

# ASSOCIATION OF CHEMISTRY TEACHERS NEWS LETTER

ISSUE : 17, MAY - AUGUST 2020

# Association of Chemistry Teachers

## News Letter, May–August 2020

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#### From the Editorial Desk..

Dr. Mannam Krishna Murthy, Editor  
Varsity Education Management Ltd, Hyderabad

We are bringing in the present issue of the news letter with the reports on new trends in chemistry, innovations in chemistry and chemistry news.

We have included four general articles in the present issue. We have also included reports on ACT Workshop on designing quality multiple choice questions, faculty development programmes, online quiz events, International and National Chemistry webinars. Reports on COVID-19 related chemistry webinars were also included.

We appreciate the Executive Council of ACT for providing us an opportunity to serve in the editorial board. We extend our sincere thanks to all those supported us for good academics. We wish the new editorial team will bring the news letter to further heights in future.

**Disclaimer : The views expressed are that of the authors and ACT is not responsible in any way for them.**

## Spectrum of Activities of ACT Members

**Dr. Yogendra Kothari**, ACT EC member from Government Excellence HS School, Madhav Nagar appeared in News paper Free press Madhya Pradesh as his Science Teacher's Videos garner reached one lack plus views on 10, May 2020.

**Dr. Ganapathy Ramakrishnan**, ACT Life member and President CSI, Mumbai organized free e-Seminars on 'Chromatography and Massspectrometry' on 25-30, May 2020.

**Dr. S.P. Sing**, Secretary ACT East Zone from A.N. College, Patna has been appointed as Campus ambassador and coordinator for RIO+ 25 International Water Action Program on 1, June 2020.

**Dr. Mannam Krishna Murthy**, Secretary ACT South Zone from Varsity Education Management Limited, Hyderabad participated in the Royal Society of Chemistry JMP Chemistry World webinar on 'Mastering Complex Processes with Design of Experiments' on 2, June 2020.

**Prof. Shraddha Sinha**, Vice-president ACT North Zone from BB Das NIT, Lucknow acted as convenor for the 'Online Lecture Series' organized by ACT, during 2-10, June 2020.

**Prof. D.V. Prabhu**, General Secretary ACT from Wilson College Mumbai received best presentation award at 2<sup>nd</sup> International Conference on 'Emperical and Theoretical Research' organized on-line by International Board of Education, Research and Development on 4-5, June 2020.

**Dr. P. Shyamala**, ACT Life member from Andhra University, Visakhapatnam organized FDP National Webinar on 'Analytical and Dignostic Tools in Chemical and Life Sciences' on 5-6, June 2020.

**Prof. D.C. Deka**, Former president ACT and Vice-chancellor of Madhabdev University, Lakhimpur participated as Chief guest at the first foundation day of the University on 14, June 2020.

**Prof. Nayan K. Bhattacharya**, ACT EC Member from SM Institute of Technology, Majitar coordinated the webinar on 'Advanced Nano Technology, Versatile Molecular and Spectroscopy, at Sikkim Manipal University, Rangpo, during 3-4 July, 2020.

**Dr. Dheeraj Mandloi**, EC member ACT Central Zone from I.E.T., Indore acted as a resource person for e-Seminar on 'Research and Ethics' organized by SAGE University, Indore on 8, July 2020.

**Dr. Wasudeo Gurmule**, Secretary ACT West Zone from Kamala Nehru Mahavidyalaya, Nagapur acted as a resource person for the International webinar on 'Nanotechnology for Energy and the Environment' organized by D.P.V. College, Bilaspur on 9, July 2020.

**Prof. P.V.S. Machiraju**, EC Member ACT from Pragati Engineering College, Kakinada acted as a resource person for online FDP on 'Advanced Technologies in Chemical Science Research' organized by S.V. College of Engineering, Etcherla, A.P. State on 11-14, July 2020.

**Prof. M. Swaminathan**, EC Member ACT from Kalasalingam University, Krishnankoil, Tamilnadu, became a member of the American Chemical Society on 16, July 2020.

**Dr. Raakhi Gupta**, Secretary ACT Central Zone from I.I.S. University, Jaipur organized International Webinar on 'Role of Environment and Natural Science in COVID-19 times' on 29-31, July 2020.

**Prof. R. Venkata Nath**, Life Member ACT from GITAM University, Bangalore acted as organizing secretary for International e-symposium on 'New Frontiers in Chemical Sciences' on 20-22, July 2020.

**Prof. Helen P. Kavitha**, Vice-president ACT South Zone from SRM Institute of Science and Technology, Chennai conducted a one day webinar on 'Experts on-line' on 19, July 2020.

**Dr. M.R.R. Prasad**, Life member ACT and Retd. Scientist from ISSRO Thiruvananthapuram delivered invited talk at the International webinar on 'Materials, Microbes and Outer space' organized by SEHAT on 3, August 2020.

**Prof. Sudha Jain**, ACT Past president from GSRM Memorial College, Lucknow, organized CD programme on 'Career Avenues in Aroma Industry', in association with Essential Oil Association of India, during 8-10, August 2020.

**Dr. Neera Sharma**, ACT EC member from Hindu College, New Delhi conducted a survey on 'Impact, Challenges and Solutions for Education System amid COVID-19 Pandemic' in association with Hansraj College, University of Delhi on 25, August 2020.

### ACT International Webinar at Abu Dhabi, UAE



Prof. Brijesh Pare



Prof. D.V. Prabhu



Dr. Anand Kumar Mandhian

Science India Forum (SIF), Abu Dhabi Chapter, UAE collaborated with Association of Chemistry Teachers (ACT) to organize a two day Webinar on 'Milestone Lessons' – an inquiry based presentation for Science Teachers of UAE on August 12 and 15, 2020.

130 Science and Mathematics teachers from UAE actively participated and learnt innovative teaching techniques. The sessions focused on hands on activities and there were live demonstrations and experiments.

The faculty of the webinar comprised Prof. Brijesh Pare, President ACT from Madhav Science P.G. College, Ujjain – *Exploring the Scientific process through the discovery of Oxygen* ; Prof. D.V. Prabhu, General Secretary ACT from Wilson College, Mumbai – *in the Wonderland of chemistry* and Dr. Anand Kumar Mandhian from Doon School, Dehra Dun – *The Thrill of Experimentation*.

The speakers elaborated on the challenges faced by teachers in online teaching and how to adapt to the changing times when e-learning is becoming new normal.

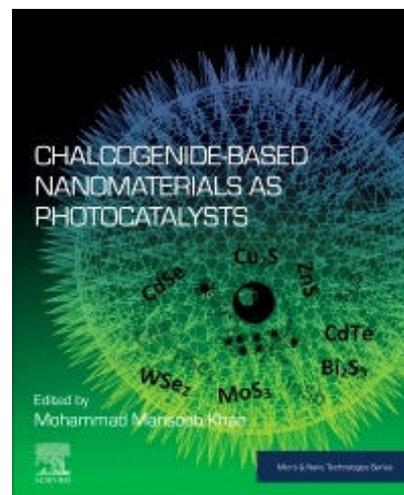
Mr. Hareesh Kumar, General Secretary, SIF, Abu Dhabi, took the initiative to organize this novel activity. Teacher participants gave a good feedback. The webinar got good coverage in the local press.

### Book Chapter in Elsevier Science

Dr. Mannam Krishna Murthy, Secretary ACT South Zone from Varsity Education Management Ltd., Hyderabad wrote a book chapter, 'Use of Chalcogenides – based nanomaterials for waste water treatment including bacterial disinfection and organic contaminants degradation'.

This chapter was published in the Elsevier book, 'Chalcogenide based Nanomaterials and Photocatalysts', edited by Dr. Md. Mansoola Khan, University Brunei Darussalam.

ISBN of the paper-Book is 9780128204986. Dr. Murthy Ch., S.V.R.M. College, Nagaram (India), Dr. Chandra S.K., Ton D.T. University (Vietnam) and Dr. Divya N., University of Tokyo (Japan) were among the contributors of this book chapter.



## The First Molecule in the Universe

By Ryan C. Fortenberry  
*Scientific American (Feb, 2020)*

The first “atoms” in the universe were not atoms at all - they were just nuclei that had not found electrons yet. The simplest nucleus, that of common hydrogen, is a bare proton with no frills. When the universe banged into existence, energy was rampant. Everything was smashing into everything else. Protons and neutrons often collided and some formed larger nuclei, such as that of deuterium as well as helium nuclei with two protons and two neutrons. Various other arrangements of protons and neutrons also formed, but because the identity of an atom is determined by its number of protons, all these other conglomerations were basically just different versions of hydrogen, helium and traces of lithium.

Of these three, helium was the first to begin forming “real” atoms. An atom is more than a nucleus - it must also possess electrons. Helium nuclei were the first to gather a full purse of electrons en masse. Why not hydrogen or lithium? Well, helium is the first “noble gas” on the periodic table - the first atom with enough electrons to completely fill the available slots in its electron shell. Thus if electrons are the currency of chemistry, helium is the master pilferer of the periodic table.

In a modern laboratory, it takes more energy to steal an electron from helium than from any other element. And the energy required to remove a second electron is more than twice what it takes for the first. In the early universe, once helium nuclei began to find electrons, they filled the coffers of their electron clouds well before the hydrogen nuclei could begin to catch up and before enough lithium nuclei were even present to collect all three of their desired electrons.

The rest of the matter in the universe at that time was still largely composed of lone protons, which were starting to feel the effects of being bereft of an electron. They began slowing down and looking for oppositely charged partners to make them electrically neutral. But catching free electrons for themselves was difficult, so the protons turned to helium, which already had some. Although helium is loath to share, it kept running into persistent hydrogen nuclei all the time. The collisional pressure eventually led a few helium atoms to share their electrons with protons. Thus, the first chemical bonds were formed. The new compound of helium and hydrogen was called helium hydride or helonium ( $\text{HeH}^+$ ), the very first molecule in the universe.



That helium was the first element to bond is surprising because in our current age, we think of helium as the least likely element to link up with others – the satisfied noble gas with just the right number of electrons. But in the early universe, helium was the only game in town – the only bank with electrons to lend.

This story has stood on solid theoretical ground for decades, but it has long lacked observational corroboration.  $\text{HeH}^+$  cannot form on Earth, except in labs and for decades it went undetected in space. Last year, however, astronomers announced that they had observed this molecule for the first time, lurking in the funeral pyre of a dying star. A 40-year search had paid off and a new and vital piece was added to our picture of how the early universe took shape.  $\text{HeH}^+$  now joins the ranks of extraterrestrial molecules; so far scientists have detected more than 200 molecular species in space. This study of chemistry beyond Earth – astrochemistry, as we practitioners like to call it – is aimed at clarifying what molecules are present in space, how they form and what their evolution means for observational and theoretical astrophysics.

Many of the known astromolecules, including water, ammonia and formaldehyde, are common here on Earth. Others are terrestrially bizarre, such as hydrochloric acid with an extra proton and hydrogen peroxide with one of its hydrogen atoms amputated.

Charged molecules, systems with unpaired electrons and strange arrangements of atoms in otherwise common molecules have also been observed. We have even seen molecules containing the so-called inert noble gases, such as  $\text{ArH}^+$  and the newly documented  $\text{HeH}^+$ .

### Where was $\text{HeH}^+$ ?

In a University of California, Berkeley, lab in 1925, T. R. Hogness found that mixing helium and hydrogen gas in the presence of an electric arc within a vacuum chamber could create different ions with different masses. Measuring the mass-to-charge ratio of molecules is the forte of the chemical discipline called mass spectrometry; the early implementation of this now common chemical technique showed that this mixture produced a transient mass-to-charge ratio of 5. That could only be  $\text{HeH}^+$ .



In the early universe, it would have been even more unstable because  $\text{HeH}^+$  is likely to let go of its proton on even the slightest contact with another atom. In this relationship, helium gives two electrons, whereas hydrogen gives none. Such uneven bonding (called dative bonding) is weaker than traditional covalent bonds, in which both atoms contribute more evenly.

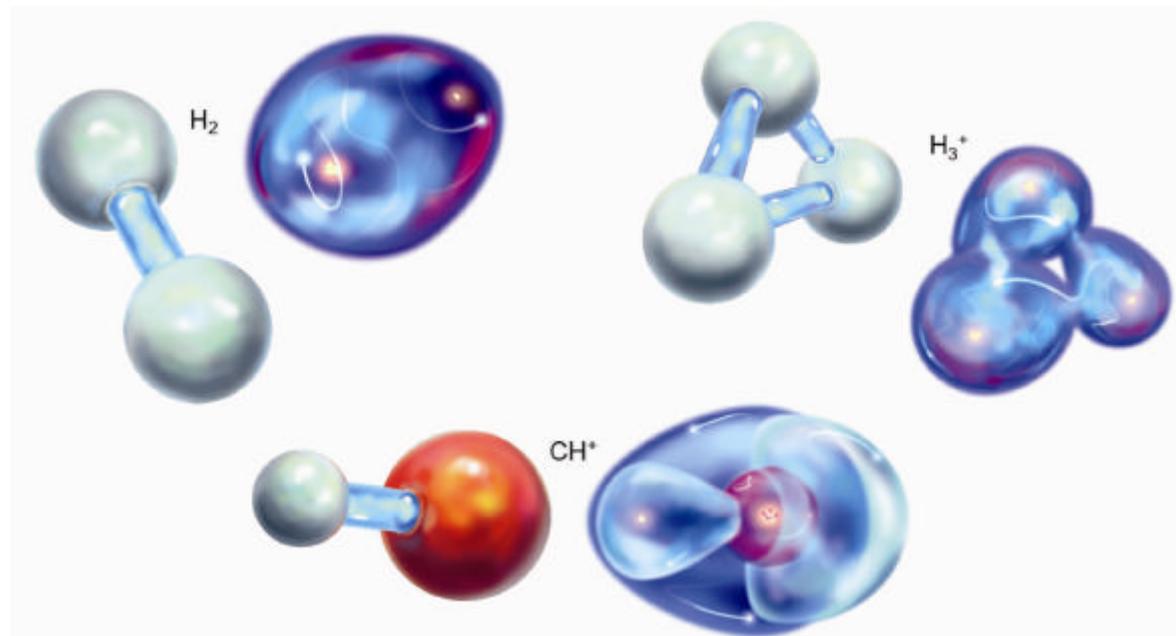
In 1978 John H. Black, then at the University of Minnesota, was the first to argue that  $\text{HeH}^+$  could still be present in space. Black suggested that a good place to look was planetary nebulae, the puffed-out and highly energized matter created in a star's death throes. In these clouds, a thin layer of ionized helium atoms is typically found in the presence of neutral hydrogen atoms; helium's strong need for electrons could drive it to borrow one from hydrogen, creating a bond.

## Discovery of HeH<sup>+</sup>

Despite many breakthroughs, for a long time HeH<sup>+</sup> remained elusive. The first molecules would have dissipated fairly quickly after the earliest epochs. As the universe matured, expanded and cooled, the leftover hydrogen nuclei began to gather electrons of their own. At that point these now neutral hydrogen atoms presumably felt the positive charge on the HeH<sup>+</sup> molecules.

When the atoms and molecules collided, the relatively weak He-H dative bond broke and a much stronger covalent bond between two hydrogens formed to create H<sub>2</sub><sup>+</sup>. After that, the helium atoms were largely left alone.

It might seem, then, that the brief existence of HeH<sup>+</sup> was inconsequential, but that is far from the case. Models of potential chemical reactions in this period indicate that without HeH<sup>+</sup> formation, H<sub>2</sub><sup>+</sup> and then neutral H<sub>2</sub>, would have come together much more slowly. Once H<sub>2</sub> had been made, though, the entire tree of chemistry unfolded. Next came H<sub>3</sub><sup>+</sup>, which begot CH<sup>+</sup>, which begot CH<sub>2</sub><sup>+</sup> and a cascade of other molecules. Eventually this chain led to water, ethanol and larger species. These processes are all the product of the unbalanced bonding in HeH<sup>+</sup>; without this initial relation, the universe would be a different place.



Still, by 2013 astrochemists were getting frustrated that HeH<sup>+</sup> was nowhere to be found. But that year a hopeful sign came when researchers discovered the related noble gas molecule ArH<sup>+</sup> in the Crab Nebula supernova remnant.

Scientists focused the search for HeH<sup>+</sup> in similar, superenergized environments. The larger problem, though, was that the spectra of HeH<sup>+</sup> fell in the same region as fingerprints of the very first molecule ever observed in space, the CH radical. No telescopes had the power to separate these signatures.

In May 2016 an International team used Stratospheric Observatory for Infrared Astronomy, a joint project of NASA and the German Aerospace Center, for three nights of successful observations. On April 17, 2019, a team led by Rolf Gusten of the Max Planck Institute for Radio Astronomy in Bonn, Germany, published a report in *Nature* heralding the discovery of HeH<sup>+</sup>.

## ACT Workshop on Designing Quality MCQ : A Report

'Association of Chemistry Teachers' has been always instrumental in conducting the Multiple Choice Questions (MCQ) based 'Concept Test in Chemistry' known as CONTECH for undergraduate students and NSEC exam for 10+2 students throughout the nation. These activities have gained popularity and have been useful in testing the concepts and generating interest in the minds of the students. Extending this thread further it was thought that MCQ based online test can be effective tool in assessing the students amidst growing pandemic. With this objective a multi session web workshop on 'Designing of Quality Multiple Choice Questions', was organized in association with the experts from HBCSE, during 1 to 10 August, 2020. The workshop proceedings were guided by Dr. D.V. Prabhu, General Secretary ACT.

Dr. S.P. Singh, Secretary, ACT East zone from A.N. College, Patna, was the Convener of the workshop; while Dr. Hemant Khanolkar, ACT Treasurer from Fr. C.R. College of Engineering, Bandra and Dr. Amrit K. Mitra, ACT EC Member from Government Degree College, Singur were the Co-conveners.



Dr. D.V. Prabhu



Dr.S.P. Singh



Dr. Hemant Khanolkar



Dr. Amrit K. Mitra



Dr. Brijesh Pare

Faculty members of various colleges and universities across the country were invited to this multi-session web workshop. Overwhelming response of about 700 entries of Chemistry teachers teaching at UG/PG level was received for participation. Short listing of participants to 300 was done based on making a balance in three domains of chemistry i.e., Physical, Inorganic & Organic, involving participants from maximum number of institutions from different ACT zones.

The organizing committee could constitute group of resource personnel in different domains of chemistry. The key role played by Dr. Ankush Gupta from HBCSE is really appreciable. Contributions of Dr. Savita Ladge, Ms. Indrani Das Sen from HBCSE and Dr. Lakshmy Ravishankar from Vaze College, Mulund; catalyzed by Prof. S.D. Samant, Former ACT President as experts remained praiseworthy.

The first session began with opening remarks, followed by deliberation on 'dos and don'ts' involved in the framing of good quality MCQs by the team of experts. Many aspects related to setting of the questions, pedagogical analysis and exemplars questions from different domains of chemistry were discussed. Prof. Brijesh Pare, ACT president discussed the features of MCQs in his presidential address. The information and skills presented by experts were relevant and useful.

The second session planned was to address problems of understanding from one's end and to reflect more from the learning of the session-1. The experts provided adequate time and effort to address the queries raised by the participants. This provided more insights and reflections on the central theme of the workshop.

The third session of the workshop different coordinators feedbacks were presented on the questions submitted by the participants. Resource persons of each domain briefly discussed selected questions.

Dr. Raakhi Gupta, Secretary, ACT Central Zone from IIS University, Rajasthan provided online platform and excellent technical support for execution of this program. Arrangements were made to send feedback on the questions submitted by participants along with the comments of the expert committee. Certificate of recognition has been awarded to all the resource persons, while Certificate of appreciation has been issued to all the participating teachers.

## Report on International Webinars

### Women in Science

A one day International Webinar on 'Women in Science' was organized jointly by SRMIST, Chennai and ACT, Mumbai on 28 July, 2020. Prof. Helen Kavitha, Vice president, ACT South Zone took initiation and coordination of this academic event.



Dr. Vicki Gardiner, President, Royal Australian Chemical Institute and President elect of Common Wealth Chemistry delivered the key-note address.

Dr. Sudha Seshayyan, Vice chancellor, Tamil Nadu Dr. M.G.R. Medical University, Chennai; Prof. Sobhana Narasimhan, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore and Prof. Brijesh Pare, President, ACT from Madhav Science PG College, Ujjain presented their respective talks related to women empowerment. About 200 school, diploma and undergraduate students and some faculty members participated in the webinar.

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### Education and Research

A two day International Webinar on 'Education and Research' was organized jointly by University of Mumbai, GP Globalize Research Journal of Chemistry and ACT on 25-26 June, 2020. The International Webinar was inaugurated on the first day by Dr. James Barton, Former Professor of Inorganic Chemistry, Wilson College, Mumbai and well known Education Consultant. Prof. Anna Pratima Nikalje, Principal, Wilson College, Mumbai served as the Chairperson of the webinar. Prof. Sakina Z. Bootwala, Head, Department of Chemistry, Wilson College, Mumbai was Convenor of webinar.

There were two talks on the first day. Prof. P. Ramasami, Computational Chemistry group, University of Mauritius delivered his talk on a Virtual visit to the home of Electron. Dr. G. Ramakrishnan, President, Chromatographic Society of Chromatography and Spectroscopy delivered his presentation on 'Importance of Education in Chromatography and Spectroscopy at Graduate level.

There were two talks on the second day. Dr. Chandrakanth Gadipelly, The Wolfson Faculty of Chemical Engineering and Technology, Israel Institute of Technology, Israel was the other eminent International and Academician with his topic, 'Biorefineries-Role of Catalysis for sustainable production of Biofuels and Biochemical'. Prof. Dr. A.K. Bakhshi, Vice chancellor, PDM University, Haryana and Chairman, National Resource Centre of Chemistry, MHRD, Government of India delivered his lecture on 'Towards Excellence in Chemistry in India in the 21<sup>st</sup> Century: Challenges and Opportunities'.

Participants interacted with the speakers in the concluding session. Prof. D.V. Prabhu, General Secretary, ACT from Wilson College, Mumbai was actively associated with the organization of the event .

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### Material Science

The Department of Chemistry, Kamala Nehru Mahavidyalaya, Nagpur and Madhav Science PG College, Ujjain, in association with ACT, organized an International Webinar on 'Material Science' on 9 June, 2020. Around 1870 delegates registered and actively participated in this webinar.

Dr. Wasudeo Gurnule, Convenor of webinar, welcomed the gathering and explained the theme of the Webinar. The Chief Guest of the Inaugural function, Prof. A. K. Bakhshi, Vice chancellor, PDM University, Haryana and Chairman of NRCC, Govt. of India delivered inaugural address. The Guest of honour was Prof. D. V. Prabhu, General Secretary, ACT.



Prof. Pankaj M. Koinkar Dr. Muhammed Shah Miran Prof. Rameshwar Adhikari Prof. D.V. Prabhu Prof. Brijesh Pare Dr. W.B. Gurnule

Prof. Pankaj Koinkar, Tokushima University, Japan gave a talk on 'Development of Ultrathin Two Dimensional Nanostructures by Laser Ablation in Liquid', Prof. Rameshwar Adhikari, Tribhuvan University, Kathmandu, Nepal, gave a talk on 'Electron Microscopy in the Study of Biomedical Materials', Prof. Mohammad Shah Miran, University of Dhaka, Bangladesh, gave a talk on 'Materials: Past, Present and Future' and Prof. Brijesh Pare, President ACT from Madhav Science PG College, Ujjain, gave a talk on 'Man and Material Through History'.

### Role of Medicinal Chemistry

A World conference on the 'Role of Medicinal Chemistry in the Current Scenario' was jointly organized by National Research Centre, Cairo, Egypt; University of Groningen, The Netherlands; Christ Church College, Kanpur; SR Group of Institutions, Lucknow and ACT, Mumbai during 3-5 July, 2020. Prof. Shraddha Sinha, Vice president ACT North Zone from BB Das NIT, Lucknow acted as conference secretary. The inaugural session was started with a welcome note by Dr. Meetkamal, Convenor, followed by the address of distinguished Chief guest Prof. Sandeep Verma, Secretary SERB, DST Delhi. The Speech of President, NRC, Cairo, Egypt Prof. Mohmad Hashem also enlightened the session.

Presidential Address was delivered by the Vice chancellor Prof. Neelima Gupta. Technical Session started with the talk of keynote speaker Prof. Said Sahably, Vice President, Academy of Scientific Research and Technology, Cairo, Egypt; Prof. A.J. Minnard, Director of the Stratingh Institute for Chemistry, University of Groningen, Netherlands delivered a talk on 'Chemical synthesis of *M. tuberculosis* glycolipid antigens and their role in immune response, followed by the session of Mr. Mandeep Singh, Regional Program Director, Asia Pacific, Contract Manufacturing Operations, Kuala Lumpur, Malaysia on Covid Changing Business Landscape. Mr. Niki Saukolin, CEO, Aalbun, UK presented on Protect your Invention. Dr. Anil Kumar Saxena, Emeritus Scientist, CDRI, Lucknow gave a lecture on 'Medicinal Chemistry in Drug Discovery and Development: Current scenario'. Dr. Jignesh Mungalpara, Senior IP Attorney, UK shared his talk on 'Patent Analytics - Pharmaceutical Research' followed by a session of paper presentations by many participants.

The valedictory session was graced by the presence Mr. P.S. Chauhan, Chairman, SJ Group of Institutions. Technical report was given by the convenor Dr. Meetkamal Dwivedi, Christ Church Degree College, Kanpur, followed by feedback from Prof. Sudha Jain, Past President ACT.

### Chemical and Material Sciences

A one day International Webinar on 'Advances in Chemical and Material Sciences was organized jointly by Annamalai University, Tamilnadu and ACT, Mumbai on 20, August 2020. Prof. M. Shanthi, Annamalai University acted as convenor and Prof. M. Swaminathan, EC member, ACT from Kalasalingam University, Krishnankoil acted as advisor of the event on behalf of ACT.

Prof. Uday Maitra, I.I.Sc. Bangalore; Prof. S.B. Jonnalagadda, University of Kwazulu-Natal, Durban; Prof. V. Balakrishnan, University of Malaya and Dr. S. Anandan, N.I.T., Tiruchinapalli were the key-note speakers of the webinar.

## Reports on COVID-19 related Chemistry Webinars

### COVID-19 Outbreak Workshop

A seven day workshop on COVID-19 Outbreak was jointly organized by SRM Group of Institutions, Lucknow and ACT North zone during 24-31 May, 2020. Dr. D.K. Awasthi from Sri JNPG College, Lucknow coordinated the event Mr. Powan Singh Chauhan, Chairman, SRM Institutions delivered inaugural address. Prof. Shraddha Sinha, Vice president, ACT North zone from BB Das NIT, Lucknow addressed on the importance of the workshop.



Dr. Sudhir Mehrotra, University of Lucknow; Dr. Archana Dixit, D.G.P.G. College, Kanpur; Dr. Rakesh Singh, Cardiologist, Lucknow; Dr. Alka Tangri, Bramhanand College, Kanpur; Dr. Jyoti Singh Jadaun, D.G.P.G. College, Kanpur; Dr. Sarita Chauhan, Shri J.N.P.G. College, Lucknow; Dr. Jagrati Bajpal, Aligarh Homeopathic Hospital and Dr. Vivek Kumar, HBTU, Kanpur delivered lectures on understanding and measures of corona virus. The lectures were knowledgeable and the workshop was fruitful.

### Webinar to Combat COVID-19

A three days International webinar conference on 'Chemistry from Nature to Mankind to Combat COVID-19' was organized during 5-7 June, 2020 by GSRM Memorial PG College, Lucknow in collaboration with ACT North zone and SRM University, Lucknow. Prof. Sudha Jain, Principal GSRM Memorial PG College welcomed the speakers and participants. Prof. Shraddha Sinha, Vice-president ACT North zone gave inaugural address.

Dr. Prabodh Kumar Trivedi, Director, CSIR-CIMAP, Lucknow delivered the key note lecture. Dr. Raghvendra Sahai, President, CAL, Parsippany, USA addressed on environmental issues. Dr. Ashok Marwah, University of Wisconsin Madison, USA, suggested different home remedies for boosting immune system. The Scientoon lecture 'Nature The Best Warrior To Lead Post COVID-19 Life' by Dr. Pradeep Srivastava, CSIR-CDRI Lucknow was interesting.

Dr. Skand Shekhar, a Clinical fellow at the National Institutes of Health, USA in his address entitled "Biomolecules in COVID-19" informed on the drugs used to corona virus. The lecture '21<sup>st</sup> Century a New Era of Viruses' was delivered by Dr. Aaruni Saxena, University of Duesseldorf Academic Hospital, Germany. Dr. Sarika Mathur, GSRM PG College and convener of the webinar proposed vote of thanks.

### e-Conference on the role of Science in COVID-19 Times

A three day International e-Conference on the Role of Environmental and Natural Science in COVID-19 times was organised by the Lucknow Christian Degree College, Lucknow in collaboration with ACT and SSCSE, New Delhi during 29-31 July, 2020. The occasion was witnessed by more than 200 participants from 12 different Nations. Dr. Renu Gupta, Head, Department of Chemistry, LCC, Lucknow, the Organising Secretary highlighted on the key features of the conference.



Prof. R. P. Singh, President, SCCSE, New Delhi; Prof. P.K. Dutta, MNNIT, Prayagraj ; Dr. Manju Gerard, ICAR, Hyderabad; Dr. Susan Verghese, St. John's College, Agra; Ms. D.B. Gaildrat, Paris, France; Dr. T. McKenzie, Fredericton, Canada and Prof. B.B.L. Srivastava, University of Dodomo, Tanzania were among the speakers.

Prof. D.V. Prabhu, General Secretary ACT from Wilson College, Mumbai delivered his talk on the role of catalysis on sustainable chemistry. Prof. Sudha Jain and Prof. Shraddha Sinha, acted as judges for poster session and research paper presentation. Winners were awarded with prizes. Dr. Pronoti Singh, convenor and Dr. Abhinav Srivastava, coordinator summarized the three-day event.

## Microfluidic Paper-based Chemical Analysis

S. Krupakar Rao

Micro PADs Division, Pragati Offset Pvt. Ltd.,  
Brindavan Colony, Vijayawada.



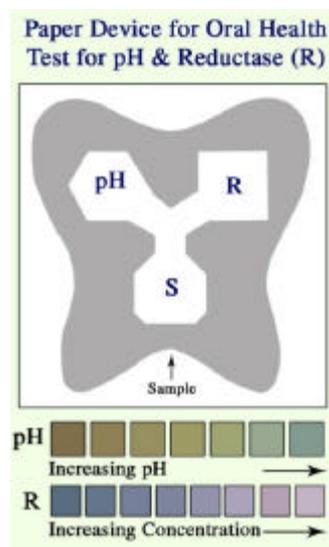
The first microfluidic paper-based analytical device ( $\mu$ PAD) was introduced by Harvard University Chemistry professor, Whitesides in 2007. The field of  $\mu$ PADs has continued to develop at an exponential rate with notable impacts on the academic and industrial communities. These devices use cellulose as substrate to serve as paper-based analytical devices for the point-of-care diagnosis, biosensing, environmental monitoring, chemical, clinical diagnosis, forensic investigations, furthermore, paper has played an important role in chemical and biochemical analysis, including paper chromatography, paper-based colorimetry, paper-based filtration and purification, pH test, etc. The method became popular, as it has several advantages, including very low-cost, power-free due to cellulose fiber networks, compatibility with small volume of samples, the ability to store reagents, easy operation and construction, portability and disposability.

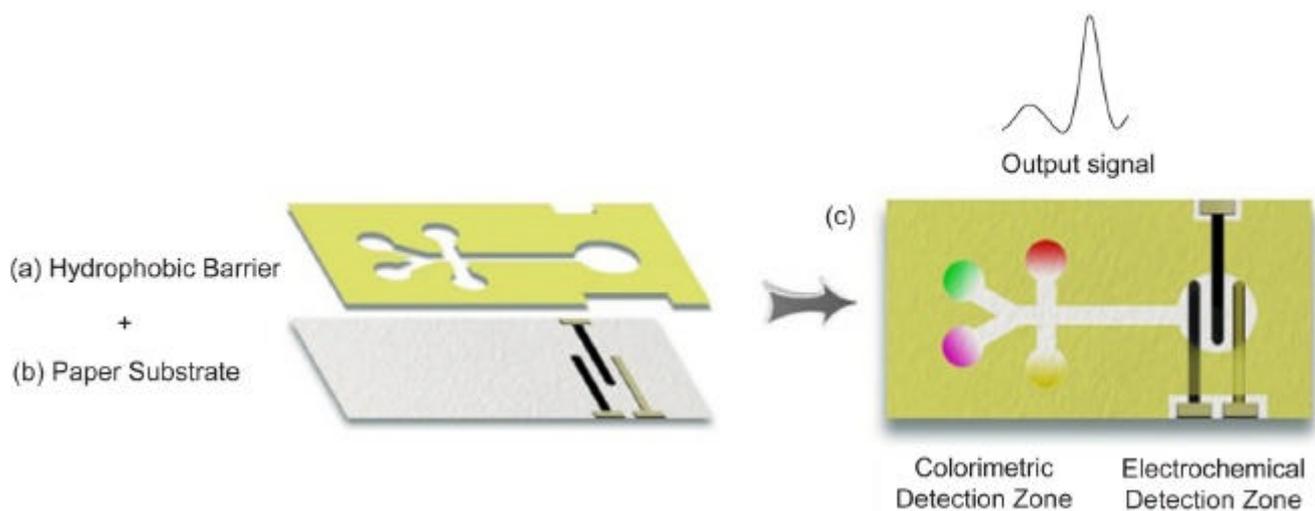
Combination of the micro-fabrication techniques with the paper has resulted in the generation of cost-effective analytical devices with robust easy and fast applications in different fields of sciences and technologies.

The selection of a paper is largely dependent on the application and construction method. In the last years, Whatman grade 1 filter, which is one of the standard grade filters, has widely been used in the construction of sensors and microfluidics, in large part because of their suitable flow rate, porosity, and particle retention.

There are various construction methods for the development of  $\mu$ PADs. The commonest method has been based on the photolithography that provides a high-resolution structure between the hydrophilic and hydrophobic areas. The wax screen-printing method is a low-cost and simple approach for the construction of the hydrophobic barriers. Polymeric organosilicon compounds have also been used for devising the  $\mu$ PADs. In fact, polydimethylsiloxane plotting is deemed to be an excellent approach for the construction of  $\mu$ PADs.

We have developed and applied a number of different biosensors for the monitoring and sensing of various inorganic/organic materials using differently advanced nanobiomaterials. The colorimetric detection is a cost-effective simplest method for the detection of various biological entities. This latter approach is largely dependent on the implementation of  $\mu$ PADs. As a matter of fact, the integration of  $\mu$ PADs with the electrochemical detection approaches were shown to provide a very useful, portable, accurate and robust detection systems – applicable for the detection in various types of settings. Other detection techniques like chemiluminescence, and fluorescence can also be implemented using  $\mu$ PAD technologies. Figure represents a schematic illustration of the  $\mu$ PAD technology.

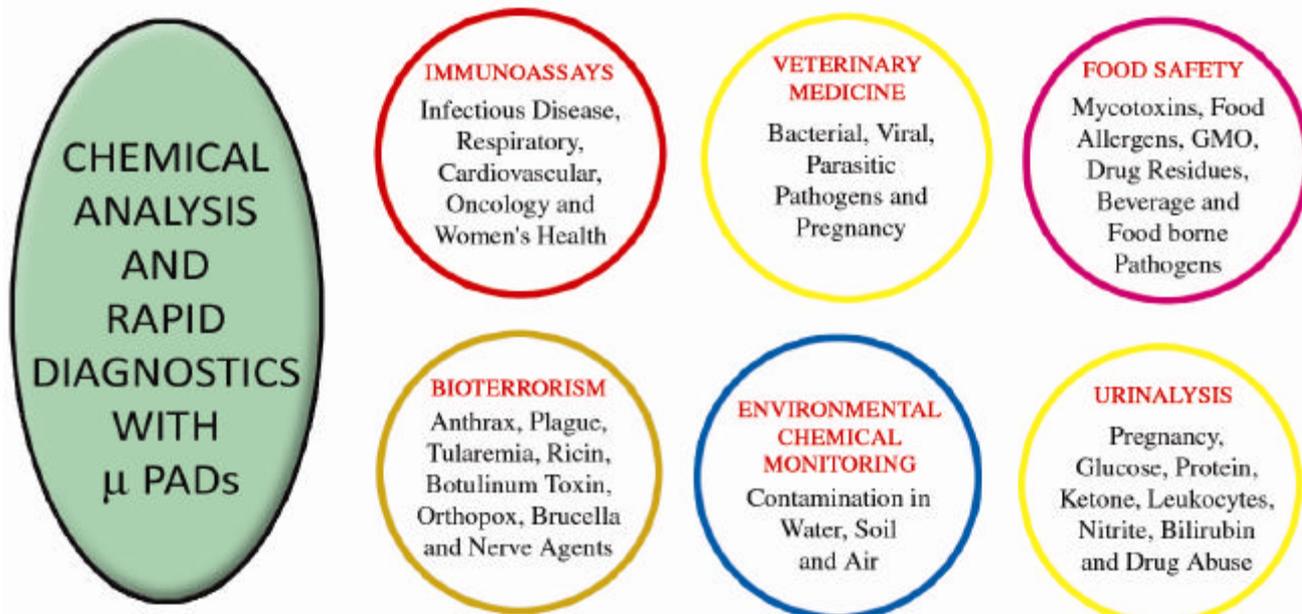




*Schematic presentation for the construction of a dual-detection potential microfluidics paper-based analytical devices (mPADs). (a) The patterning of appropriate wax on the paper. (b) The paper substrate. (c) The completed mPAD with dual colorimetric and electrochemical detection methods.*

Inducting cutting-edge technologies and incorporating best of the latest materials from time to time our group has initiated to address the challenge in translating these microfluidic laboratory, analytical innovations to social impact, by collaborating with various research organisations to mass produce point of care diagnostic devices.

Our endeavour is to mass produce these reliable, inexpensive, easy to use  $\mu$ PADs at the earliest for the benefit of the common man. These  $\mu$ PADs can also be used for testing water, soil, food etc, and will be very useful to the children in their science experiments.



**References :** Whitesides G.M., Angew Chem Int ed, 46 (2007) 1317;  
Cjoa-Te K, Sensors Actwators B Chem, 301 (2019) 126855.

Note : Advising on  $\mu$ PADs is voluntary.

For demonstration and bulk procurement contact : mail : [micropads@pragati.com](mailto:micropads@pragati.com) ; mobile : + 91 9440159456

## New Pathways in Chemistry



Prof. D.V. Prabhu, FRSC (London)  
General Secretary ACT  
Wilson College, Mumbai.

### Chemistry-the subject

Chemistry is a science whose progress is exponential as it touches every aspect of our existence and provides all the things required for life to survive on this planet. Chemistry is rightly called the Science of Life. Chemical processes provide food, clothing, shelter medicines and energy to sustain life. Feeding the ever increasing population is a big challenge calling for increased production of crops, minimizing losses during their harvesting and storage and use of new improved varieties like Genetically modified foodgrains and pulses. The use of fertilizers has increased manifold over the years leading to increase in production of food. Clothing is made from plant fibres like cotton and silk. New and better varieties of cotton have been developed. Nylon, produced by the polymer industry is also an important clothing material in some parts of the world.

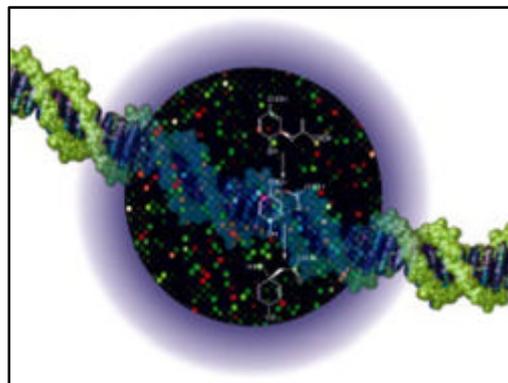
New materials like composites, fly ash bricks and polymeric wastes are being increasingly used for construction purposes especially for housing and roads. Research for synthesis of new drugs to combat diseases is a continuous activity and the pharmaceutical industry has a huge investment especially in our country. Indigenous medicine systems like Ayurveda, Homoeopathy and Unani are also contributing to health welfare especially in India. Of late, nanomedicines are emerging as an important area of medicine. Non-conventional energy sources like solar, nuclear, hydro, biodiesel and wind energy are being increasingly tapped as possible substitutes for the fast depleting coal and oil reserves.

The International Solar alliance, initiated by India aims at forging a strong partnership between all nations to tap and use solar energy.

### Chemistry- the provider of novel materials

In the last few decades, Chemistry had developed some novel materials which have influenced and enriched our lives.

Nanomaterials - materials with nanometer size of  $10^{-9}$ m which is responsible for their unique properties eg. gold is golden yellow in colour but nanogold is reddish. Nano-composites, used as heterogeneous catalysts offer a wide range of benefits like good yield, reusability, thermal stability, non toxic nature and crystalline solid structure. These nanocatalysts



promote excellent atom economy and thus adhere to the principles of Green Chemistry eg. bimetallic oxides. Heterocatalysts are the best choice for water purification and degradation of organic wastes.

Superconductors which offer almost zero resistance to the flow of electric current below a certain temperature called transition temperature  $T_c$  which is much below room temperature.eg the transition temperature for  $\text{LiTiO}_4$  is 13K. Efforts are on to increase the transition temperature to room temperature so that transmission of electricity can be done efficiently at room temperature without loss. Superconductors find applications in power transmission and high field electromagnets which are used in NMR for structure elucidation and MIR for medical diagnosis.

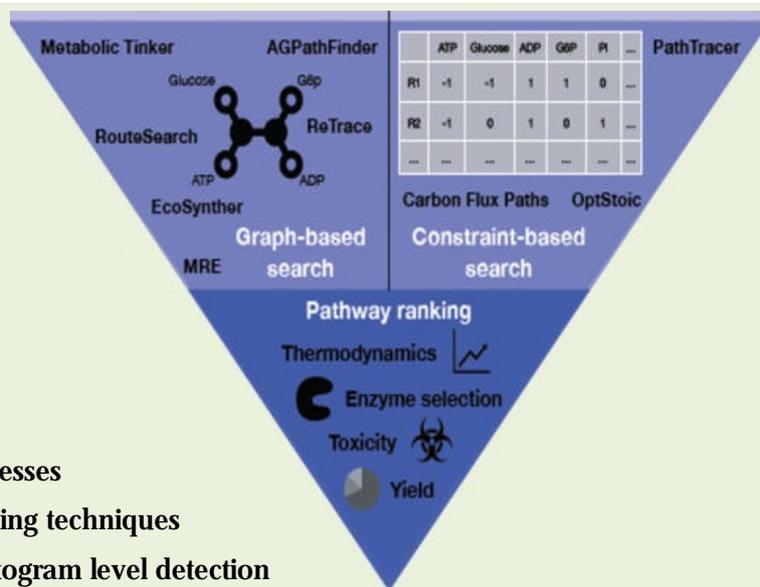
Fullerenes – carbon clusters like  $\text{C}_{60}$  which have extraordinary physical and chemical properties and extraordinary strength. A whole new chemistry called Fullerene Chemistry has developed just like Carbon Chemistry.

## Chemistry-the pivotal science

Chemistry is a central science with strong links with all other Sciences specially Physics and Biology. Chemistry provides structural and reactivity data and information about reaction mechanism making it indispensable to other sciences. Advances in synthetic methodology and computational methods and refinement in instrumentation have revolutionized Chemistry resulting in a host of interdisciplinary subjects like Chemical Biology, Biophysics, Bioinorganic Chemistry, Bioanalytical Chemistry etc. Infact, Environmental Science is the best example of an interdisciplinary science.

## Thrust areas of Chemical research

- Materials Chemistry
- Medicinal Chemistry
- Synthesis of biodegradable plastics
- Supramolecular Chemistry
- Fast reaction kinetics
- Harnessing renewable sources of energy
- Nuclear Fast Breeder reactors
- Waste to Technology (WtT)
- Greening of Chemistry and Eco-friendly processes
- Increase in food production by use of harvesting techniques
- Refinement in instrumentation to enable femtogram level detection



## India's success stories

India brought about the Green Revolution (Dr. M. S. Swaminathan) in the 1970s which converted a food deficient nation into a self sufficient nation. Subsequently, the White Revolution (Dr. Varghese Kurien) made the nation self sufficient in milk and the largest milk producer in the world. The drug revolution brought about to produce and market drugs which are 10-100 times less expensive than the drugs available anywhere else have greatly helped to combat diseases and improve the health of the people. In fact, toda India is a major supplier of good quality drugs to many countries eg. in the COVID19 crisis.

Mention must be made of the DNA technology mission which made India the second country in the world to develop its own probe for DNA fingerprinting (Dr. Lalji Singh) which is widely used to solve criminal cases.

The other major biotechnological achievements are the production of the genetically engineered Hepatitis B vaccine and development of LISA kits for the diagnosis of infection by Japanese encephalitic virus, Hepatitis A and Dengue fever.

All these success stories are a tribute to the genius and self confidence of our scientists and technologists. We should be proud of our scientists.

## Chemistry Education and Research in India

In India, Chemistry is offered as a subject in most colleges and has a large enrolment. We have several world class research institutions where front line research is carried out, to name a few, BARC, Mumbai, IISc, Bengaluru, CSIR-NCL, Pune, IITs and IISERs.

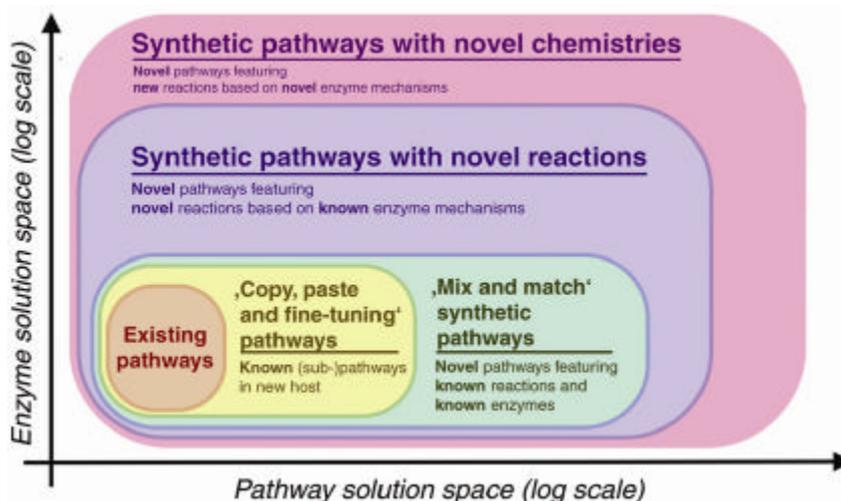
The important funding agencies are: DST, CSIR, DAE, DBT, DOD, BRNS and State Science Councils. Chemistry has plenty of career prospects in industry, teaching, research and entrepreneurship.

## Paradigm shift in learning and research

Of late, a perceptible paradigm shift is seen from the traditional classroom teaching to self learning using multimedia, online courses, MOOCs etc. This technology enabled learning is in participatory and interactive modes where the teacher is a guide and facilitator. The concept of a Global Classroom is fast becoming a reality. Today the focus is on interdisciplinary research and the emphasis is on filing of patents along with publishing in high impact factor journals

## The Path ahead

The quality of higher education and research has to be enhanced by inclusion of interdisciplinary and frontier areas of the subject in our curricula. More experimentation has to be included. We have to prepare a clear roadmap to convert our universities into active centres of research. A vibrant academic-industry interaction will lead to cross fertilization of ideas. Academic – industry collaboration is a win-win situation reaping benefits for both partners. Industry learns about cutting edge scientific and technological advances, gains insights in the direction of research and gets an early access to PhD students as future employees. In turn, Universities get a ready set of hard core industry problems that fuel their research and funding. Students gain access to potential employers along with training and exposure to industrial research.



Courses offered should increase the employability of our students. Preparation of good quality text books and study material will play a vital role in enhancing the quality of teaching and instruction. Our courses should also include soft skills as required by industry, communication skills, knowledge of patent laws, environmental audit and intellectual property rights.

At present, a project in an industry is a part of the M.Sc. programme in most Indian universities. Some bold initiatives worth mentioning are inclusion of chemical engineering subjects in the M.Sc. Chemistry curriculum of ICT, Mumbai and NIUS programme at HBCSE (TIFR), Mumbai wherein talented and motivated undergraduate students are nurtured for advanced studies and research.

Mention must also be made of The International Chemistry Olympiad which has proved to be a great motivator to students to pursue Chemistry as a lifelong passion and career. It is possibly the only competition which lays emphasis on experimentation. The Indian Chemistry Olympiad programme, organized by HBCSE involves scientists from national level research laboratories and academicians from prestigious Indian institutions. It is a matter of pride that India has been doing exceedingly well and winning laurels in the International Chemistry Olympiad as in all other Science Olympiads.

To sum up 'innovation' should be the buzzword in today's Chemistry education and should light the pathway to the future.

## Polyphenols : Potential Natural Antioxidants

Dr. Neera Sharma

Senior Assistant Professor, Hindu College,  
University of Delhi, New Delhi.



Plants and plant-derived products have played a key role in maintenance of human health by improving the quality of life for centuries. Since few decades, the research studies focusing on the phenolic compounds from medicinal plant species have increased considerably, due to their benefits in the prevention and cure of many human ailments. Plants with polyphenol activity have played a major role in traditional Indian Ayurvedic medicine for centuries.

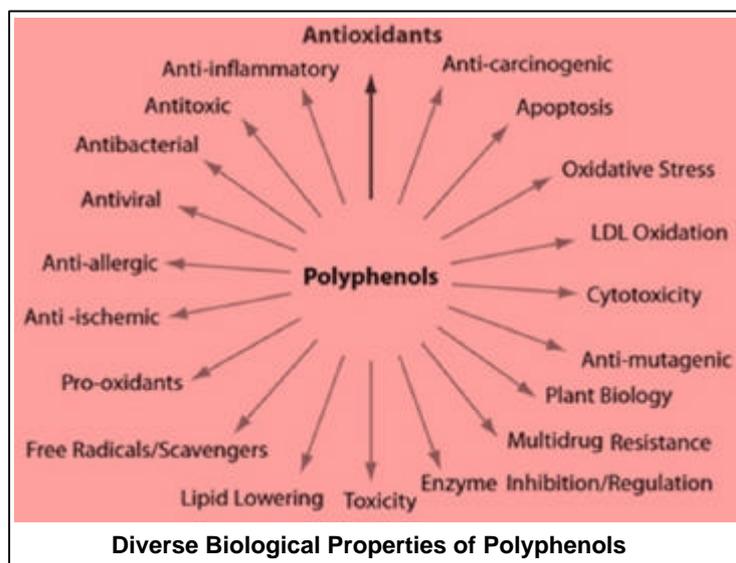
Polyphenols are secondary metabolites of plants which refer to more than 8,000 compounds found in the plant kingdom and possessing at least an aromatic ring with one or more hydroxyl substituents, including functional derivatives like esters, methyl ethers, glycosides, etc. They have potential applications in pharmaceutical and medical aspects, especially for health promoting, e.g., antioxidant effect, antibacterial effect, anticancer effect, cardio protective effect, anti-inflammatory effective, immune system promoting and skin protective effect from UV radiation.

In the present danger of global pandemic caused by Corona virus, WHO has also stressed on to develop a healthy lifestyle with strong immune system to protect against this infection. A large number of flavonoids and other phenolics have been proved their noteworthy effects on immune system function and inflammatory process. The stimulation of the immune system by phenolic compounds can be attributed to the presence of -OH groups in the structure. The immunomodulatory properties can be partially linked with the antioxidant activity of polyphenols. Due to their potent antioxidant properties, plant phenolics have scientifically proven to prevent various oxidative stress-related as well as chronic diseases, such as cancer, cardiovascular and neurodegenerative diseases.

The health benefits of antioxidants are well known as they are also helpful for regulating enzyme function and stimulating cell receptors. These molecules play an important role in neutralizing the destructive reactivity of undesired reactive oxygen/nitrogen species produced as by product during metabolic processes in the body. Reactive oxygen and nitrogen metabolites play a complex role in many diseases and in metabolic regulation.

### How does Polyphenols act as Antioxidants?

Polyphenols are powerful nutrients that protect our health by fighting against free radicals in body and preventing damage from oxidation. They inhibit the lipid peroxidation induced by reactive oxygen species (ROS). ROS are highly reactive oxygen containing molecules, which include free radicals also. The process of cellular damage and its antioxidant inhibition occurs through the chemicals reactions which follow the free radical mechanism.

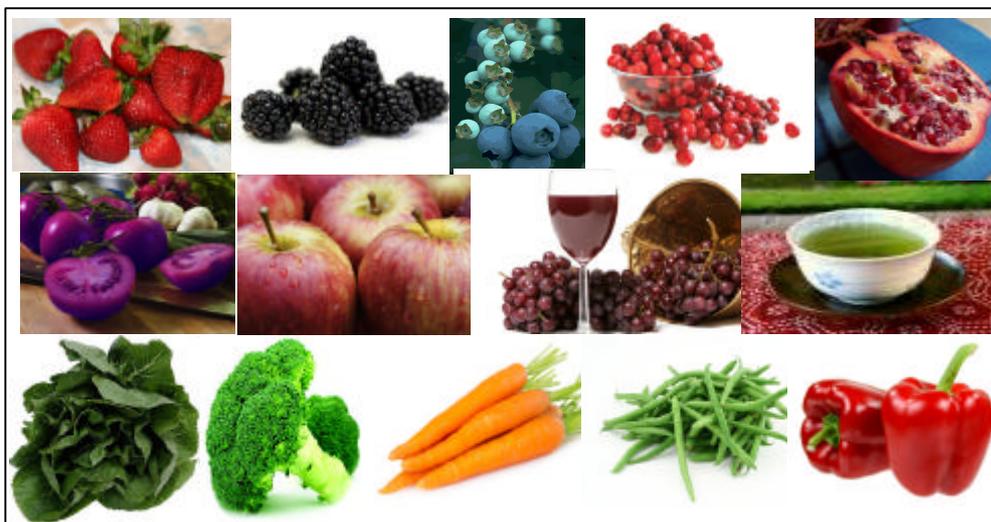


The reaction is initiated by some radical species ( $\text{In}^\cdot$ ) which may react with the (lipid) substrate  $\text{RH}$  (mainly by H-atom abstraction) and results in the formation of an alkyl radical  $\text{R}^\cdot$ . In the chain propagation step this alkyl radical  $\text{R}^\cdot$ , reacts with oxygen to form a peroxy radical ( $\text{ROO}^\cdot$ ).  $\text{ROO}^\cdot$  radical generated, attacks another molecule of the substrate in cyclic manner to form a hydroperoxide  $\text{ROOH}$  (the oxidised substrate) and another radical  $\text{R}^\cdot$ . The chain reaction proceeds for many cycles before two radical species incidentally quench each other in a termination step. The number of cycles occurring between initiation and termination is named 'chain length'.

The role of antioxidant is of impairing this radical chain reaction by transferring a hydrogen atom and is divided into two main groups (Preventive antioxidant and Chain-breaking antioxidant), depending on their mechanism of interference. Chain-breaking antioxidants are by far most important antioxidants, because preventive antioxidants are completely ineffective after the process has started. Phenols are the prototypical chain-breaking antioxidants. It is known that reactive species are kept at physiological levels by phenolic antioxidant by quenching free radical species through hydrogen atom transfer from  $\text{Ar-OH}$  group.

During this process, the phenolic group ( $\text{ArOH}$ ) is converted into phenoxyl radical ( $\text{ArO}^\cdot$ ) which is more stable due to electron delocalization. Relative stability of phenoxyl radical and antioxidant activity depends on the substituent on the neighbouring carbon atom, number of  $-\text{OH}$  groups, groups present at other positions which causes resonance stabilization through extended conjugation. Thus phenoxyl radical is less harmful and does not react with many substrate molecules. Quantum chemical studies have provided significant data on mechanism of reaction between phenolic compounds and free radicals outlining a number of properties with a key role for the radical scavenging activity and capacity of phenolics.

Natural  
Sources of  
Polyphenols  
in Food



Many studies have also shown that the combination of antioxidants with antiviral drugs synergistically reduces the lethal effects of viral infections. Polyphenols, possess both antioxidant and antiviral properties, therefore, could be largely used as natural remedy for prevention from corona virus. The abundance of polyphenols in our diet, evidence of their role in the prevention of various diseases and strengthening the immune system, provides the tremendous scope for their use in present situation.

References: (1) Noboru Uchide et al., *Antioxidant Therapy as a Potential Approach to Severe Influenza-Associated Complications*, *Molecules*, 2011, 16, 2032. (2) DuangjaiTungmunnithum et al., *Flavonoids and Other Phenolic Compounds from Medicinal Plants for Pharmaceutical and Medical Aspects: An Overview*, *Medicines*, 2018, 5, 93.

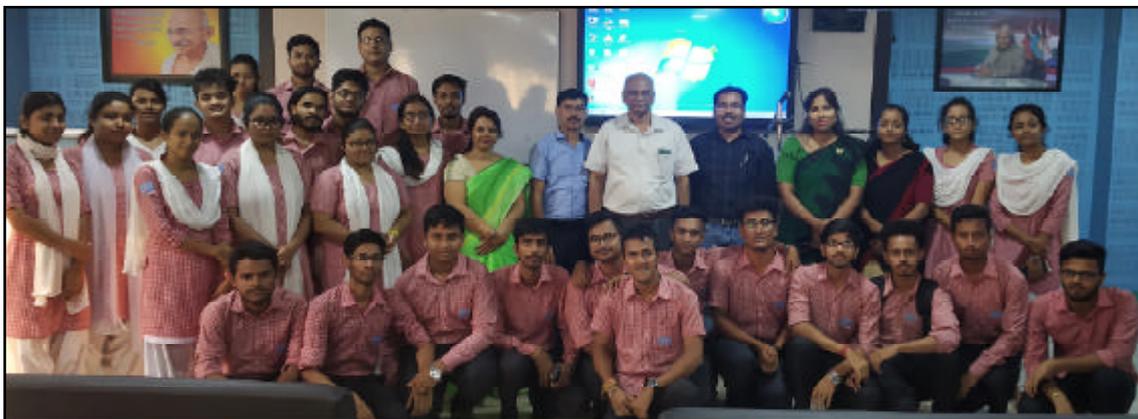
## Reports on National Virtual Conferences

### Chemistry Education : Prospects and Opportunities

Department of Chemistry, Pandu College in collaboration with ACT, North East Zone organized a National webinar on 'Chemistry Education: Prospects and Opportunities' on 26 June, 2020. Dr. Sanchay Jyoti Bora, HOD Chemistry, Pandu College was the Convenor of the Webinar.

The inaugural programme was chaired by Prof. D.C. Deka, Vice-Chancellor, Madhabdev University, Assam. Prof. B.K. Das, Vice-Chancellor, Bhattadev University, Assam and Dr. Jogesh Kakati, Principal, Pandu College gave their respect to addresses.

Prof. Brijesh Pare, President, ACT from Madhav Science PG College, Ujjain has discussed on the discovery of fullerene. Prof. Ashim Jyoti Thakur of Tezpur University demonstrated the chemistry behind pharmaceutical industries. Prof. Ujjal Kumar Gautam of IISER, Mohali gave a talk on 'Electron Microscopic Techniques and their Application in Chemistry research'.



More than five hundred participants across the country have registered for the webinar, out of which 350 participants connected through the online platform. All the participants were awarded with E-certificates.

### Scintillating Chemistry

National Webinar 'Scintillating Chemistry' held on 28 June, 2020 was an initiative of ACT-East Zone. Dr. S.P. Singh, Secretary, ACT East Zone was the Chief Coordinator and Dr. Amrit K Mitra, EC Member, ACT East Zone was the Coordinator of this event.

The first invited speaker was Prof. N. Sathyamurthy, Founder Director, IISER, Mohali, delivered a lecture on 'The Chemical Bond'. The second invited speaker was Prof. Uday Maitra from the Indian Institute of Science, Bangalore delivered a lecture on 'Molecules Which Defy Rules'. Prof. Anindya Dutta, Indian Institute of Technology, Mumbai delivered a lecture on 'Quest for Solid State Organic Emitters'. Dr. Prabodh Chobe, Head, R & D centre, BASF, India delivered a lecture on 'Fairytale Like Future Innovations Based on Chemistry'.

Presidential Address was delivered by the ACT President Prof. Brijesh Pare. About 1600 participants attended this webinar. Certificate of Recognition was awarded to all the Resource Persons whereas Certificate of Participation was issued to all the participants by the Organizing Committee. Prof. P. M. Mishra, Zonal Vice-President, ACT East Zone extended the 'Vote of Thanks'.

## Features of Chemdraw and Greener Aspects of Drug Discovery

A one day National Webinar on 'Features of Chemdraw and Greener Aspects of Drug Discovery' was organized by RNC arts, JDB Commerce and NSC Science College, Nashik, in collaboration with ACT and Perkin Elmer Informatics on 23 July, 2020.

Dr. Sudesh Ghoderao, Convenor of the webinar welcomed the dignitaries and briefed about the concept of the webinar. Dr. Ram Kulkarni, Zonal Secretary of GE Society was the chief guest. Dr. Dhanesh Kalal, presided over the inaugural session. Dr. D.V. Prabhu, General Secretary, ACT was the guest of honour.



Prof. Arvind A. Natu, Visiting Faculty at IISER, Pune. guided the participants on 'Greener Aspects of drug Discovery'. Prof. Brijesh Pare, President, ACT from Madhav Science PG College, Ujjain delivered his talk on 'The significance of Chemical Revolution Initiated by Lavoisier'. Mr. Charitra Gour, Scube Scientific Software Solutions Pvt. Ltd., New Delhi guided the participants on 'Features of ChemDraw'.

There were more than 1300 registrations and about 700 delegates actively participated in the webinar.

## Hydrogen based Economy

A one day National Webinar on 'Hydrogen Based Economy - Future Prospects', was organized by the Department of Chemistry, A.G. & S.G. Siddhartha Degree College, Vuyyuru, Krishna Dist., A.P. state, in association with IQAC and ACT Mumbai on 12 August, 2020.

Dr. D. Balakrishna, Principal and Chairman, inaugurated the Webinar and delivered the presidential address. Prof. D. Ramachandran, Life member ACT from Acharya Nagarjuna University, Guntur delivered the key-note address.

Dr. Mannam Krishna Murthy, Secretary ACT south zone from Varsity Education Management Limited, Hyderabad coordinated the academics on behalf of ACT. He delivered an invited presentation on 'Hydrogen : Eco-friendly Future Fuel.' Dr. C.V.V. Satyanarayana, Retd. Chief Scientist, CSIR-NCL, Pune delivered another invited presentation on 'Hydrogen Energy and Fuel Cells'.



About 300 delegates registered free to the webinar, some of them were very active in the interactive session. Mrs. A. Indira, HOD Chemistry and Convenor of the webinar proposed vote of thanks.

## Challenges of Virtual Lab and Simulation

A one day National Webinar on 'Opportunities and Challenges of Virtual Lab and Simulations' was jointly organized by Swami Shukdevanand College, Shahjanpur, Uttar Pradesh and ACT, Mumbai on 30 August, 2020.

Dr. A.K. Singh, HOD Chemistry, S.S. College acted as convenor. Prof. R.K.P. Singh, Vice-chancellor, Dr. S.M. National Rehabilitation University, Lucknow was the Chief Guest. Prof. D.V. Prabhu, General Secretary, ACT was guest of honour and Dr. Priyabrat Dwivedi, National University of Science and Technology, Oman was a resource person.

## Reports on Faculty Development Programmes

### Chemistry Significance

Department of Basic Sciences and R & D Division of Pragati Engineering College (Autonomous), Andhra Pradesh, organized a five day On-line Faculty Development Programme from 2-6 June, 2020 in association with Association of Chemistry Teachers (ACT), Mumbai. Prof. P.V.S. Machiraju, ACT EC member and Dean R&D, Pragati Engineering College acted as convenor of the five day FDP.

Ten Resource Persons delivered invited talks, two on each day and 173 Persons from Institutions, Scientific organizations participated in the programme.

Day	Name of the Presenter	Topic
Day One	Prof. P.V.S. Machiraju, R & D Division Pragati Engineering College (A), A.P.	Chemistry Significance in Interdisciplinary Research
	Dr. B. Sridhar, Senior Principal Scientist ICT, Hyderabad.	Nano Engineered Materials : Synthesis, Characterization and Catalytic Applications
Day Two	Dr. Brijesh Pare, President, ACT Vikram University, Madhya Pradesh.	Exploring the Scientific Process (Through Discovery of Oxygen by Joseph Priestley)
	Sri Murthy Chittoori, Director M/s. Venky Pharma Pvt. Ltd., Yanam.	Nano Engineered Materials : Synthesis, Characterization and Catalytic Applications
Day Three	Dr. G.J. Naga Raju, JNT University UCEV, Vizianagaram, A.P.	PIXE : A Novel Analytical Technique
	Prof. Helen Kavitha, HOD Chemistry SRM University, Ramapuram, Tamilnadu.	Design of Synthetic Organic compounds for Medicinal Applications
Day Four	Dr. P.S. Brahmanandam, Shri Vishnu Engineering College for Women, Bhimavaram, A.P.	Nano Sensors; Definition and Applications
	Prof. M. Swaminathan, Kalasalingam Academy, Kirshnankoil.	Eco-friendly Nano Materials and Environmental remediation and Organic Synthesis
Day Five	Dr. S. Venkata Mohan, Scientist ICT Hyderabad.	Emerging Environmental Innovations in Chemistry Perspectives
	Dr. Mannam Krishna Murthy, Dean Varsity Education Management Ltd., Hyderabad.	Eco-friendly Nano Materials and Environmental remediation and Organic Synthesis

### Scope of Chemistry in Industries

A one week faculty development programme on 'Scope of Chemistry in Industries' was organised under the patronage of ACT, Mumbai and SRIM, Lucknow during 17-24 June, 2020. FDP aims to provide opportunities to faculty members, research scholars and PG students to enrich their teaching skill and research in chemistry. The FDP was attended by about 100 participants from faculty members of many colleges and Institutes. The programme started with inaugural function and opening remarks by Dr. Alka Tangri, convenor of the programme.

Prof. Shraddha Sinha, Vice president of ACT addressed the audience with her presidential speech. Shri P.S. Chauhan, Chairman, SRIM appreciated the program and also encouraged for such activities. Dr. D.K. Awasthi the coordinator of FDP introduced the dignitaries and participants with the Theme of the program. Mr. Ram Mehrotra, Vice president, Nerolac Kansai Paints Ltd. was the chief guest of the program.

Dr. J.P. Singh, UP Textile Technology Institute has delivered an interactive lecture on 'Sustainable Growth in Textiles'. In this session participants were learned how to reduce flow of chemicals originating from textile industry by recycling and polyester filtration method.

An informative lecture on 'Sugar Sweeteners Processing and Quality Considerations amidst Pandemic' was discussed by Prof. Narendra Mohan, Director National Sugar Institute.

Mr. Krishnaraj, Chief Manager, Nerolac Kansai paints illuminated his talk on 'Smart Coatings Sustainable Solutions for Paints and Coatings'.

Prof. Reena Singhal, Plastic technology department, Harcourt Butler Technological University, discussed on significance and use of plastics in manufacturing roads, tiles, automobiles and relevant use of waste produced from industry.

Prof. B.V. Shukla, Assistant Director, Fragrance and Flavour Development centre discussed on 'Various Career and Business Opportunities in Aroma Industry'.

Mr. Dharmendra Pathak, Technical Manager, R&D from Catalysts Biotechnologies Ltd., New Delhi, highlighted his talk on 'Basics of Ethanol Fermentation, Process improvement, trouble shooting key points which originated during the production of Ethanol in industries'.

Dr. Vivek Kumar, Food Technology Department Harcourt Butler Technological University, focussed his talk on 'New Innovations in Food Sector'.

During the valedictory session on the concluding day, the report of one week academics was presented. Prof. D.K. Awasthi, JNPG College, Lucknow acted as coordinator for the feedback given by the participants.

### Sustainable Development

A five day faculty development programme on 'Prospective Research on Sustainable Development' was organized by the Department of Chemistry, SRM Institute of Science and Technology, Ramapuram, in association with ACT, Mumbai, during 20-24 July, 2020.

Prof. Helen Kavitha, Vice president, ACT South zone acted as convenor of the online programme. She extended warm welcome to the resource persons and participants. Prof. S. Sivasubramanian, Former Vice chancellor of Bharathiar University, Coimbatore and Noorul Islam University, Kumaracoil, TN State delivered inaugural address and presented his lecture on the changing role of chemists.

There were two invited presentations on each of the day 2 to day 5, by eminent speakers. About 300 faculty members from various places of the Nation participated actively in the FDP.

Date	Name of the Presenter	Topic
21 July	Dr. S. Sivasubramanian, Former Vice Chancellor Bharathiar University, Coimbatore	The Changing Role of Chemists
	Dr. M. Swaminathan, Kalasalingam Academy of Research and Education, Krishnankoil.	Green Tehcnology for Industrial Effluent Treatment
	Dr. J.P. Rajapandian, Institute of Analytical Chemistry, University of Leipzig, Germany.	Micro fluidic devices and its Applications in Analytical Chemistry
22 July	Prof. D. Ravi Shankaran, University of Madras, Chennai.	Nanosensors for Point of Care Healthcare Applications
	Prof. Ch. Subramanyam, Indian Institute of Technology, Hyderabad.	Artificial Photosynthesis Basics and Recent Advances
23 July	Dr. U.P. Senthilkumar, Senior Vice president Orchid Pharma Ltd., Chennai.	Drug Discovery and Development
	Prof. Radha Jayaram, Institute of Chemical Technology, Mumbai, India.	Catalysis and the Green Revolution in Chemistry
24 July	Dr. K. John Adaikalasamy, HOD Chemistry, American College, Madurai.	Molecular Switches and Machines
	Dr. S. Maheshwaran, Indian Institute of Technology, Mumbai.	Molecular Engineering to Control the Electronic, Magnetic and Catalytic Properties

## Reports on Online Quiz Programme

### Quiz on Everyday Chemistry

Department of Chemistry, SRM Institute of Science and Technology and ACT, Mumbai jointly organized an online quiz programme during 7-15, June 2020.

The topic of the quiz programme is Everyday Chemistry. The quiz competition was conducted at different levels for Diploma and plus 2 students; undergraduate and postgraduate students; School and College Teachers.



**SRM**  
INSTITUTE OF SCIENCE & TECHNOLOGY  
Deemed to be University by u/s 3 of UGC Act, 1956  
**RAMAPURAM**



Prof. Helen Kavitha, Vice president ACT South Zone from SRM Institute, Ramapuram coordinated and supervised the quiz programme. Chemistry faculty members supported in setting questions and organizing the competition.



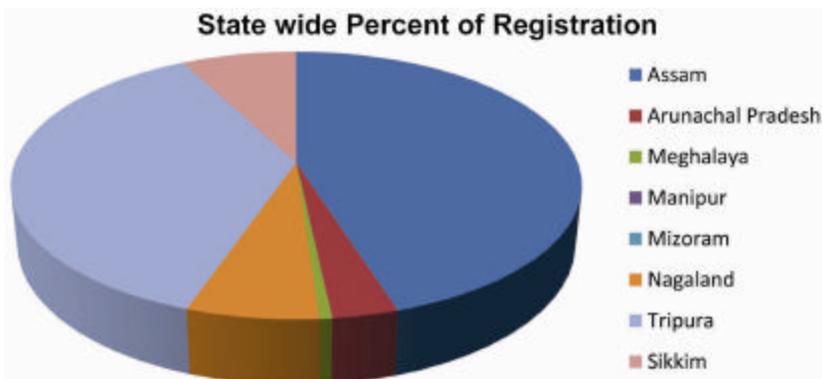
There were more than 450 participants in the quiz. E-certificates were provided to those participants who scored 50 percent and more. Best performances were recognized with certificate of merit.

### Chem Quiz for Science Students

ACT North East Zone has organized an Online Quiz Competition, for North East Science Students on 10 August, 2020.

Students from all over the north east states registered for the competition. Students from Cotton University, Netaji Subhash Mahavidyalaya, Tripura University, Jawaharlal Nehru College (Pasighat), Namchi Government College, Ishwar Chandra Vidya Sagar College etc registered for the Quiz.

About 94% of all the registered participants were from Government Institutions and the other participants were from Private Institutions. A total of 594 students registered for the competition.



The quiz was scheduled to start at 7:00 pm through Google Forms. A total of 20 questions were set for the competition and the allotted time to each participant was 30 minutes.

First prize was won by Subham Kumar Guha, Rangia College, Assam; second prize by Hiya Deka, Rangia College, Assam and third prize by Ilakshi Baruah, Dakshin Kamrup College, Mirza, Assam.

The winners of the competition have been awarded with E-Certificate. The Quiz Master for the competition was Dr. Gitimoni Deka, Secretary, ACT North East Zone from Rangia College. The Quiz Master was assisted by Akib Hussain, Political science major student of Rangia College, Assam.



### The odd Behaviors of Water

Water, so ordinary and so essential to life, acts in ways that are quite puzzling to scientists. Now a new study provides strong evidence for a controversial theory that at very cold temperatures water can exist in two distinct liquid forms, one being less dense and more structured than the other.



Researchers at Princeton University and Sapienza University of Rome conducted computer simulations of water molecules to discover the critical point at which one liquid phase transforms into the other.

The new study used today's much faster powerful computers and more accurate models of water. Even with today's powerful research computers, the simulations took roughly 1.5 years of computation time. In the case of the two liquids forms of water, the two phases coexist in uneasy equilibrium at temperatures below freezing and at sufficiently high pressures.

### Hypochlorous Acid Cell



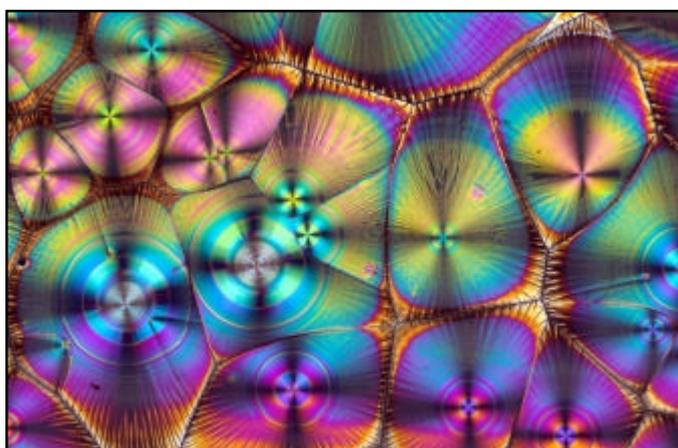
Hypochlorous acid is used in many industries including Hospitality, Food service, Grocery/Retail, Post harvest vegetable production, Hydroponics and Medical services. Electrochemically Activated Water is made by passing low-voltage electricity through saltwater (Sodium Chloride) in the Hypochlorous Acid Cell and splitting the sodium ions (catholyte) from the Chlorine ions (Anolyte-Hypochlorous acid).

Hypochlorous acid is proven to be safe, environmentally friendly, and fast acting against a broad range of resistant pathogens, including MRSA, M.tuberculosis, Legionella, E.coli, HIV, poliovirus, Helicobacter pylori, Norovirus, the avian influenza virus, Covid 19 and many more.

### Polarised Light Image of Vitamin C

The Image of vitamin C taken with polarised light is very Interesting.

Vitamin C is essential for collagen formation and wound healing and a lack of it can lead to scurvy. Its study led to the awarding of both the Medicine and Chemistry Prizes in 1937: The first to Albert von Szent-Gyorgyi, born on this day, who first isolated the vitamin and the second to Norman Haworth for determining its molecular structure.



## 9 Year Girl Snatched the Periodic Table World record

In Lahore, Natalia set a world record by setting a Periodic Table in 2 minutes and 42 seconds, according to the Geysler World Record. Dr. Manaqshi Agarwal's record was 2 minutes 49 seconds. Natalia Najam was overjoyed to set the record and said that her favorite subject is chemistry and she wants to become a biochemist.



## Longest Synthetic Carbohydrate



Longest linear polysaccharide was made in a 201-step automated synthesis that took only eight days

The longest ever synthetic carbohydrate, a sugar with 100 monosaccharide units strung in a linear chain, has been made by chemists in Germany. The team used an automated synthesiser for 201 of the 203 steps. The 100-mer beats the previous record holder, a 92-mer created by regular convergent total synthesis in 2017.

## Visakhapatnam Gas Leak

The Visakhapatnam gas leak, also referred to as the Vizag gas leak, was an industrial accident that occurred at the LG Polymers chemical plant in the Venkatapuram village of the Gopalapatnam neighbourhood, located at the outskirts of Visakhapatnam, Andhra Pradesh, during the early morning of 7 May 2020.

The main chemical constituent responsible for the gas tragedy is styrene, which has relevant hazards like irritation to eyes, skin and to upper respiratory track.



## Chemical Explosion at Beirut



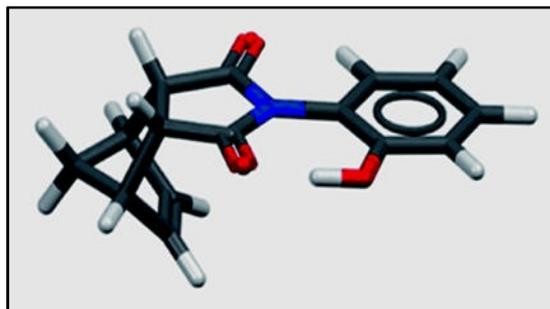
Major General Abbas Ibrahim, of Lebanon's General Security Directorate, said the massive blast that shook Beirut's port area on 4 August, 2020 was caused by 'confiscated high explosive materials.'

A CNN producer in Beirut has described the 'chaotic scene,' in the emergency room of one Beirut's hospitals, with doctors conducting triage as they try to treat dozens of people injured in explosion.

'Some people had broken limbs, some showered with glass,' Ghazi Balkiz said. 'I walked in, I saw a few people lying on the floor -- doctors trying to put IVs into them. A couple of people were passed out,' he added.

## Hydrogen Bond Imparts more Stability

A single hydrogen bond can stabilise a transition state significantly more than its intrinsic interaction energy would suggest, new research shows. The team behind the work suggest that stabilisation partly arises from the molecule using strong destabilising repulsive interactions to prepay an energy penalty reaction – a concept that chemists could use to make better catalysts.



## Using ions to connect Life to Machines



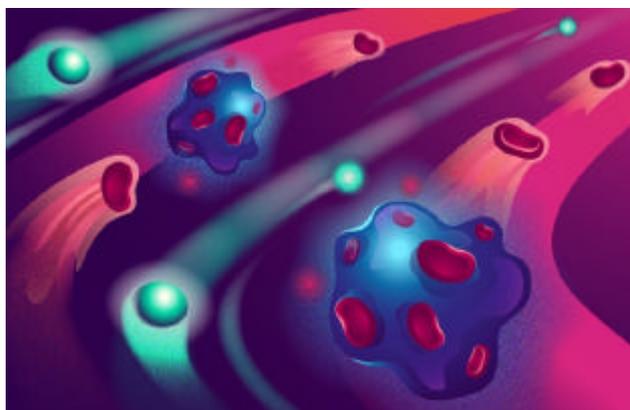
Ionotronic materials are beginning to show how life's signals can be aligned with electronics. James Urquhart speaks to the scientists who are exploring the emerging frontier.

Every second, electricity flows through the soft, flexible, water-filled cells of living organisms. This electricity enables us to think, move and experience the world and it happens thanks to ions: atoms and molecules carrying positive or negative charge. When our senses are stimulated, ions are triggered into motion across cell membranes, precisely controlled by protein channels, generating an electrical current that fires signals along nerves to the brain.

A growing number of studies are revealing just how the world of ions and electrons can be integrated, offering tantalising glimpses into what merging living matter with machines could look like in years to come. Ionotronic materials can respond to environmental changes in life-like ways, which could be a crucial step in the integration of humans and machines. Such technology could ultimately lead to anything from bionic soft robots, intelligent wearable sensors and cyborg tissues all the way to human-computer interfaces, electronic plants and digital control of biomolecules.

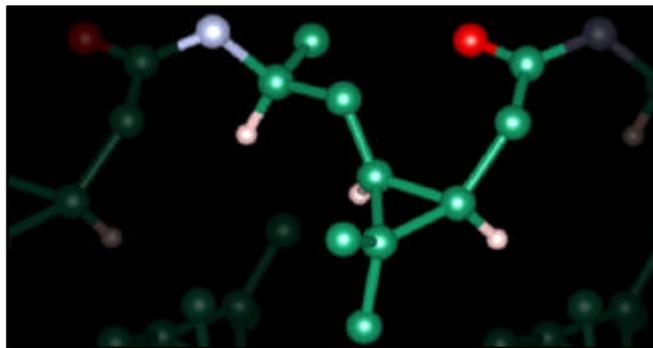
## New Technology promises to Revolutionize Nanomedicine

Researchers from the Moscow Institute of Technology and their colleagues from Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry of the Russian Academy of Sciences have developed a breakthrough technology to resolve a key problem that has prevented the introduction of novel drugs into clinical practice for decades. The new solution prolongs blood circulation for virtually any nanomedicine, boosting its therapeutic efficiency.



The new technology exploits the fact that the immune system continually eliminates the old, 'expired' red blood cells—about 1% per day in humans—from the bloodstream.

## A Real Alternative to Crude Oil



A research team from the Fraunhofer Society and the Technical University of Munich has developed a new polyamide family which can be produced from a byproduct of cellulose production – a successful example for a more sustainable economy with bio-based materials.

Polyamides are important plastics. Commercially, they have been made predominantly from crude oil

up until now; there are just a few ‘green’ alternatives, such as polyamides based on castor oil.

The new polyamides impress thanks to their special properties which make them attractive for many applications. For example, they melt at higher temperatures than the competing crude oil derived products. In addition, the new compounds can be produced transparently as well as in a partially crystalline manner, which increases its later application possibilities using the same starting substance.

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## Mystery : Benzene forms Cherry-flavour in Soft drinks

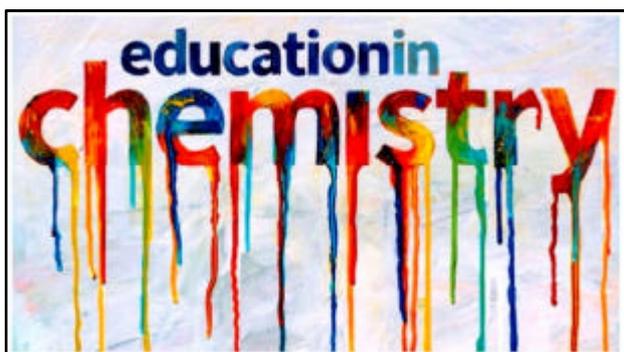
Benzaldehyde is one of the world’s most widely used food flavourings. It can simulate both almond and cherry flavours and odours and it occurs naturally in many fruit extracts.

Researchers at the Technical University of Munich tested flavoured drinks and natural cherry juice examining their pH, oxygen content, temperature, exposure to light and the presence of metal ions. Direct formation of benzene from benzaldehyde during light exposure suggested an ionic formation pathway. The researchers also found the reaction didn’t occur in dark red cherry juice – and so they reason that the colour acts as a light filter and prevents the formation of benzene.



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## COVID Secure Teaching Ideas



The following ideas were reported recently in Royal Society of Chemistry’s Education in Chemistry:

A teacher-only demo to fire up students – by using water to light a match. Ideal for discussing the properties of water or enthalpy; Get disengaged learners back on track by reflecting on their learning at home and help them turn their reflections into actions; Worried about back-to-school behavior? Transform

your classroom behavior culture with these ideas; How to write effective questions for formative assessment; Which technologies from the past six months will teachers stick with once they are back in school? One view on what practical classes might look like this year; Expert teachers answer NQT’s queries in our new column, Classroom questions.

A teaching tip is that the latest in education research, including a scaffolding method to improve student’s scientific argumentation skills and tips on how to use concept maps and creative exercises to boost student’s conceptual understanding.

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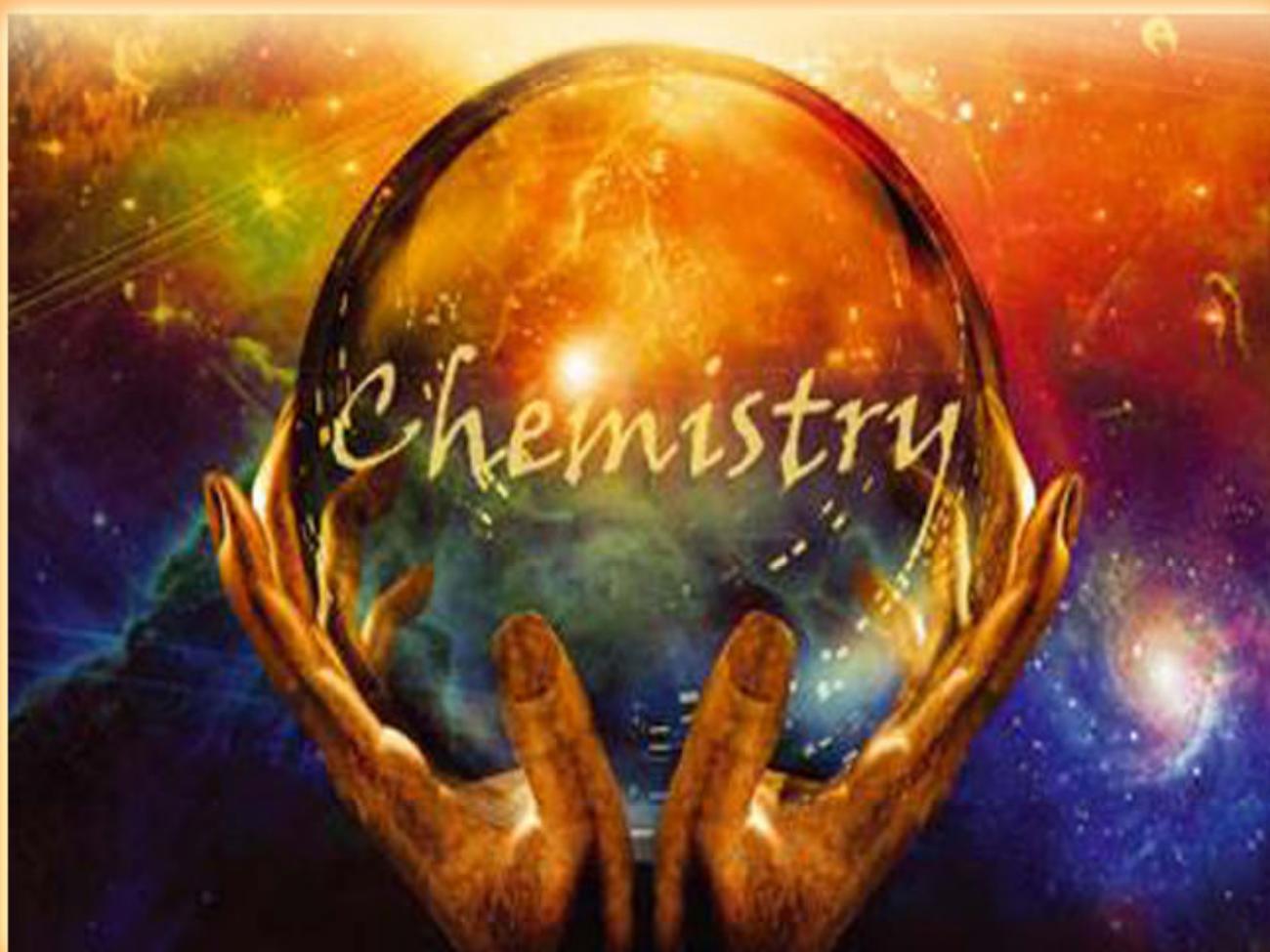
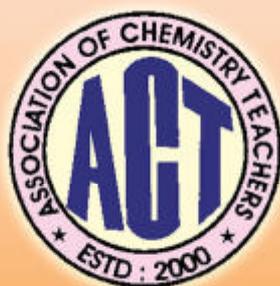
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