure can be used to access compounds with novel stoichiometry and electronic structures.

Na₂He would never be stable under atmospheric conditions, but it has been synthesized in this study at roughly 40% of the pressure present at the Earth's centre. The findings broaden understanding of chemical processes that may occur at great pressures inside gas giants such as Jupiter and Saturn. Earlier discoveries of other noble gas compounds made it clear that inertness is a question of reaction conditions. But helium has been a holdout even under extreme conditions because it clings to its inner-shell electrons tightly and will not let go. These new findings show that in some ways, the last bastion of inertness has finally fallen. The researchers also predict the existence of Na₂HeO with a similar structure at pressures above 15 GPa.

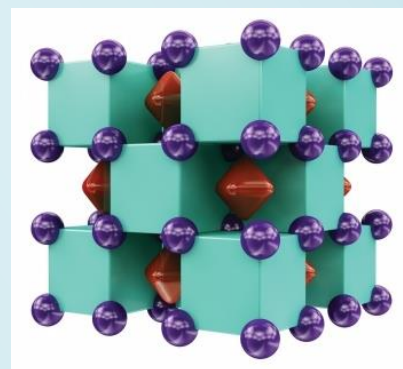


Fig 2: At high pressure Na₂He forms a stable compound with a three dimensional structure. Sodiums are the purple spheres, heliums are green cubes and electrons are red regions.

(END)

Ancient civilizations in general and more particularly, the civilization in India had been the cradle of great knowledge. Indian mind was always preoccupied with the inquiry into the mystery of nature, universe and life. The findings of these sustained inquiries have survived in the form of Vedas, Upanishads and several other valuable treatises, written mostly in Sanskrit. Innumerable scientific facts and theories are spread over in the Ancient Indian Philosophical and literary works. Ancient India made significant contributions in the field of chemistry also. The age old desires of human beings to get rich and to live forever were the main incentives for the development of Chemistry, which led to the early efforts to turn base metals to gold and to develop an elixir. Chemistry in ancient India was called 'Rasayana shastra' or 'Rasa vidya'. Let us see some of the great inquiries made in the field of Chemistry in Ancient India:

I. Achievements during the Vedic Period:

1. The word लोह which means metal is seen to have been use from the Vedic Age itself. The Vedas provide ample evidence for the fact that metals were extracted from their ores and were utilized not only for manufacturing ornaments, weapons, vessels, pillars, wheels etc but also for making coins. Yajurveda Samhita states: हिरण्यं च मे अयश्च मे श्यामं च मे लोहं च मे सीसं च मे त्रपु च मे – which means I want gold, iron, copper lead, tin etc. This shows that the Vedic people strongly desired for these metals for their various uses. Mention about the soldering of metals is seen in Chandogyaupanishad. The excavations in Lothel etc have proved that metals like gold, silver, copper, lead, tin etc had become part of the routine life of Indians 5000 years ago!

2. **Ancient Indian Scholars and Authors in the field of Chemistry:** There were 27 Scientists who had deep knowledge of Chemistry and were adept at making medicines. Govindacharya is the Author of रसहृदयतन्त्रं, an ancient treatise on Chemistry. These facts prove that India was far ahead in the scientific organization of chemical laboratories, experimentation and refinement of medicines and treatment of ailments as compared to other parts of the world.

3. **The concepts of Alchemy:** It is known that base metals like lead and iron decay with time, but noble metals like silver and gold are not destroyed by atmospheric interaction. Ancient Scientists succeeded in the endeavour to convert the base metals into noble metals. The idea of Alchemy, which emerged from the imagination of ancient Indians, became rooted in the minds of modern scientists as well. Dr.Dubbyshere and Dr.Kenneth.T.bainbridge together succeed in their effort to make gold from Mercury. Thousands of years ago Kautilya and Nagarjuna had considered Mercury as a good source for preparing gold.

4. **Gunpowder and Saltpetre:** A crucial factor in the history of Chemistry was the discovery of Potassium Nitrate (Saltpetre) and its chief application in Gunpowder. रसोपनिषद्, the ancient Alchemical text gives the preparations for a mixture of Gunpowder. In Sukracharya's Sukra-Nitisara, the exact proportions of sulphur, saltpeter and charcoal to prepare a recipe of Gunpowder.

II. Chemistry in later periods:

1. **Mention about Chemistry in Amarakosa:** Amarasimha (one among the Nine Gems in King Vikramaditya's court) in his Amarakosa – the oldest Sanskrit dictionary, has mentioned about minerals like Antimony, Copper, Potash alum by giving their equivalent terms. This shows that the processing and use of these chemicals were in vogue during the 5th century AD itself.

2. **International prominence of Indian Practical Chemistry Standards:** During the Gupta Era, India had developed production units for dye, soap, glass, cement etc and was looked up with wonder even by Romans as the first to make such achievements. During the 6th Century AD, the Indians had gone a long way ahead in Industrial Chemistry, compared to the Europeans. They had become skilled in the crafts of Calcinations, Distillation, Sublimation (Paatna), Anesthetics etc.

3. **Manufacture of paper:** It appears that paper was known to India in the 7th century AD from the Chinese traveler Hiuen Tsang's account. Paper making was practised in places like Murshidabad, Mysore and Ahmedabad.

4. **Art forms in which knowledge of Chemistry is involved:** At Ellora and Ajanta caves, the paintings found in the walls look fresh even after 1000 years and one can see the high levels that chemical science reached in Ancient India. The Iron Pillar of Delhi is a proof of the universal excellence of the skill that ancient had in the field of metallurgy. Centuries of climatic changes have not been able to tarnish this Iron Pillar a bit and it continues to puzzle and amaze visitors even now. The Iron Pillar is composed of 95% of iron. But it has not taken rust and still it remains an enigma.

Only a nanoscopic panorama of the research and development in the field of Chemistry in Ancient India is attempted here. Ceaseless encouragement and understanding of the History of Chemistry in India will encourage people to undertake further research in this field. All credit should be given to ancient Indian Alchemists who, with their foresight and hard work, paved the way for the comfort and the need of future generations. The attention of modern India should be carefully extended to treasures of knowledge in Chemistry expounded by our own Chemists of yore!
(END)

A walk through the Nano world.

Department of Chemistry, Mahatma Gandhi College organized an invited talk on the topic "Impact of Nanotechnology on materials research" on 6th October 2016. The programme was conducted in college seminar hall. Inaugural address was given by our respected Principal Dr. M.R. Sudarsanakumar. The talk was delivered by Prof. Vijayamohan Pillai, Director, CSIR-CECRI. Research Scholars, M.Sc. and B.Sc students of our college and the faculties of Dept. of Chemistry literally had a walk through the nano world. Dr. Rahul.S. presented a memento to Prof. Vijayamohan Pillai as a token of gratitude. Dr. Dhanya V.S. delivered vote of thanks.



HAPPENINGS

Department NEWS

Achievements

- ✚ Deepa P. bagged 3rd rank in the Kerala University MSc Chemistry Exam.
- ✚ Gayathri Sankar of S4, MSc Chemistry came in the top three at the South Indian regionals of Famelab, a science communication competition held by British council India and Cheltenham University UK. She represented Kerala at the National finals held at IISER Pune.
- ✚ Oormila A. of BSc S6 won the first prize in Kerala Lalitha Kala Academy Reading Competition and State Level Safety Essay Competition conducted by National Safety Council, Kerala.
- ✚ Anandhu G. of S4, MSc Chemistry came first at the inter Colligate ball badminton Championship representing our college. He became selected to the Kerala state ball badminton team and represented Kerala in the National level held at Karnataka State.
- ✚ Nandhu B.S of S4, and Midhun Raj of S2, BSc Chemistry, came first in the College Quiz Competition on the topic "Mahathma Gandhi & Freedom movement" which was held as a part of *Gandhijayanthi* Celebrations.
- ✚ Aarcha Santhosh of S2, BSc Chemistry came first in the flash presentation competition held as a part of the ozone day celebrations in our college.
- ✚ Divya I.S, Sarga Sunil, Haritha K. Nair and Gayathri Sankar of S4, MSc Chemistry and Akhila M.L. of S4 BSc Chemistry were awarded with Kerala University merit scholarship for the year 2015-17.
- ✚ Meenu G.Nayar and Athira S.R of S4 MSc Chemistry got selected at VSSC for their S4 Projects.
- ✚ Nayana A.R and Suranya K. of S4 MSc Chemistry got selected at CESS for their S4 Projects.
- ✚ Sarga Sunil, Shyamili S., Athira A. and Divya I.S. got selected at CSIR-NIIST TVM, for their S4 Projects.
- ✚ Drishya R., Research student, got selected with the best Poster at the national seminar held at All Saint's College.
- ✚ The Dept. of chemistry came 2nd in the *athapookalam* competition held as a part of the Onam Celebrations.
- ✚ Remya Anil was awarded PhD in Chemistry under the guidance of Dr. M. R. Sudarsanakumar from University of Kerala.
- ✚ The Dept. of chemistry team came 1st in the *thiruvathirakali* competition held as a part of the college arts festival and the team will represent the college in the Kerala University arts festival 2016-17.
- ✚ The Dept. of chemistry team came 1st in the group song competition held as a part of the college arts fest and team will represent the college in the Kerala University arts fest 2016-17.



113 Nh Nihonium	286	115 Mc Moscovium	289
117 Ts Tennessine	294	118 Og Oganesson	294

NIHONIUM BECOMES ASIA'S 1st PERIODIC TABLE ELEMENT

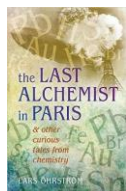
Chemistry's Highest gatekeepers have accepted the newly proposed names for elements 113(Nihonium), 115 (Moscovium), 117(Tennesine) and 118(Oganesson). Periodic table element with atomic number 113, Nihonium(Nh) has become the first ever element to be discovered by an Asian country after it was officially revealed by the International Union of Pure and applied Chemistry (IUPAC). Along with three other elements that helped to complete the periodic table, Nihonium was discovered and proposed by the RIKEN collaboration team in Japan.

Gokul Das, 2nd BSc Chemistry

THE MUST READS THIS YEAR

Chemistry is better understood when there is a humane touch and the books below will give you that amalgamation in the perfect proportions.

- the Last **ALCHEMIST** in **PARIS** & other curious tales from chemistry.



This book by LARS OHRSTROM is about discovery, exploitation and invention, warfare and science, and the relationship between human beings and the chemical elements that make up our planet. It is an introduction to chemistry as you never taught it at school.

- A Tale of 7 Elements**



This book by Eric Scerri is a story of the discovery behind the elements Protactinium, Hafnium, Rhenium, Technetium, Francium, Astatine and Promethium. Personal tales of researchers overcoming great obstacles opens up a humane platform of research and the science world, which at times is demoralising.

NANOSPHERES FOR CANCER TREATMENT

Aarcha Santhosh, 1st DC Chemistry.

Cancer is the word that we utter with fear. Many people still believe that the disease is incurable, but a group of researchers from IISER Kolkata have come forward with a way to confront the disease. It is targeted anticancer drug delivery to cancer cells and controlled release of drug.

Conventional chemotherapy is not designed to target only the cancer cells, this group of researchers assure that the drug release is minimal inside healthy cells. The drug is delivered using porous carbon nano spheres about 150nm in diameter. They have even found a cheaper method of producing carbon nano spheres from lemon grass. The anticancer drug doxorubicin is covalently bound in the surface of the nano spheres and also in the pores. Since the nano spheres contain a numerous pores, they carry a greater amount of drug. Cancer cells are normally acidic in nature, and normal cells have neutral pH. When the nano carriers reach the cancer cells since they are acidic, the hydrazone covalent bond of the drug gets broken slowly. The process is accelerated when the proton in acidic cancer cells gets added to the amine group present in the drug.

Besides the targeted drug delivery the researchers have designed nano spheres for controlled release of the anticancer drug. They have developed the method of controlling the release of drug inside the cancer cells over a 24-48 hour period. This is mainly because the drug is chemically trapped inside the pores of the nano carriers. There is a possibility of premature release of Drug such a way that it causes no harm for a human body. Thus the researchers of IISER Kolkata, opens a novel way to control the fatal disease. This attempt is also an endeavour of creating a breakthrough in the field of nano technology.



VISHAK M. G., 3rd BSc Chemistry, shows his talent in science communication through his creative graphical cartoon.



Stability of Carbocation



1°



2°



3°

NATIONAL SEMINAR ON COMPUTATIONAL CHEMISTRY

The National seminar on computational chemistry, sponsored by the UGC under CPE scheme and also in collaboration with Academy of Chemistry teachers (ACT), took place on the 8th and 9th of June at the college seminar hall. The event was co-ordinated by Mrs. Sreeja T. G., presided by the department head Dr. Sudha Devi R. It was inaugurated by Dr. M.R. Sudarsanakumar, Principal, M.G College, which followed felicitation speech by IQAC co-ordinator & faculty,

Dr. Balachandran S. The First session of the seminar was about '**Changing face of Chemical Research- Computational Chemistry**' by Dr C. H. Suresh, Principal scientist, Chemical Science and Technology Division, CSIR-NIIST TVM. Dr. Vijayalakshmi K.P, Scientist VSSC, TVM, was the speaker for the second session, which lighted up the '**modelling of molecular properties: Theory and applications.**' The first day ended with an open Q&A session on the topics. On the second day the Third session of the seminar was rendered by Dr.P.K. Krishnan Namboori, Associate Professor and Head Computation Chemistry group, Amrita Molecular Modelling and Synthesis (AMMAS) Research lab, AMRITA Vishwa Vidhyapeedam, Amritanagar, Coimbatore. He talked on the '**Gateway to Quantum Mechanical Modelling.**' The final session of the seminar was on '**MOT perspective on the approximate solutions of Molecular Schrodinger equation**', which was handled by Dr. Jayasree E.G., Assistant professor of Chemistry, UoK, TVM. The event ended with a valedictory function, in which certificates were distributed. The event's student convener Vipin U. V. was an integral part in co-ordinating students and outside participants. The seminar found participation of students and teachers alike from outside the college. The seminar ended by leaving a bench mark for further seminars to be conducted in future.



Researchers' Stage

The department of Chemistry stands a role model in our college in the area of research by regularly organising presentations from our research scholars which will definitely arouse the curiosity and interest of UG and PG students in the world of research. We had three excellent presentations so far. The first presentation by Sri. Satheesh Chandran P.R about the Metal organic frameworks helped the students to understand the concept of Metal organic framework, different types of crystal systems, various crystal growth techniques, characterisation techniques such as FT-IR, Single crystal XRD, Powder XRD etc. It motivated our students to think about the wide scope of applications of Metal organic framework for the benefits of human beings. The second presentation by Lakshmi C.S. Nair proved the significance and applications of computational chemistry in the area of research. Awareness of application softwares in chemistry helps the students to understand the new trends in the most modern world of research. The last presentation by Sheeja.S clearly pointed out the present scenario- energy crisis. She beautifully explained the importance of hydrogen as a sustainable and clean energy source. The technique for the evolution and storage of hydrogen deeply influenced the students to find out more techniques for the same. **The MG College- Annual Research conference (MGC-ARC 2017)** was another stage where our researchers proved presented their work as paper and poster presentation. Drishya R won the best oral presentation award and Shibu Prasad got the best poster award in chemistry. It was useful self evaluating platform. The research team will continue its venture to promote and impart deep and new knowledge of what is happening in our field now.

Back to the Alma mater...

Co-ordinator of the event, Dr. Shikha T. S. writes.

An alumni meet of MSc students (from 2009 batch onwards) was conducted on 4th March 2017 in the department of Chemistry at 10.00 am. The occasion was graced by a number of Alumni, the senior teachers and the staffs of the department of Chemistry. The meeting was presided by our beloved principal Dr. M.R Sudarsanakumar. Our head of the department Dr. R Sudha Devi welcomed the alumni and everyone gathered there. In her words she emphasized the need of alumni association. She also outlined many future activities to be taken up by the association. The presidential address was given by the Principal. He appreciated those who attended the meet. He also gave an informative talk about what an alumnus could do for his Alma mater.

The senior teachers who attend the meet include Dr. Vijaya Kumar, S. Vijaya Kumar, Dr. Jalajamony S and Dr. Asha T. They also addressed the alumni. Some of them cherished the memories in connection with their students. Everyone congratulated the HoD and staffs for the new step of organizing the alumni meet. They also promised to extend any help to department and alumni association. Each and every one of the alumni delivered a few words. In their words they unanimously expressed their willingness to do something for the department. Miss. Sourageethi impressed the gathering with a sweet song. Miss. Vidhu proposed vote of thanks. The meet ended with promise to meet again.

Our alumnae shares, what life had for them outside the campus...

Mr. Krishan Kumar R. UG alumnae of the department writes about his journey in career after he left the college.



To talk about my life in MG College in a nutshell, I was an active member of the NCC during my college days where I got enough opportunities to lead M.G College to Kerala battalion cadets on various training camps. I used to lead the cadets as a Senior Under-Officer.

The year was 1990-93 where I was enrolled for BSc Chemistry. An interesting aspect of learning chemistry was the lab part, where first-hand information was available about chemical reactions of various components. Even though my aspiration at the time was to become an army man, destiny eventually led me into the field of information technology where I could build a career. I was fortunate to be part of co-operates such as DST worldwide (www.dst.com), Hitachi Consultancy(www.hitachiconsulting.com) and TATA consultancy services(www.tcs.com). As with any job, IT requires not only thorough theoretical knowledge but also good command over communication and leadership abilities. It was here that my previous NCC experience came as a support. During coding, the chemistry aspect helped me in having a systematic way and also in envisioning the different components that could work together to form a complete system. If you ask me what the secret to a happy life is, I would say, be it any field, have passion, then each day becomes a creative holiday.



Neelima V. Nair, PG alumnae writes about her world of chemistry in which she lives in.

I joined MG College as a MSc. Chemistry student in July 2006. Right from the beginning, it was a pleasant experience. The teachers were excellent, the environment was

friendly, and I formed lasting friendships. I discovered that the students were quite lively and adventurous at MG College. I found this to be quite refreshing as I had lived a very sheltered life throughout. When I think about my experiences at MG College, the events that stand out the most are the intercollegiate chemistry quiz competitions which I had the opportunity to attend, at Fatima Mata National (FMN) College, Kollam, and University College, Trivandrum. In 2007, I went to FMN College with two of my seniors, escorted by none other than Dr. M. R. Sudarsanakumar. Sir received a very warm welcome from the department, and moreover, we secured 1st prize. Undoubtedly, Sir's presence gave us an added confidence that helped secure the win. The following year, I attended same event with my classmates, Anoop and Preethi, and we won the 2nd prize. Anoop and I also came 2nd at the University College Chemistry Quiz Competition held the



CARTOONS AND BONE STRENGTH!!!

Malini S. 2nd MSc Chemistry

Wondering about the Relation between Cartoon characters and bone strength? Having been a 1990s child Popey the sailor man was my favorite cartoon hero. He was more of a hero to my mom, as then he used to convince me as a three year old to eat my greens, making her life easier. Popey was not just an entertaining cartoon but it had a social relevance by making children eat greens to bring up a healthier society for tomorrow. Spinach was chosen to be popey's secret weapon because it is a green with high content of calcium. Calcium is not just a structural material of the bone and teeth but is also vital for proper blood clotting, muscular contractions and relaxations, and even for regularity in heartbeat. But was Popey serving his purpose to make a calcium rich society for tomorrow? I Don't think so! Calcium in body exists as Ca^{2+} ions and these can be bound to the body only if there is presence of a compound called calcitonin. Calcitonin is synthesized in the liver from its precursor, a compound called Vitamin D, and where do you get that from? The Sun of course!!! As children were staying indoors to watch these cartoon characters do their thing in the television, calcium rich diet taken was not actually getting any intended effect. Calcium deficiency in children can cause a painful condition called rickets, which is the softening of bones leading to multiple fractures in future even on small exertions. Not just children but also their parents can have chances of osteoporosis if calcium deficient or vitamin D deficient. So let's have a calcium rich diet and also go out to the sun at the right times from morning 7-8 and evening 5-6 to get it deposited. Don't get sun burned and drink lots of water because a lot of calcium can give you kidney stones. Stay Calcium RICH!

same year. During my final semester, I carried out my dissertation work at the department under Dr. M. D. Ajitha Bai and Dr. G. Jayakumar. Working with them was a unique experience, and it was my first time using a UV-Vis spectrometer. As I would discover later, UV-Vis studies formed an important part of my PhD research as well. I joined the University of Houston in fall of 2010 as a PhD student in the Organic Chemistry Division. I was delighted that my poster was selected for Sci-Mix, which is a large poster session and mixer comprising of the top 10% posters. I experienced my happiest moment during those 5 years when I completed my thesis. Chemistry has a lot of scope out there so all you need to do is the willingness to explore with dedication and passion. With that all are sure to reach heights. I wish the upcoming generation of chemists all the very best.

IV @ NCESS

NCESS visit for the 2nd MSc Students with Dr. K. Anoop Krishnan, was an eye opener to many new instruments and its working. The students gained a visual treat in the working of certain analytical techniques that were just theory on paper for them. The visit invoked curiosity and has resulted in 2 of the students to join CESS for their final semester project. Chromatographic technique, Chem.imaging techniques like SEM, TEM, STM, and XRD. Dr. Resmi Raghunandan and Mrs. Sreeja T. G. accompanied them on their IV visit.



New instruments in lab

Electronic balance Satorius Model: BSA224S-CW & Magnus inverted tissue culture trinocular microscope MagCam Digital camera, both for DST-inspire faculty project (Dr. Bindhu P.Nair). UV visible spectrophotometer Lamda 365 Perkin and Elmer, Refrigerated Centrifuge from Laby, both purchased using CPE Fund.

Ozone day Celebrations

On 27th Sept 2k16 our department celebrated environmental day. The inauguration was done by Dr. K. N. Nainan, Rtd. Scientist, VSSC, TVM with Dr. M. R. Sudarsanakumar, Dr. Sudha Devi, Dr. Balachandran S., Dr. A. G. Oleena & Dr. B. Suresh Kumar sharing the dais. The inaugural lecture by the chief guest covered on '**Global warming and its remedies**'. Dr. Bijukumar HoD Dept. of Aquatic Biology UoK talked on '**Ozone depletion and Environmental issues**'. As per the new trend set by our college, the afternoon session was kept aside for students to show their skills in presenting. The flash presentation was based on focal theme and Archa Santhosh of 1st DC Chemistry bagged first place.



The second day, 28th, witnessed lecture by Dr. V. Sivanandan Achari, Associate professor, CUSAT, based on '**Basics of environmental modelling**'. Our principal inaugurated the display board which focused on the topic, save our earth and her atmosphere. The event, which was co-ordinated by Dr. Rahul S., ended on the note of taking a pledge to save our mother earth.

On taking that extra mile...

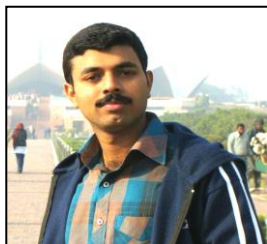
We Women will always go the extra mile to get what we don't have. When it comes to beauty, straight, shiny, smooth and glossy hair is the one main thing we all want to have. But the Humid conditions in our country naturally make us wavy or curly hair beauties. So most of us opt for chemically treating our hair to become a straight hair beauty. Don't you want to know what your stylist is actually doing with your hair? Your stylist is actually playing chemist with your hair. Your hair is a protein called keratin which takes shape of spiral staircase called the helix. This structure is kept intact by mainly 3 types of bonds, being, weak H-Bond, weak Salt bonds and strong Disulphide bonds. If you opt for a temporary straightening your stylist breaks the hydrogen bond of the helix structure of your hair protein. This effect is reversible and goes back to its original state on exposure with water or humid air. But we always want to look glamorous right? So then that's when you choose permanent straightening. Your stylist breaks your disulphide bonds with the help of a magic straightener mixture, treats it with heat from a flat iron and reforms back your disulphide bonds by an oxidation process. And now, "Voila" you have fabulous looking straight hair. Now you certainly have what you don't have! Glamour and also a step closer to CANCER.

The Magic Straightening mixture your stylist had used is sure to contain one these, Formalin, sodium hydroxide and Thioglyconate. Formalin is a preserver solvent of dead bodies in mortuaries and labs. It is potent even make a dead body out of you on prolonged exposure. Many hair straightening products out there contain formalin to an amount of 12%, which remain in hair for a long time as formaldehyde molecules are very small to hide in among our hair cuticles, causing health problems like pneumonia, bronchitis and cancer to several parts of the body, the major one reported far and wide being leukemia. Sodium hydroxide though not cancerous can form a lot of skin irritations. Then thioglyconate which causes miscarriage in pregnant women, also infertility and cancer. So next time you want to take that extra mile to get what you don't have, think. In fact the world actually loves to see the natural beauty outside and inside of you.

Gayathri Sankar, 2nd MSc Chemistry

FACULTY NEWS

The department established its full strength in permanent faculty this June with the advent of two new Asst. Professors. Dr. Dhanya V. S. and Dr. Rahul S.



The number of publications this academic year for the research scholars under guidance of the faculty of our department was 18.

Dr. Shikha T. S. and Dr. Resmi Raghunanadhan received guideship this academic year from UoK.

Dr. Resmi Raghunandan and Mrs. Sreeja T. G. presented papers at the international conference on Nano-technology- ICON17 @ NMC College, Marthandam.

Coming soon

The Department of Chemistry has had a wonderful academic year. We hope to continue our activities and to further more achieve through the student community in the coming years. The challenge lies in identifying the unique talent in each and giving them space to grow. It is a matter of great pride for all of us when students achieve greater heights! We congratulate our students Deepa P. for securing Third Rank in University of Kerala for MSc Chemistry (2014-16) course, Gayathri Sankar of MSc S4 for winning third prize in the southern region FAMELAB science communication competition by British Council India and becoming the youngest finalist in Nationals conducted at IISER Pune, Oormila A of BSc S6 for winning first prize in the Kerala Lalitha Kala Academy Reading Competition and State Level Safety Essay Competition conducted by National Safety Council, Kerala and Anandhu of MSc S4 who was selected in the Kerala team for ball badminton. A Felicitation ceremony to celebrate their achievements is to happen on 20th of March 2017.

We are going into the next year with a clear cut idea of what to do next, and hence with confidence we say, these are coming to you soon... The department plans to adopt a government school and to engage children there with our students, as to lending them a helping hand in getting to know science more the fun and easy way. The coming year will also get to witness an open day, where the public will get a chance to see the labs and fun filled experiments chemistry has to offer. The Department will be seeing to it that the next ELEMENTS too will be jam packed with what we will do by then, till then it's a wrap. Hope you enjoyed this ELEMENTS.



Tripping ☺☺☺

As the 3rd DC Chemistry Students, we started our journey for fun with a bit of frightening scenes from the movie 'Ezra'. The trip extended to Coorg where we had the boating trip and sinagog temple visit. The bamboo forest was some place to be, followed by the camp fire. Chic Manglore waterfalls felt so real other than what we used to see in the movies. Mysore was the last destination where Mysore palace, Zoo and the Chamundi hills amazed us. Chemistry was dusted with a bit of history when we arrived at the Tipu's palace. The fun, the joy, the excitement were all distressing. Simi teacher and Dhanya teacher accompanied us with their teachers coat off and their friend's coat on. In a word it was AWWWwSssommmEE.



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