ACT's FOOTPRINTS

A commemorative souvenir dedicated to the

20 YEARS

of Association of Chemistry Teachers' Glorious Journey

ASSOCIATION OF CHEMISTRY TEACHERS' (ACT)
C/o Homi Bhabha Centre for Science Education, (TIFR), Mumbai 400088.

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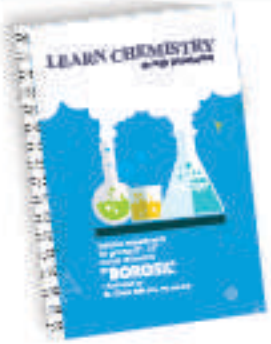

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Why FootPrints?

The Association of Chemistry Teachers' (ACT) was formed in the year 2000 to serve as an apex national body of chemistry educators to promote excellence in chemistry education.

The idea of formulating ACT was conceptualised by Homi Bhabha Centre for Science Education (TIFR) Mumbai. The Association brings together on a common platform higher secondary school teachers, college and university lecturers, professors, scientists and researchers from the industry for organising subject related activities. The ACT is growing with every minute passing, leaving behind its unmatchable & exemplary FootPrints.

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Development, Raipur

FROM THE CHIEF EDITOR's DESK

It gives me immense pleasure to inform you that Association of Chemistry Teachers C/O Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research, Mumbai has completed 20 long years of its glorious journey, this year. The Association of Chemistry Teachers was formed in 2000 to serve as an apex national body of chemistry educators to promote excellence in chemistry education.

And since its inception, ACT has been working tirelessly to strengthen chemistry education in India and to motivate students to pursue chemistry as a career. In order to celebrate its 20th Anniversary, ACT has decided to come up with a Commemorative Souvenir dedicated to the glorious journey of ACT, ACT'S FOOTPRINTS.

I, on the behalf of my entire team, would like to take this opportunity to extend our heartfelt gratitude to all our ACT family members for showering us with unconditional cooperation and support in bringing out this Commemorative Souvenir and thank Prof Dr Brijesh Pare, National President, ACT, Prof. D.V. Prabhu, General Secretary, ACT and Members of Editorial Board, along with all the EC members of ACT who persistently proved to be our beacons of light for all this while.

As you flip the pages, you will find out the interesting messages from prominent educationists, ACT family and people from Chemistry Fraternity.

In addition to it, we have a lot more enticing content including interesting chemistry articles, chemtoons and lots more waiting for you to explore optimally.

So, without any further ado, I, on the behalf of my entire team, beckon all the readers with open arms to explore this special souvenir, ACT's FootPrints.

Happy Reading!

Dr. Umesh Chandra Jain,
Secretary, ACT - NORTH ZONE &
PRINCIPAL, A.H.P.S. Morena.
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We'd love to hear from you!
We are staunch believers of constructive criticism and look forward to hearing your feedback.
Mail us at: officeofdrumesh@gmail.com

ACT's FOOTPRINTS

A
commemorative
souvenir dedicated to the

20 YEARS

of Association of
Chemistry Teachers'
Glorious Journey

Messages

ACT's FOOTPRINTS

A
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20 YEARS

of Association of
Chemistry Teachers'
Glorious Journey

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Bharat Ratna Professor C.N.R. RAO F.R.S
Linus Pauling Research Professor
and
Honorary President

28th October 2020

MESSAGE

I am very glad to note that the 20th anniversary of Association of Chemistry Teachers has been planned.

"Chemistry is well pervading". I am also a servant of Chemistry and I have no doubt that everything will be as planned. I wish great success.

Best wishes,
C.N.R. Rao

Message received through E-Mail

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Former Director,
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Mumbai 400071

October 26, 2020

MESSAGE

There is no branch of science which has made greater effect on quality of life as Chemistry. There is no life possible without chemistry but there is better life possible. The human body critically depends on the chemistry of oxygen with haemoglobin and exhaling of CO2. CHEMISTRY HAS STRONG LINKS WITH CHEMICAL BIOLOGY AND MATERIAL SCIENCE. Chemistry made available polymers which are now ubiquitous. Food security has been greatly influenced by chemistry and even apparels are made of polyester. The pharma industry thrives on chemistry. Even forensic science depends on chemistry.The family planning was greatly influenced by the PILL.

The subject of catalysis has a profound effect on making transformations facile and has brought together chemists, physicists, material science and chemical engineers together. Outstanding success has been seen in asymmetric synthesis and metathesis. The only branch of Engineering which has strong links with chemistry is Chemical Engineering.

Best Wishes !
M.M.Sharma

Message received through E-Mail

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अध्यक्ष
Prof. D. P. Singh
Chairman

विश्वविद्यालय अनुदान आयोग
शिक्षा मंत्रालय, भारत सरकार
University Grants Commission
Ministry of Education, Govt. of India

MESSAGE

I am pleased to know that the Association of Chemistry Teachers (ACT), Mumbai, formed in 2000, has completed 20 years of its glorious journey and is planning to celebrate 20th Anniversary in 2020.

ACT is an apex national body of chemistry educators engaged in promoting excellence in chemistry education. On this occasion, the Association is planning to bring out a Commemorative Souvenir – ACT's Foot Print.

In its journey of two decades, the Association of Chemistry Teachers has been striving to strengthen chemistry education in India and to motivate students to pursue chemistry as a career. The Association provides a platform for collaboration between academia from school, higher educational institutions, research organizations and industry to organize several subject specific activities.

I extend my best wishes and greetings to all the members of the Association of Chemistry Teachers, organisers and well-wishers for joining hands in providing quality education in the field of Chemistry. On this momentous occasion, I commend them for their continuous efforts in promoting Chemistry education and wish the Celebration a grand success.

(Prof. D.P. Singh)

22nd October, 2020

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November 26, 2020

MESSAGE

Professional teacher associations such as the Association of Chemistry Teachers are extremely important for strengthening education at all levels. Such associations have a critical role to play in strengthening professional capacities of teachers and in acting as a bridge between school teachers, college teachers, university academicians and scientists. It is very heartening to see that ACT has completed 20 years of very active existence. On the occasion of its National Convention, I congratulate the Association and its team members for coming up with - ACT FootPrints - A commemorative souvenir dedicated to the 20 years of Association of Chemistry Teacher's Glorious Journey and also for the Association's other regular activities and contributions. I wish it every success in further expanding its reach and activity far into the future .

Dr. K. Subramaniam
Director & Professor
Homi Bhabha Centre for Science Education
Tata Institute of Fundamental Research

Message received through E-Mail

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PROMOTING EXCELLENCE IN CHEMISTRY EDUCATION

November 10, 2020

MESSAGE

Association of Chemistry Teachers is celebrating 20 years of its glorious existence. Since its inception in 2000, ACT has worked tirelessly to promote excellence in Chemistry education and has brought. together on a common platform, college and university teachers and scientists for fruitful interaction and organization of a wide spectrum of subjected related activities. Over the years, there has been an exponential growth in its activities and new activities have been started.

To chronicle the milestones in the growth of ACT, a commemorative souvenir entitled "ACT Footprints" is being brought out with Principal Dr Umesh Chandra Jain as Chief Editor supported by an efficient editorial board. To all involved with ACT, it will be a nostalgic trip down memory lane.

I wish Dr Jain and his team great success in their endeavours.

My best wishes and regards to all ACT members.

Dr. D. V. Prabhu
Founder General Secretary
Association of Chemistry Teachers &
Former Head and Adjunct Professor,
Department of Chemistry,
Wilson College, Mumbai

Message received through E-Mail

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Website: http://www.associationofchemistryteachers.org

PROMOTING EXCELLENCE IN CHEMISTRY EDUCATION

20th November 2020

MESSAGE

It gives me immense pleasure in sending this message to the Souvenir - ACTs FootPrints, that is being published to commemorate the 20th year of establishment of Association of Chemistry Teachers, c/o Homi Bhabha Center for Science Education, TIFR, Mumbai. ACTs FootPrints is the tribute to the past and an expression of grateful thanks to those who had untiringly laboured to make the association see light of success and glory.

I take this opportunity to congratulate all ACT members and executive office bearers for taking the torch of chemistry education across the length & breadth of India.

I am truly convinced that there are every reason for ACT to celebrate this journey of 20 years in which together we all have done substantial contribution in achieving the set objectives of the association particularly popularizing the chemistry among young students by organizing Olympiads, concept test, chemistry popularization workshops and collaborating various events with Royal Society of Chemistry etc.

Its great to know that persons like Bharat Ratna Prof C. N. R. Rao, Padma Vibushan Prof Raghunath Anant Mashelkar, Padma Vibhushan Prof M. M. Sharma have been the honorary members of ACT.

I wish ACT many more years of existence for the further service to the cause of chemistry education.

I hereby extend my best wishes on this historic occasion.

Dr. Brijesh Pare
President,
Association of Chemistry Teachers &
Head, Department of Chemistry,
Madhav Science PG College, Ujjain

Message received through E-Mail

DR. N. SATHYAMURTHY
PAST PRESIDENT
ASSOCIATION OF CHEMISTRY TEACHERS
HONORARY PROFESSOR & FOUNDER DIRECTOR, IISER MOHALI

16th November 2020

MESSAGE

Message from the Founder President, Association of Chemistry Teachers

I am delighted to see that the National Convention of Chemistry Teachers 2020 is being organized by the Association of Chemistry Teachers (ACT), albeit through the virtual mode because of the prevailing pandemic conditions due to Covid-19.

That conveys the active spirit of the members of ACT, which has kept the organization growing from strength to strength over the last twenty years.

I heartily congratulate the organizers for putting together an exciting program, spread over three days, with talks given by well known chemists from India and elsewhere, for the benefit of chemistry teachers and students.

It is with great satisfaction that I look back at the twenty years since ACT was founded, with the registered office in the Homi Bhabha Centre for Science Education, Mumbai. I must place on record our appreciation of the untiring efforts of Dr. Prabhu in ensuring the continuity of ACT activities across the country in the last two decades.

I take this opportunity to wish the Convention a great success.

Dr. N. Sathyamurthy

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Dr. (Ms.) Sudha Jain
Former Professor& Head
Department of Chemistry,
University of Lucknow,
Lucknow 226 007

28th October 2020

MESSAGE

I am indeed happy and proud that the Association of Chemistry Teachers (ACT), established as Indian Association of Chemistry Teachers (IACT) has completed a journey of two decades. I still remember the first convention held at Homi Bhabha Centre for Science Education (TIFR), Mumbai in which Prof Satyamurthy was nominated as the President. His dynamic leadership and vision made the association active and viable to go ahead.

ACT is now a registered body having its office at HBCSE and more than 2000 members along with Institutional members. The credit goes to the tireless efforts of office bearers and members, with a special mention of Dr D.V. Prabhu, General Secretary of ACT who has always been very humble, cooperative and ready to help everywhere with a smiling face.

I feel proud that I have been associated to some extent of this two decades of journey and firmly say that the association has contributed a lot to Chemistry education and motivated the students which were its prime objective. The association has proudly reached an International level.

It is really an excellent thought to celebrate 20 Years of ACT by holding the National Convention of Chemistry Teachers 2020 (NCCT 2020) alongwith International Webcon on Recent Advances in Chemistry Education and Chemical Research in virtual mode from November 29, 30 and December 1, 2020.

Further to publish a commemorative souvenir dedicated to the two decades of journey of ACT – ACT'S FOOTPRINTS is an excellent way of celebrating the event.

On this happy occasion I extend my warm greetings and hearty felicitation to distinguished participants and also wish the publication of commemorative souvenir ACT'S FOOTPRINTS a great success.

(Sudha Jain)
Past President ACT(2011-2013)

Message received through E-Mail

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of Organic Chemistry
Institute of Chemical Technology

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Thane (West) 400 607

November 20, 2020

MESSAGE

I am delighted that this year we are celebrating the 20th anniversary of our Association of Chemistry Teachers (ACT). The ACT was established in 2001, as an offshoot of the Chemistry Olympiad activity; in that year our country had hosted International Chemistry Olympiad (IChO), in Mumbai, with HBCSE as the host Institution. The first NCCT was organized in Mumbai in collaboration with the Homi Bhabha Centre for Science Education (HBCSE) (TIFR), Mumbai, which has extended a sustained support to all our activities through these years.

Since inception, I have been associated with the ACT for last 20 years, in various capacities, and witnessed the growth of the ACT. It is a trail of many ever-cherished memories of this glorious journey. It is satisfying that our Association has grown substantially over the years and I am happy that all the zones are active and working towards the objectives of the Association.

Our Association is only of its kind in the country, an apex national organization of Chemistry Teachers. Our core objective is to work for excellence in Chemistry Education. There are many aspects of this guiding objective and to fulfil our objectives we need to bring all the stakeholders in Chemistry Education on this platform; like school teachers, college and university teachers, scientists, chemists/researchers from the industry, and persons form relevant Professional bodies. Through such interaction we can enrich ourselves and, in turn, help our students to grow. For example, I wish that chemical industry should be our active partner.

Chemistry is mainly an experimental central science and it is rapidly developing and influences all aspects of our life, including our environment. In the last few decades many phenomenal inventions and discoveries have been made, and the traditional boundaries of scientific disciplines are melting. Somebody has rightly said that "now chemistry must extend its scope from molecules to everything that involves molecules". We teachers should pay attention to this fact and find out how to incorporate these developments in our teaching and training. How to teach the subject in an experiential and curiosity-driven mode, and also make it contextual? How can we introduce History and Philosophy of the subject in our curricula, particularly our rich traditional knowledge and Indian thought? We should organize meetings with experts from diverse fields to activate cross-disciplinary thinking. It is essential to generate new resources for our teachers and students.

I wish that more and more ACT members take active part in our activities, identify talented manpower as resources, arrange meaningful activities, and collaborate with organizations having overlapping interests. My best wishes for very bright future of the ACT. I wish the symposium, NCCT-2020 and ACT's FootPrints - a great success.

Dr. Shriniwas D. Samant

Message received through E-Mail

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Vice-Chancellor

20 Years of ACT- It's Time to Celebrate

20 Years of ACT- a long and fruitful journey. It gives me immense pleasure to look back and recollect the memories of this twenty-year long journey. Being a founder Executive Committee Member, I personally have seen the birth and the growth of ACT under the leadership of Dr. D. V. Prabhu as the General Secretary. The **Association of Chemistry Teachers (ACT)** was launched in the year 2000 in the initiative of Homi Bhabha Centre for Science Education, Mumbai. Since then the ACT is dedicating its services for the nation. Strengthening the science education in general and chemistry education in particular in schools is the prime mission of ACT. Mass awareness among school children about International Chemistry Olympiad and excellent performance of Indian teams all these years since 2000 is the biggest success story of ACT. Providing a pan Indian platform for chemistry educators in India is another success story of ACT. For organizational convenience the country is divided into six zones and each zone is looked after by different zonal committees. ACT has received mass recognition as well. It has received several endowments from individuals to institute awards to recognize services of chemistry educators. Over the past twenty years, ACT has grown into a major National Platform of Chemistry Teachers and Researchers for sharing and deliberating issues concerning national and global chemistry education. I wish this glorious past of ACT would continue to inspire generations to come and the present generation must ensure that.

Long Live ACT and Best Wishes for ACT's FootPrints.

Narayanpur, 19th November 2020

(D. C. Deka)

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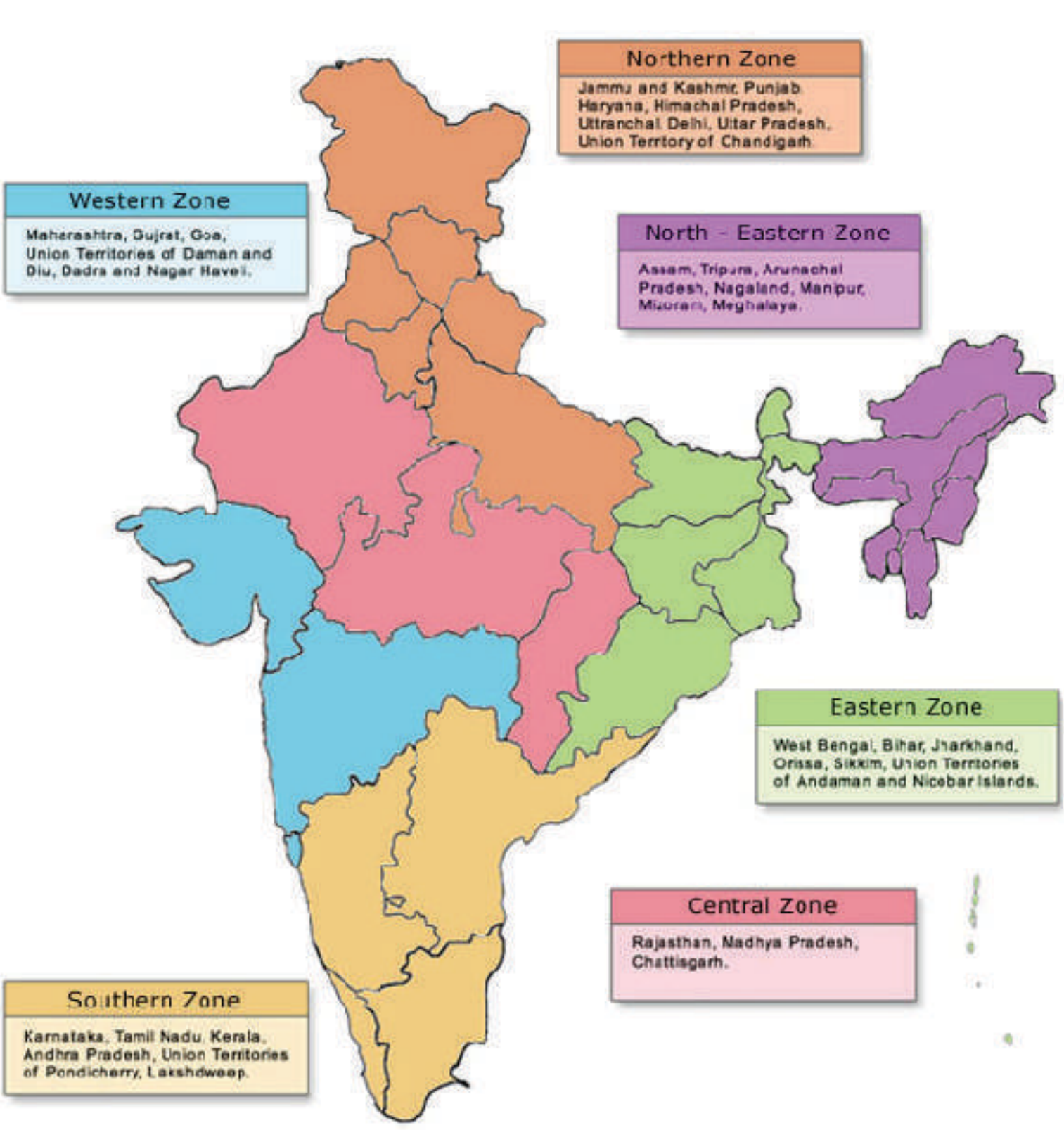
THE ACT ZONES



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ACT's FOOTPRINTS

A
commemorative
souvenir dedicated to the

20 YEARS

of Association of
Chemistry Teachers'
Glorious Journey

ASSOCIATION OF CHEMISTRY TEACHERS

YOUNG...

-Dr. D.V. Prabhu

General Secretary, Association of Chemistry Teachers

Association of Chemistry Teachers (ACT), launched in 2000 is in its 20th year of dedicated service to the Chemistry fraternity. As the national registered body of Chemistry educators of India, it has consistently promoted excellence in Chemistry education through its manifold activities. The idea of formulating ACT was conceptualized by Homi Bhabha Centre for Science Education (TIFR), Mumbai which has always been a pillar of strength and support to the association. HBCSE played a proactive role in the founding of ACT. ACT is thankful to HBCSE (TIFR) for encouragement and help at all times.

THE BEGINNINGS...

The need for a vibrant association of Chemistry teachers was felt for a long time and a meeting of Chemistry teachers was held on October 9,2000 at HBCSE (TIFR), Mumbai to launch ACT.

The main objectives were identified as:

1) To advance Chemistry education in the country by means of curriculum development and innovation in teaching and evaluation methodologies

2) To organize workshops, symposia and conferences including an annual National Convention of Chemistry Teachers (NCCT) in different parts of the country

3) To forge a vibrant synergistic relationship between academia, industry and research centre for mutual benefit

4) To explore and nurture talent in Chemistry with special reference to the Indian National and International Chemistry Olympiads

5) To collaborate with International Science Teachers' organizations for exchange of ideas and organization of joint programmes.

The first National Convention of Chemistry Teachers (NCCT-2001) was held on September 8, 2001 at HBCSE (TIFR), Mumbai under the convenorship of Dr D V Prabhu (Wilson College, Mumbai) and Dr Savita Ladage (HBCSE-TIFR, Mumbai). The convention was inaugurated by Prof Dr J P Mittal, the then Group Director of Chemistry and Isotope Group, BARC, Mumbai. Prof N Sathyamurthy (IIT-Kanpur) was elected as the First President of ACT. Dr D V Prabhu was elected as General Secretary and Dr M A Tandel (Wilson College) as Treasurer. For quite sometime, the association operated from the Chemistry Department of Wilson College before it moved to its present office at HBCSE (TIFR), Mumbai.

The Association brings together on a common platform, college, university and higher secondary school teachers, scientists and researchers from industry for organizing subject related activities which include conferences, training workshops, Chemistry competitions for school and college students and an annual National Convention of Chemistry Teachers (NCCT).

Over the years, the activities have grown exponentially and new activities have been initiated.

SOME IMPORTANT MILESTONES IN THE EVENTFUL JOURNEY

Activities

1) International Conference on Education in Chemistry (ICEC-2010) in November 2010 to commemorate the International Year of Chemistry (IYC 2011) at HBCSE(TIFR), Mumbai. Prof Savita Ladage and Dr D V Prabhu served as the convenors.
A book entitled "Chemical Education" based on the proceedings of ICEC 2010, edited by Prof S D Samant and Prof Savita Ladage was published by Narosa Publishers, New Delhi.

2) International Conference on Education in Chemistry (ICEC 2014)in December 2014 at HBCSE (TIFR), Mumbai. Prof Savita Ladage and Dr D V Prabhu served as the convenors.

3) International Conference on Modern Trends in Chemical Sciences including Green Chemistry (MTCSGC 2018) in December 2018 at SRM Institute of Science and Technology, Ramapuram, Chennai. Prof Helen Kavitha and Dr D V Prabhu served as the convenors.

4) Teacher Training Workshops for high school Science teachers in collaboration with Royal Society of Chemistry (London,UK) under the Dr Yusuf Hamied Inspirational Chemistry Programme of RSC.

5) DST sponsored Chemistry Popularization Workshops in different parts of the country during 2012-2013 from the DST Grant of Rs 4.3 lakhs. Prof Brijesh Pare coordinated the country wide programme as the National Coordinator.

6)Concept Test in Chemistry for Undergraduate students is organized annually from 2011. This is possibly the only Chemistry test for under graduate students in our country. Prof Savita Ladage and Prof Hemant Pande served as the National Coordinators from 2011 to 2014 and since then Prof Subhash Prasad Singh is the National Coordinator.

7) Celebration of National Chemistry Day on December 10 and National Science Day on February 28 by organization of Chemistry poster, essay and quiz competitions for school and college students.

8) Web Workshop on Designing Quality Multiple Choice Questions in August 2020 with Prof Subhash Prasad Singh as Coordinator.

9) ACT Research Convention – a series of online lectures on various aspects of Research during October–December 2020 with Prof Raakhi Gupta as the National Coordinator.

10) Publication of a commemorative souvenir to celebrate 20 years of ACT with Principal Dr Umesh Chandra Jain as the Chief Editor.

Role of ACT in the Chemistry Olympiad Programme

ACT plays a pivotal role in the organization of the National Standard Examination in Chemistry (NSEC) held in November. NSEC is the first stage examination leading to participation in the Indian National and International Chemistry Olympiads. The valuable help and support of Indian Association of Physics Teachers (IAPT) in the organization of NSEC is gratefully acknowledged.

ACT Awards

ACT has instituted 08 awards to recognize teachers for their outstanding contributions to Chemistry education and research.

The ACT awards have been instituted from endowments given by well wishers.

1) Life Time Achievement Award (2012)

2) Shri Anupam Sinha Best Chemistry Teacher Award (2014)

3) Best Woman Chemistry Teacher Award (2015)

4) Prof Lallan Singh Best PG Chemistry Teacher Award (State Universities) (2016)

5) Prof P R Singh Award for Outstanding Contribution to Chemistry Education (2016)

6) Dr Uma Sai Prakash Chemistry Popularization Award (2016)

7) Prof Dr Bhupendra Sahai Saxena Best PG Chemistry Teacher Award (2017)

8) Prof P B Punjabi Award for Outstanding Contribution to Research in Chemical Sciences (2020)

Tata Chemicals –ACT Best Chemistry Teacher Awards (2011-2013)

To commemorate the International Year of Chemistry (IYC 2011), ACT partnered with Tata Chemicals, Mumbai to institute the Tata Chemicals-ACT Best Chemistry Teacher Awards in 07 categories. The awards were presented in the years 2011, 2012 and 2013.

ACT Newsletter

The first issue of ACT Newsletter was published in November 2002 and is in continuous publication since then, Dr D V Prabhu and Dr Mannam Krishnamurthy have served as editors and Prof Wasudeo Gurnule is now the Chief Editor.
The triannual ACT newsletter can be accessed on the ACT website:
www.associationofchemistryteachers.org

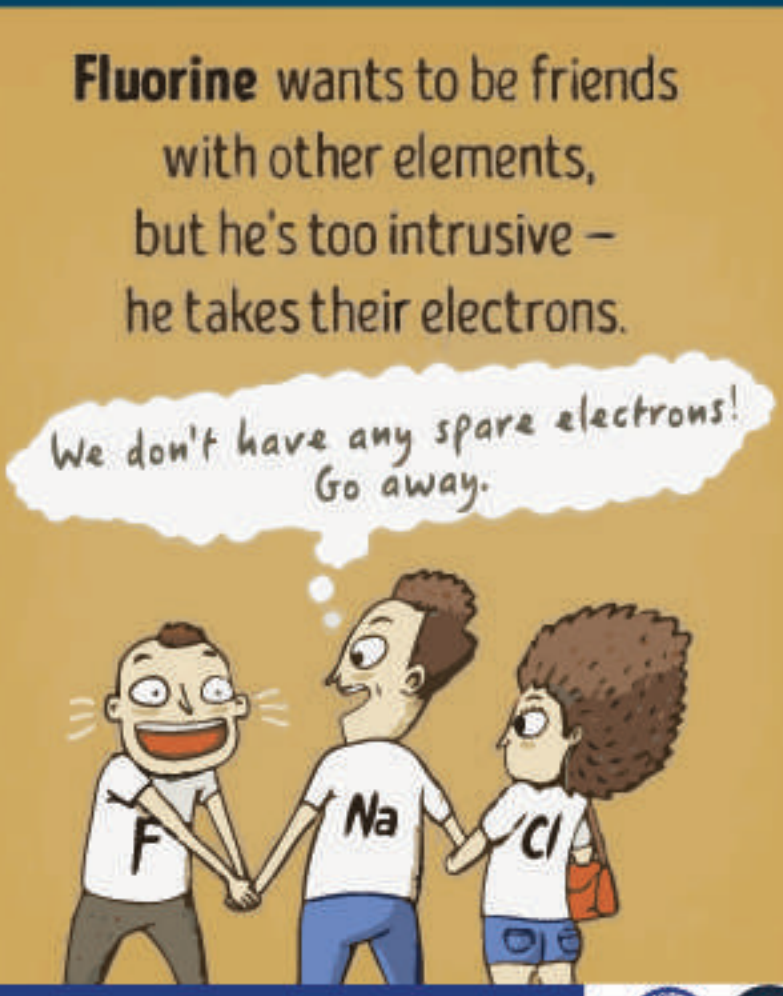
Honorary Members of ACT

ACT is fortunate to have the guidance and support of the leading chemical scientists and academicians of the country including Bharat Ratna Prof C N R Rao, FRS, who are role models for all teachers to emulate.

ACT has a large network of Life Members and Institutional members across the country who are active participants in all activities.

THE PATH AHEAD

ACT is pledged to promote excellence in Chemistry Education. The National Education Policy 2020 (NEP 2020) focuses on an universal access to education to all sections of society, innovation in teaching methods, increased use of technology in education and high quality research. Members of ACT will strive to contribute substantially in all these thrust areas so that India becomes a global hub of knowledge. Tieups with the leading educational and research institutions of the country will be initiated. The reach of ACT across the country will be increased so that all Chemistry educators of the country can actively participate in subject related activities.



SOME KEY HIGHLIGHTS OF ACT

Dr. Brijesh Pare conducting chemistry popularization workshops at DPS, Ludhiana (Punjab), DPS, Pune (MS) & at The Aditya Birla Public School, Bharuch (Gujarat).

ACT – Dr Yusuf Hamied Inspirational Chemistry Teacher Training Programme

Association of Chemistry teachers has always been active in propagating chemistry education in India. In tune with its objectives, ACT collaborated with Royal Society of chemistry to organize Dr Yusuf Hamied Inspirational Chemistry teacher training programme across in India with the help of its 6 zones.

Dr Brijesh Pare as a national coordinator of this program on behalf of ACT coordinated ACT – RSC Chemistry teacher training programme across India.

All the zones actively organized these workshops successfully.

Dr. Brijesh Pare conducting panel discussion during chemistry popularization workshops at DPS, Ludhiana (Punjab).

ACT – DST Chemistry popularization workshops

Prof Brijesh Pare, the then Vice president, central zone conceived and designed a program for popularizing chemistry among young Indian students. Proposal was submitted to National Council of Science and Technology Communication DST New Delhi and ACT received financial support for this program in the year 2012 – 2013.

Dr Pare spearheaded the program across India and organized series of chemistry popularization workshops. These workshops were catalysed and supported by National Council of Science and Technology Communication, DST, New Delhi. Workshops were conducted at following places: University of Tezpur, Tezpur (Assam), PSG College, Coimbatore, (TN), Venus Hr SS Chidambaram (TN), Delhi Public School, Ludhiana, (Punjab) Delhi Public School, Pune, (MS) The ABPS, Bharuch, (Gujarat), University of Kashmir, Srinagar, (JK), The Shishukunj Int School, Indore, SRM University, Chennai, (TN) Kulachi Hansraj Model school, New Delhi, IIS University, Jaipur, (Rajasthan) Delhi Public School, Udaipur. (Rajasthan).

All these workshops went very well attended and exemplary successful.

ACT-CONTECH: A REPORT

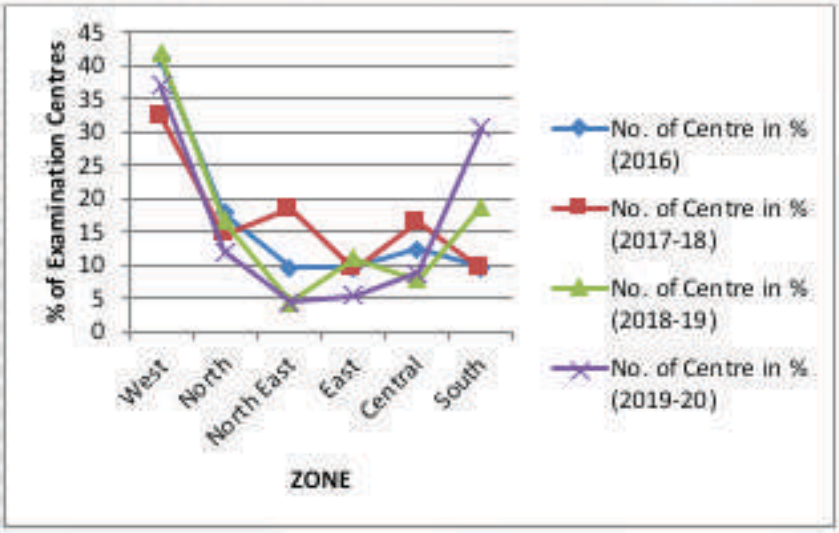
Science Students emerging from the senior secondary system and studying undergraduate level in higher education appear in a multitude of entrance examinations. Students often face difficulties in coping with learning chemistry. ACT-CONTECH, a concept test in chemistry at national level finds its usefulness in knowing the pulse of chemistry teaching and learning at UG level and thus helps teachers to take appropriate action. It aims to strengthen the teaching profession and to monitor the progress and achievement of UG students in chemistry. This test is a big boost for the students to improve in the subject and to assess their conceptual understanding in chemistry. With this view CONTECH has regularly been conducted annually right from 2010. It was conducted once a year initially but from 2017-18, it is being conducted twice a year as 1st Phase and 2nd Phase to serve the masses in the Nation.

This examination consists of scientifically crafted 80 Multiple Choice Questions (MCQs) with four options with a correct answer. Each question merits one mark. There is no provision of negative marking for a wrong choice. Keeping in view of the suggestions received from stakeholders, questions are set as per the criteria mentioned below;

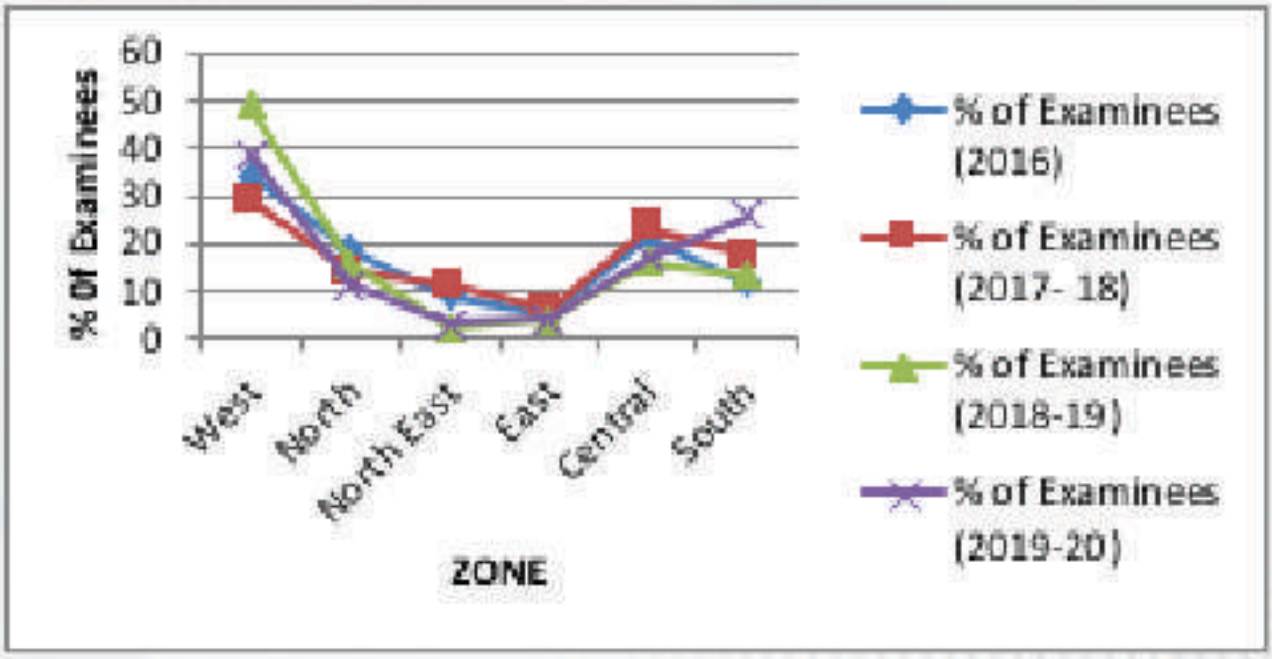
(i) 75% Questions to test the Knowledge, Understanding and Application of knowledge.
(ii) 25% Questions were Process based, Problem solving and Experimental skill based, Structured questions giving some practical situations, Observations and asking to draw inferences or replying questions pertaining to observation of an experimental situation.

Combined efforts of ACT members to motivate and inspire teachers to be a part of this national event for mobilizing students to take this test in all parts of our country made the test a grand success. Statistical analysis is hereby presented in terms of various components. There has been continual increase in the graph in term of zone wise % of examination centres and % of examinees involved in CONTECH right from its inception.

The comparative plots of zone wise % of Examination centres in the year 2016, 2017-18, 2018-19 & 2019-20 is shown in fig.1.



.In term of the no. of examination centres, West Zone ranked 1st in the country followed by South and North Zone. Central, East and North East Zone follow the lower ladder. However, there is a drop of centres in West Zone in comparison to 2018-19. Similar situation has been reflected in North and East Zone whereas an increase in no of centre has been observed in South and Central Zone. More or less trend of Examination centres in term of % remains same in North East Zone. The comparative plots of Zone wise no of examinees' % in the year 2016, 2017-18, 2018-19 & 2019-20 (fig.2).



In term of no of Examinees' % appearing from a zone, West Zone again topped the list in tune with the previous year followed by South, Central, North, East and North East Zone. However, comparative data with respect to 2019-20 shows a drop in examinees % in West and East Zone.

There is % increase in term of students scoring 30% or more in South, East and North East Zone whereas % decrease is seen in West, North and Central Zone in comparison to previous session as per the session wise ranking details given hereunder;

In 2019-20, West Zone (33.67%) > South Zone (23.67%) > Central Zone (17.17%) > North Zone (14.96%) > East Zone (5.58%) > North East Zone (4.95%)

In 2018-19, West Zone (39.7%) > North Zone (22.02%) > Central Zone (19.16%) > South Zone (12.39%) > East Zone (4.25%) > North East Zone (2.57%)

In 2017-18, West Zone > Central Zone > North Zone > South Zone > North East Zone > East Zone

In 2016, West Zone > North Zone > Central Zone > South Zone > East Zone > North East Zone

The 1st ranking has been retained by the West Zone in the category right from the inception of CONTECH. Percentage of participants scoring 60% is high in North & South zone in the respective zone and even in the Nation but compatibility is balancing one in West zone.

No of Students' % scoring 60% or more in their respective zones in 2019-20 falls in the following order;

North Zone > South Zone > West Zone > Central Zone > North East Zone > East Zone

In 2019-20, Students' % scoring 60% or more in the Nation is exhibited in the following order;

North Zone > South Zone > West Zone > North East Zone > Central Zone > East Zone

North, South and West follow the same order in their respective zone and in the Nation, too.

Comparative data of % students scoring 60 % or more in the nation during 2017-18, 2018-19 and 2019-20 is reflected in table 8 whereas fig.8 reflects comparative plots in the category. North zone excels throughout consecutively whereas lots of fluctuation is observed in North East zone in term of % students scoring 60% or more in the years specified.

ACT approved Certificate of Participation duly signed by the President, General Secretary, National Coordinator, and College Coordinator have been issued to students scoring 30% or more whereas Certificate of Excellence are given to students scoring 60% or more.

In addition, at local level, Centre Heads (Principals / College Coordinators) have freedom to give away the awards to the meritorious students. In general no certificate / award is given to candidate getting less than 30% marks (even if he / She is the topper at the Centre), in order to maintain the standards.

Letter of appreciation is mailed to all the Principals of the Colleges involved in CONTECH. Certificate of Appreciation is issued to all College Coordinators after successful conduct of the Test. These certificates are also issued to all the Local Coordinators who appoints at least 10 active College Coordinators. College Coordinators / Local Coordinators who register 100 or more than 100 participating students shall receive Annual Subscription Fee of Journal 'Resonance'.

The Special Award is given to the College Coordinator for having maximum participation of students in the country. Dr. Nishamol Kanat (Mumbai, West Zone), Dr Dhanesh Singh (Raigarh, Central Zone), Dr. Rashmy Nair (Jaipur, Central Zone), Dr Milind V Gaikwad (Pune, West Zone), Dr. R.Srinivasu (Vizianagram, South Zone), Dr S. A. Shah (Chandrapur, West Zone), Dr. Mamta T Sangole (Akola, West Zone), Dr. Valsamma Wilson (Mumbai, West Zone) have consistently been performing well in term of maximum participation. They deserve special thanks.

Dr. Uttara Dutta & Dr Tripti Kumari (Delhi, North Zone), M. Parameswari (Kanchipuram, South Zone), Dr. R Subha (Tiruchirappalli, South Zone), Dr S. D. Katre (Gondia, West Zone), Y. Ramesh Naidu (Vizianagaram, South Zone) contributed to maximum participation first time. As a whole the order of contribution to maximum participation by the zones during 2019-20 is as follows;

West Zone (06 Coordinators) > South Zone (03 Coordinators) > Central Zone (02 Coordinators) > North Zone (01 Coordinator).

Prof K Krishna Kishore (Vijayanagram, South Zone) owe special thanks for their outstanding contributions for involving maximum no. of students from various colleges in Andhra Pradesh to participate in CONTECH as a Local Coordinator. Prof. Krishna Kishore has proved himself the best local coordinator in consecutive years. Thanks are also due to Dr Ani Deepthi from Department of Chemistry, University of Kerala for involving quite lot students from Kerala first time in CONTECH-2020 as a Local Coordinator.

The maximum contributing regions are Mumbai in West Zone and Vijaynagram in South Zone. It is a proud moment for all of us that more and more chemistry teachers and students are taking interest in such a test for the interest of students learning chemistry as is obvious from the increasing trend of participating students year by year but still we need to do a lot in term of getting all the non-participating states & union territories involved. Affirmative

response from all the stakeholders for popularization of chemistry in future is welcomed. I extend my sincere thanks to those who have been able to collectively achieve in our vocation.

Concluding Remarks

It is encouraging for all of us that participation of students in CONTECH is increasing year by year. Some regions have done well in term of participation and results as well, some have done partially well but some have not yet participated in the Test. Special attention is required to involve students from all the regions in future through ACT officials, Life members and Chemistry teachers in general. Appreciable comments have been received by the coordinators in general. The valuable suggestions are always welcomed to improve the overall conduct of CONTECH in future. Yearly subscription of reputed national journals such as Resonance is proposed to be given by ACT to all those teachers who credited maximum participation of candidates. Covid-19 pandemic has of course caused hindrance to take the test in 2020-21 in offline mode but bad days will certainly build better days. When it rains, it pours. But soon, the Sun shines again. Therefore, we need to be confident as better days are on their ways.

Dr. S.P. Singh

National Coordinator, CONTECH

Some Gems of Chemistry in India

(HONORARY MEMBERS OF ACT)

BHARAT RATNA
Prof C N R Rao, FRS

National Research Professor
Linus Pauling Research Professor,
Jawaharlal Nehru Centre for Advanced Scientific Research,
Jakkur,Bengaluru 560064

Prof. Chintamani Nagesa Ramachandra Rao, popularly known as CNR Rao is a leading Indian scientist in the field of solid state and materials chemistry. His major area of research comprises transition metal oxides and other extended inorganic solids, inorganic-organic hybrid materials, nanomaterials and generation of hydrogen by photocatalysis. His latest works include research on the new wonder material graphene and artificial photosynthesis.

Known for his vast publication records, Prof. Rao has contributed 1600 research publications and authored 51 books. He is the first Indian scientist to cross the H index of 100 - an author-level metric that attempts to measure both the productivity and citation impact of the publications of a scientist. Prof. Rao is one of the few scientists across the world having nearly 1 lakh citations for research publications.

In his research career of five decades, Prof. Rao had served at many national and international institutions in various capacities. In addition to receiving numerous national and international recognitions and awards, he was awarded the Bharat Ratna - the highest civilian award in India, in 2014.

PADMA VIBHUSHAN
Prof M M SHARMA

Former Director,
Institute of Chemical Technology,
Mumbai 400019 2/3,Jaswant Baug,V N Purav Marg,
Chembur,Mumbai 400071

Professor Man Mohan Sharma is an institution in himself, being the most decorated UDCT alumnus in the country whose life's mission has been to serve the chemical industry and the profession of chemical science, engineering and technology. He is a knowledge engineer with unparallel record in the annals of chemical engineering and technology. Teaching, research and consultation have been his mantra and he has offered innumerable advices to industry and government on matters vital to the growth of chemical engineering science, education and nation at large.

Countless decorations, honors and fellowships have not stopped him from learning new things every day. Whether Moulton Medal of Institution of Chemical Engineers (UK) (1971, 77), SS Bhatnagar prize of the CSIR for engineering sciences (1973), Padma Bhushan (1987), Fellowship of the Royal Society, London (1990), distinguished Academician Award, IIT Patna (2014) or Rajasthan Science Congress Award (2016);to cite just a few, he is as humble and inspiring educator and advisor as ever. He has 250 research papers in Chemical Engineering Science, Chemical Engineering Research and Design and Industrial and Engineering Chemistry Research to his credit. MMS, as he is popularly known, has supervised 71 Doctoral Thesis and 35 M Chem. Eng./ M.Sc. (Tech) Thesis.

The Civilian award of PADMA VIBHUSHAN by the President of India on the Republic Day, the 26th January 2001 is a tribute to Professor Sharma's monumental contribution to chemical engineering science and technology, Chemical industry and the government on important policy matters for nation building.

CSIR Bhatnagar Fellow,
President,Global Research Alliance,
CSIR-National Chemical Laboratory,
Pune 411008 Former Director General,
CSIR,New Delhi

Dr. Mashelkar's research is in the area of transport phenomena; particularly in thermodynamics of swelling, super swelling and shrinking polymers, modelling of polymerisation reactors, and engineering analysis of non-Newtonian flows. He started his research career at National Chemical Laboratory in Pune, where he rose to become its Director. He also served as the.

Director General of CSIR from 1995 to 2006–being one of the longest serving Director Generals of CSIR. He is credited with unifying the various laboratories of CSIR and striving for greater collaboration amongst different labs.

One of his important contributions to the society is his legal crusade against US patents on turmeric, neem and basmati rice. This also led to recognition and need for stronger IP laws in the country, in addition to earning h im the title 'the Warrior of Haldighati'. Dr. Mashelkar has received numerous awards including the Padma Vibhushan, Padma Bhushan and the Shanti Swarup Bhatnagar Award. He has been elected to several academies and advisory councils across the world. He is the National Research Professor and Chairperson of the National Innovation Foundation.

PADMA SHRI
Dr NITYA ANAND

Former Director,
CSIR-Central Drug Research Institute,
Lucknow B-62,Nirala Nagar,Lucknow-226020

Dr Nitya Anand, a legendary figure on the Indian Drug Research scene. Dr. Nitya Anand's contribution to the growth and development of the Central Drug Research Institute has been monumental. He propelled its advancement to a world-class centre for drug discovery and development especially for tropical diseases (malaria, filaria), contraception and drugs from medicinal plants, areas of special national relevance. The Institute greatly encouraged interaction with academia and industry. Dr. Anand is deeply committed to the utilization of science for social benefits, and he took Drug Research because of the direct benefits it could provide to society. He has been a great champion of self-reliance and self-sufficiency of the Indian Pharmaceutical Industry, and has supported this cause in the Drug Policy Committees of the Government of India and non governmental bodies of which he was a member for many years. He has also been a great supporter of spreading the message of scientific temper and of science as a way of life in schools. A genuine nationalist, he continues to hold that belief and shared his distress about the current situation wherein some big pharmaceutical companies are selling off their share for a huge price to foreign investors. Dr Nityanand, a great humanitarian and nationalist, appreciated and understood the immediate needs of the common man and the most lethal diseases that afflicted the Indian citizens especially the masses, were : Leprosy, Malaria, Tuberculosis and a mammoth work to be done for population control.

Prof R S MALI

Former Vice-Chancellor,
Kavayitri Bahinabai Chaudhari North
Maharashtra University, Jalgaon

Prof. Mali had his college education at Jalgaon and Post-graduate and doctoral studies in Pune. He has done post-doctoral studies and had been a visiting fellow at the prestig-ious Swiss Federal Institute of Technology (ETH) at Zurich (Switzerland) in 1979-80.

Prof. Mali has started his research work in 1969 and teaching career as Lecturer in the Department of Chemistry, Savitribai Phule Pune University, in 1973. He was a Pro-fessor of Organic Chemistry in the University Department of Chemistry and has more than 40 years of teaching experience along with 40 years of research experience and has published over 130 papers in national and international journals. Since last fifteen years Prof. Mali has been closely associated with NAAC activities. As Chair-person of NAAC Peer Team and his team members have assessed and accredited more than 70 colleg-es and universities all over India.

He has received several awards which include Prin. V.K. Joag Award of Savitribai Phule Pune Universi-ty in February 1997 and Dr. R.C. Shaha Memorial Award of Mumbai University in January 2005. Recently he has received the prestigious Namdar Gopalkrishna Gokhale Maharashtra Award-2017 of Maharashtra Council of Educa-tional Administration and Management, Pune. Receiving "Vanashree Award" from the Govt. of Maharashtra to North Maharashtra University in March 2002 and "Indira Priyadarshani Vrikshamitra Award" from the Ministry of Environment and Forest, New Delhi in September 2005 were the remarkable achievements.

Prof S JAYARAMA REDDY

Professor Dr.S.Jayarama Reddy
Former Vice-Chancellor, Sri Venkateswara University, Tirupati.

Dr. Jayarama Reddy Puthalpet is solar energy and environment professional. He was formerly Professor of Physics (1973-1995) and Vice chancellor (1991-1994), Sri Venkateswara University, India; First Director, Sri Sathya Sai Institute of Higher Learning. Research assignments: Post-doctoral Research Associate in the Dept of Materials Science & Engineering, Cornell University; Commonwealth Visiting fellow, Imperial College of Science & Technology, London; Indo-Czech Exchange Fellow, Charles University, Prague; Guest Professor, Institute of Physical Electronics, Stuttgart University.

Presented papers, delivered lectures in many national and Intl. conferences in India and abroad; Traveled widely on lecture programs. Published more than 200 papers on 'materials,' particularly thin film solar cells; authored several books on 'energy and environment'.Council member, Chemical Research Society of India, Bangalore.

He has received many Awards and Honours including

Chemical research society of india medal for significant contributors to chemical research

Best University Teacher Award by Andhra Pradesh State Government

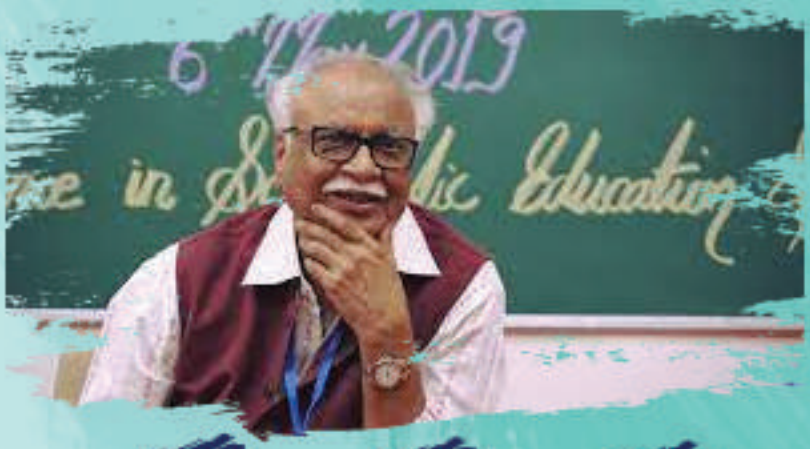
Life time Achievement award for Academic Excellence, National and International Collaboration, Administrative and Organisational capability, S V University

Executive Committee member, Indian society of Chemists and Biologists

Executive Council member, Indian Council of Chemists

Founder President, Society for Environmental Chemists

Sectional President, Environmental and Analytical Chemistry, IXth Annual Conference of the Indian Council of Chemists



PADMA SHRI PROF DR JAI P MITTAL

Distinguished Professor and Chairman,
Academic Board, UM-DAE Centre for Excellence
in Basic Sciences,University of Mumbai.

Jai Pal Mittal was born on 21 September 1940 in Meerut in the Indian state of Uttar Pradesh. He completed his graduate (BSc) and master's studies (MSc) in chemistry from the Agra University and migrated to Mumbai in 1959, looking for career opportunities. He joined the Training School of Atomic Energy Establishment, erstwhile Bhabha Atomic Research Centre and did a one-year course after which he moved to USA to join the Department of Radiation Chemistry of the University of Notre Dame, Indiana. He completed his doctoral studies (PhD) in 1967, under the guidance of A. A. Lamola and W. H. Hamill. Receiving an invitation from Willard Libby, the 1960 Nobel laureate in Chemistry, to assist him, Mittal did his post doctoral research, for over a year, at the Radiation and Nuclear Chemistry laboratory of the University of California.

In 1969, Mittal returned to India to start his career as a Pool Officer at the Bhabha Atomic Research Centre (BARC) and started working in the field of photochemistry. Two years later, in 1971, he got an opportunity to work with Professor E. Hayon at the United States Army Natick Soldier Research, Development and Engineering Center and worked there for one year. On his return to India in 1972, he formed a research group at BARC for research in photochemistry and radiation chemistry.

A winner of 1964 Fulbright scholarship and 2002 Humboldt Research Award, Mittal has received the Senior JSPS Award, National Academy of Sciences, India N. R. Dhar Memorial Medal, Goyal Gold Medal and the Indian Science Congress Association Platinum Jubilee Award. The Government of India awarded him the civilian award of Padma Shri in 2003.

Prof MIHIR K CHAUDHURI

Former Vice-Chancellor,
Tezpur University,Tezpur,
Assam

Dr. Mihir Kanti Chaudhuri is an Indian inorganic chemist of international repute and Vice Chancellor of Tezpur University. He did his Ph.D from IIT, Kharagpur and Dr.rer.Nat. (Organometallic Chemistry) from Ruhr University, Germany. He is known for his studies on the synthesis of dioxygen complexes and fluorine compounds of metals and non metals. Council of Scientific and Industrial Research awarded him the Shanti Swarup Bhatnagar Prize, one of the highest Indian science awards, in 1989 for his contributions to chemical sciences. He became an elected fellow of the Indian National Science Academy in 1991 and received P. Natrajan Endowment Award in 1998. He is a recipient of the Chemito Award (2002) and S. S. Sandhu Award of Indian Chemical Society (2005). He is also the recipient of Acharya P. C. Ray Memorial Award (2015) by Indian Chemical Society, D. Sc. (honoris causa) by Vidyasagar University, Distinguished Alumnus Award of IIT-Kharagpur, North-East Excellence Award on Environment (2009) by Indian Chamber of Commerce for his significant contribution in Chemical and Pharmaceutical Sciences. Dr Chaudhuri, known for his honesty and sincerity, has been at the helm of many important administrative responsibilities and has worked rigorously to bring reformations in the approach towards research. Dr Chaudhuri is known as a man with a vision who strives hard to execute his mission to encourage quality education. Hence, Tezpur University won the Visitor's "Best University Award 2016" for its academic excellence and overall performance in the year 2015. Dr. Mihir Kanti Chaudhuri received this award on behalf of his university from the Hon'ble President Shri Pranab Mukherjee in a function organized in the Rashtrapati Bhawan.

BEYOND THE CRISIS : AN ACT WEBINAR SERIES

ACT Research Convention 2020

REPORT

Patron
Prof. Brijesh Pare
President, ACT
Madhav Science
PG College,Ujjian

Patron
Prof. D V Prabhu
General Secretary, ACT
Wilson College,Mumbai

National Convener
Dr. Rakhi Gupta
Secretary-Central Zone, ACT
IIS(deemed to be University),
Jaipur

CONVENORS

Research Problem Instrumental Methods of Analysis

Prof. M Swaminathan
Member-EC, South Zone, ACT
Kalasalingam Academy of Research and Education, Krishnankoil, Tamil Nadu

Dr. Wasudeo Gurnule
Secretary-EC, West Zone, ACT
Kamala Nehru Mahavidyalaya, Nagpur

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Dr. Amar Srivastava
Member-EC, North Zone, ACT
DAV(PG) College, Kanpur

Scientometry

Dr. Sanchay Jyoti Bora
Coopted Member-EC, North East Zone, ACT
Pandu College, Guwahati, Assam

Research Problem Instrumental Methods of Analysis

Dr. Pragya Sinha
IIS(deemed to be University),
Jaipur

Dr. Manisha Patni
IIS(deemed to be University),
Jaipur

Organic Synthesis

Prof. Helen P. Kavitha
Vice President-EC, South Zone, ACT
SRM Institute of Science and Technology, Kattangulathur, Chennai

Dr. Amrit Mitra
Member-EC, East Zone, ACT
Govt.General Degree College, Singur, Hooghly, West Bengal

Analysis of Numerical Data

Prof. Dr. A Sakthivel
Coopted Member-EC, South Zone, ACT
Central University of Kerala, Kasaragod, Kerala

Chemistry Education

Dr. V.P. Singh
Vice President-EC, Central Zone, ACT
NCERT, New Delhi

ADVISORS

Prof. S.D. Samant
Past President, ACT
ICT, Mumbai

Prof. Sudha Jain
Past President, ACT
Principal, GSPMM
PG College, Lucknow

Prof. D.C. Deka
Past President, ACT
Vice Chancellor
Madhabdev University,
Lakhimpur, Assam

Prof. R.K. Bansal
IIS(deemed to be
University), Jaipur

In fact, by way of these webinars, ACT has been successful in accomplishing its mission of promotion of Chemistry education and research in India and capacity-building of Chemistry teachers and students.

ACT supported the organization of these webinars by providing financial assistance wherever required and the registration for all delegates was free.

The consolidated report compiled here gives the details of the different webinars conducted as part of this research convention series. The feedback taken in all the webinars is quite encouraging and has motivated the Association to continue organizing the convention every year.

First Webinar

Date : 5 October 2020

Title of the Event : International

Webinar on Research problem (ACTRC-2020)

Organizing Institution : Kalasalingam Academy of Research and Education, Krishnankoil in Association with Kamala Nehru Mahavidyalaya, Nagpur

Convenor : Dr. M. Swaminathan

Total No. of registrations in the event : 600

SPEAKER NAME	DESIGNATION	TOPIC
PROF. DR. C. RAMALINGAN	DEAN SAS, KARPAGAM ACADEMY OF HIGHER EDUCATION	INTERNATIONAL WEBINAR ON RESEARCH PROBLEM (ACTRC-2020)
PROF. DR. SHRINIWAS D. SAMANTH	PROFESSOR, INSTITUTE OF CHEMICAL TECHNOLOGY, MUMBAI ON "RESEARCH PROBLEMS IN ORGANIC CHEMISTRY PERSPECTIVE"	"RESEARCH PROBLEMS IN ORGANIC CHEMISTRY PERSPECTIVE"
PROF. DR. PONNADURAI RAMASAMI	UNIVERSITY OF MAURITIUS, REPUBLIC OF MAURITIUS ON "GRAPHITE, GRAPHENE, SILICENE,	"GRAPHITE, GRAPHENE, SILICENE
PROF. DR. M. SWAMINATHAN	PROFESSOR OF CHEMISTRY, IRC, KARE, KRISHNANKOILON THE TOPIC "RESEARCH PROBLEMS IN ANALYTICAL AND ENVIRONMENTAL CHEMISTRY"	"RESEARCH PROBLEMS IN ANALYTICAL AND ENVIRONMENTAL CHEMISTRY"

Second Webinar

Date : 17-18 October 2020

Title of the Event :National Webinar on Instrumental Methods of Analysis

Organizing Institute(s):Kamla Nehru Mahavidyalaya, Nagpur &
Kalasalingam Academy of Research and Education, Krishnakoli, Tamilnadu

Convenor Dr. Wasudeo Gurnule

Total No. of registrations in the event : 2858

SPEAKER NAME	DESIGNATION	
DR. SMEETA A. WANJARRI	TREASURER OF AMAR SEWA MANDAL, NAGPUR	NATIONAL WEBINAR ON INSTRUMENTAL METHODS OF ANALYSIS
DR. SHREEDHAR BOJJA	IICT HYDERABAD	SURFACE CHARACTERIZATION BY X-RAY PHOTOELECTRON SPECTROSCOPY
PROF. UMA SHARMA	SCHOOL OF STUDIES IN CHEMISTRY & BIOCHEMISTRY VIKRAM UNIVERSITY, UJJAIN	MOSSBAUER SPECTROSCOPY
PROF. PUNDLIK R. BHAGAT	DEPARTMENT OF CHEMISTRY, SCHOOL OF ADVANCED SCIENCES, VELLORE INSTITUTE OF TECHNOLOGY (VIT), VELLORE	'OPTIMUM USE O INSTRUMENTATION RESOURCES TO MAXIMIZE RESEARCH OUTPUT

Third Webinar

Date : 31 October 2020

Title of the Event: National convention on Scientometry

Organizing Institute(s) : Madhavdev University, Assam

Convenor : Dr. Sanchay J. Bora

Total No. of registrations in the event : 300

S.NO	SPEAKER NAME	DESIGNATION	TOPIC
	PROF. BHASKAR BANERJEE	, HOD, LIBRARY AND INFORMATION SCIENCE, BANARAS HINDU UNIVERSITY	'ACADEMIC AND SCIENTIFIC WRITINGS: A SCIENTOMETRIC APPROACH'
	PROF. DEEPJYOTI KALITA	COTTON UNIVERSITY	'SCIENTOMETRIC INDICATORS AND ACADEMIC EXCELLENCE

Fourth Webinar

Date :21 November 2020

Title of the Event : National Webinar on Research Data Analysis

Organizing Institute(s) : Department of Chemistry, SPS Central University of Kerala

Convenor : Prof. Sakthivel , Head, Dept. of Chemistry,
Central University of Kerala

Co-Convenor : Dr. M. Bhagiyalakshmi from Central University of Kerala

Total No. of registrations in the event : 200

S.NO	SPEAKER NAME	DESIGNATION	TOPIC
	PROF. R. NAGARAJAN	UNIVERSITY OF DELHI	"DEVELOPING CRITICAL THINKING IN SCIENTIFIC RESEARCH DATA ANALYSIS"
	PROF. K. MURALIDHARAN	UNIVERSITY OF HYDERABAD	"SELECTION ON METHOD FOR CHEMICAL ANALYSIS"
	DR. M. BHAGIYALAKSHMI	CENTRAL UNIVERSITY OF KERALA ERSITY, UJJAIN	"DATA ANALYSIS IN ELECTROCHEMICAL STUDIES"
	DR. K. MURUGA POOPATHI RAJA	, DEPARTMENT OF PHYSICAL CHEMISTRY, MADURAI KAMRAJ UNIVERSITY, MADURAI	"SPECTROSCOPIC ANALYSIS: FROM DATA TO KNOWLEDGE"

Fifth Webinar

Date : 27-28 November 2020

Title of the Event : International Webinar on Scientific Writing

Organizing Institute(s) : IIS (Deemed to be University), Jaipur

Convenor : Dr. Pragya Sinha, Head, Dept. of Chemistry

Organising Secretary : Dr Manisha Patni

Total No. of registration in the event : 1145

S.NO	SPEAKER NAME	DESIGNATION	TOPIC
1.	DR. ASHOK GUPTA	CHANCELLOR, IIS (DEEMED TO BE) UNIVERSITY	INTERNATIONAL WEBINAR ON SCIENTIFIC WRITING
2.	PROF. T.N. MATHUR	VICE CHANCELLOR, IIS (DEEMED TO BE) UNIVERSITY	INTERNATIONAL WEBINAR ON SCIENTIFIC WRITING
3.	PROF. GYORGY KEGLEVICH	BUDAPEST UNIVERSITY OF TECHNOLOGY	DEVELOPMENT OF RESULTS DURING RESEARCH- SOME EXAMPLES FROM ORGANOPHOSPHOROUS CHEMISTRY
4.	PROF. MARTIN D RUDD	UNIVERSITY OF WISCONSIN	GETTING YOUR RESEARCH PUBLISHED
5.	PROF. SANDEEP VERMA	SECRETARY SCIENTIFIC AND ENGINEERING RESEARCH BOARD	DST PROJECT WRITING
6.	PROFESSOR R.K. BANSAL	IIS (DEEMED TO BE UNIVERSITY)	COMMON MISTAKES IN WRITING A RESEARCH PAPER
7.	PROF. AYAAN DATTA	INDIAN ASSOCIATION	THE CULTIVATION OF SCIENCES EFFECTIVE SCIENTIFIC MANUSCRIPT WRITING
8.	PROF. MASAKI YOSHIFUJI	TOHUKU UNIVERSITY JAPAN	EDITOR'S PERSPECTIVE ABOUT A RESEARCH PAPER
9.	PROF. S D SAMANT	FORMER PRESIDENT, ASSOCIATION OF CHEMISTRY TEACHERS, MUMBAI	HOW TO WRITE A THESIS

Sixth Webinar

Date : 12-13 December 2020

Title of the Event :National Webinar on Organic Synthesis

Organizing Institute(s) : Department of Chemistry, SRM Institute of Science and Technology-Ramapuram campus and Government General Degree College, Singur, Hooghly, West Bengal

Convenors : Dr. Helen P. Kavitha and Dr. Amrit Krishna Mitra

S.NO	SPEAKER NAME	DESIGNATION	TOPIC
1.	DR. SUBHAJIT BANDYOPADHYAY	PROFESSOR, DEPARTMENT OF CHEMICAL SCIENCES AND ASSOCIATE DEAN OF ACADEMIC AFFAIRS, IISER KOLKATA	"MOLECULAR MACHINES: WHO RUNS THEM, AND HOW?".
2.	DR. DIWAN S RAWAT	PROFESSOR AND DEAN EXAMINATIONS, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF DELHI	NATIONAL WEBINAR ON ORGANIC SYNTHESIS
3.	DR. BALARAM MUKHOPADHYAY	PROFESSOR, DEPARTMENT OF CHEMICAL SCIENCES AND DEAN OF STUDENT AFFAIRS, IISER KOLKATA	"SYNTHETIC CARBOHYDRATE CHEMISTRY TOWARDS DEVELOPMENT OF SYNTHETIC VACCINE CANDIDATES AGAINST BACTERIAL INFECTIONS".
4.	DR. BISWADIP BANERJI	SENIOR PRINCIPAL SCIENTIST, ORGANIC & MEDICINAL CHEMISTRY DIVISION, CSIR – INDIAN INSTITUTE OF CHEMICAL BIOLOGY, KOLKATA	"SYNTHETIC JOURNEY TOWARDS N-FUSED HETEROCYCLES & THEIR EFFICACY STUDIES".
5.	PROF. AMITAVA DAS	PROFESSOR, DEPARTMENT OF CHEMICAL SCIENCES AND DEAN, RESEARCH AND DEVELOPMENT, IISER KOLKATA	"STIMULI-RESPONSIVE MOLECULES AND MOLECULAR ASSEMBLIES"

Seventh Webinar

Date : 19 December 2020

Title of the Event : National Webinar on Intellectual Property Rights (IPRs)

Organizing Institute(s) : D.A.V. (PG) College, Kanpur and CSJM University, Kanpur

Convenor : Dr. Amar Srivastava

Total No. of registration in the event : More than 417

S.NO	SPEAKER NAME	DESIGNATION	TOPIC
1.	MR. RAGHAVENDER GR	JOINT SECRETARY, DEPARTMENT OF JUSTICE, MINISTRY OF LAW AND JUSTICE, GOVT. OF INDIA, 'NEW DELHI.	"COPYRIGHT LAWS AND ACADEMIC INSTITUTIONS".
2.	MR. VIKAS ASAWAT	REGISTERED PATENT AND TRADEMARK ATTORNEY, GOVT. OF INDIA, KOTA (RAJASTHAN)	"CRITICAL ISSUES IN CHEMISTRY RELATED INVENTIONS IN INDIAN SCENARIO".
3.	DR. RAMJEE PALLELA	CHIEF OPERATING OFFICER, ATAL INCUBATION CENTRE OF CENTER FOR CELLULAR AND MOLECULAR BIOLOGY (CCMB), HYDERABAD	."IPR AND TECHNOLOGY TRANSFER AVENUES IN ACADEMIC SECTOR".


ACT
AWARDS

Best Chemistry Teachers Award 2011

Tata Chemicals instituted the Best Chemistry Teacher Award (BCTA) to recognise chemistry teachers in India. The initiative has been launched in collaboration with the Association of Chemistry Teachers (ACT).

The Best Chemistry Teacher Awards have been felicitated to following individuals in the following categories:-

2011:-

Best Chemistry Teacher (For Class XI/XII and equivalent)

Ravindra Bhaskar,

New English Jr. College, Akola

2011-

Best Chemistry Teacher (For Bachelor's Degree and equivalent)

Prof. Raghunath Toche,

KTHM College, Nashik

2011-

Best Chemistry Teacher for promotion of Chemistry as a subject

Dr. Palash Moni Saikia,

Sr. Lecturer, Darrang College, Assam

2011-

Best Chemistry Teacher for innovation in teaching

Dr. Lakshmy Ravishankar,

Professor, V.G.Vaze College of Arts, Science and Commerce

2011-

Most Popular Chemistry Teacher - purely based on social media response

Ms. Tasneem Kausar,

PGT, Birla School, Pilani

2011-

Tata Chemicals Honour for Distinguished service to Chemistry Education and Research

Dr. Zarin Turel,

Indian Nuclear Chemistry Educator, Researcher

Best Chemistry Teachers Award 2012

Best Chemistry Teacher (Class XI/XII and equivalent)
Dr. Umesh Chandra Jain,
Simpkins School (Affiliated to CBSE, New Delhi)

Best Chemistry Teacher (Bachelor's Degree and equivalent)
Prof. Anshu Dandia,
University of Rajasthan, Jaipur Chemistry Department

Best Chemistry Teacher (For Master's Degree and above)
Prof. Chitta Ranjan Sinha,
Jadavpur University

Best Chemistry Teacher for promotion of Chemistry as a subject
Dr. Keshav Annappa Bulbule,
KLE Society's S. Nijalingappa College,
Rajajinagar, Bangalore

Best Chemistry Teachers Award 2013

Best Chemistry Teacher (class XI/XII) Award
Dr Yogendra Kothari,
Government Excellence Higher Secondary School, Madhavnagar, Ujjain

Best Chemistry Teacher (Bachelor's Degree) Award.
Prof Sunita Bhagat,
ARSD College, Delhi

Best Chemistry Teacher (Bachelor's Degree) Award.
Prof Suhas Pednekar,
Ramnarain Ruia College,

Best Chemistry Teacher (Master's Degree)
Prof Anil Elias,
IIT Delhi

Best Chemistry Teacher for promotion of chemistry as a subject
Prof Prodeep Phukan,
Gauhati University, Guwahati

ACT Life Time Achievement Award
(instituted in 2012)

The award is presented to a superannuated teacher for outstanding contributions to Chemistry Education and Research

2012-
Prof Saibal Kanti Bhattacharjee,
Gauhati University, Guwahati

2013-
Prof Subhu Perumal,
Madurai Kamaraj University, Madurai

2014-
Prof R K Bansal,
IIS University,Jaipur

2015-
Prof R P Rastogi,
INSA Scientist, Former, Vice Chancellor,
Gorakhpur University,Gorakhpur
(Deceased)

2016-
Prof Sukumar Maiti,
Formerly IIT-Kanpur, Kanpur

2017-
Prof Y L N Murthy,
Emeritus Professor,
Andhra University, Vishakapatnam

2018-
Prof Suresh Ameta,
PAHER University, Udaipur

2018
Prof R V Singh,
Emeritus Professor,
University of Jaipur

2019-
Prof S M Khopkar,
Emeritus Professor,
IIT- Bombay, Mumbai

2019-
Prof V S Jamode,
Former Pro Vice Chancellor,
Sant Gadge Baba Amravati University, Amravati,
Maharashtra

2020-
Prof Dr Ashutosh Ghosh
Former Vice Chancellor,
University of Calcutta

2020-
Prof Dr Amar Nath Mishra
Former Head,Department of Chemistry,
T M Bhagalpur University, Bhagalpur, Bihar

ACT Shri Anupam Sinha Best Chemistry Teacher Award

(UG level) (instituted in 2014)

2014-
Dr.Bihari Singh,
A N College, Patna

2015-
Dr Gitimoni Deka
,Rangia College, Rangia,Assam

2016-
Dr Prashant Singh,
DAV College, Dehradun

2017-
Dr Basabi Mahapatra,
Magadh Mahila College,Patna

2018-
Dr Prem Mohan Mishra,
MLSM College, Darbhanga

2020-
Prof Dr B R Venkataraman
Periyar E V R College, Tiruchirappali,
Tamil Nadu

ACT Best Woman Chemistry Teacher Award

(instituted in 2015)

2015-
Prof Radha Jayaram,
Institute of Chemical Technology, Mumbai

2016-
Dr Chitrani Medhi,
Gauhati University, Guwahati

2017-
Dr Shraddha Sinha,
B B Das National Institute of Technology and Mangement,Lucknow

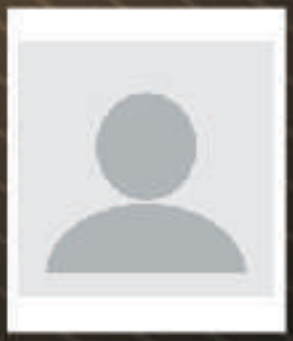
2018-
Dr Sakina Z Bootwala,
Wilson College, Mumbai

2019-
Dr Helen Kavitha,
SRM Institute of Science and Technology,
Ramapuram,Chennai

2020-
Prof Dr Rita Das
JKBK Government College, Cuttack. Odisha

ACT Prof P R Singh Award for Outstanding Contribution to Chemistry Education

(instituted in 2016)



2016-
Prof Kshiradhar Baruah,
Biswanath College, Milanpur, Chariali, Assam

2017-
Dr Mannam Krishnamurthy,
Varsity Educational Management Ltd., Hyderabad

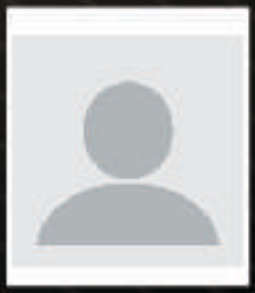
2019-
Prof M Swaminathan,
International Research Centre,Kalasalingam Academy of Research and Education, Krishnankoil, TN

2020-
Prof Dr Vimal Rarh
SGTB Khalsa College, University of Delhi, Delhi

ACT Prof Lallan Singh Award for Best PG Chemistry Teacher

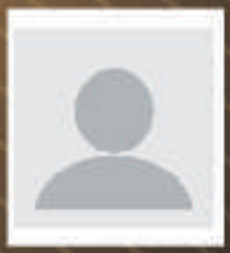
(instituted in 2016)

2016-
Prof C Suresh Reddy,
S V University, Tirupati



2017-
Prof Syed Mumtazuddin,
BRA Bihar University,Muzaffarpur

2018-
Prof Ranjit Kumar Verma,
Honourable Vice Chancellor, Munger University,
Munger,Bihar



2019-

Prof M Venkat Basaveswara Rao,
Krishna University, Machilipatnam, AP

2020-

Prof Dr Pramila Kumari Mishra
School of Chemistry, Sambalpur University,
Jyoti Vihar, Odisha

ACT Dr Uma Sai Prakash Chemistry Popularization Award

(instituted in 2016)

2016-
Prof Hemant Pande,
Hislop College, Nagpur

2017-
Dr Pannalal Ghosh,
Cotton College, Guwahati

2018-
Dr P V S Machiraju,
Pragati Engineering College,Surampalem, AP

2019-
Dr Subhash Prasad Singh,
A N College, Patna

2020-
Prof Sukumar Maiti,
Formerly IIT-Kanpur, Kanpur

ACT Prof Dr Bhupendra Sahai Saxena Award for Best PG Chemistry Teacher

(instituted in 2017)

2017-
Prof P Venkatesu,Delhi University,Delhi

2018-
Prof Nigamananda Das,
Utkal University, Bhubaneswar

"Some glimpses of ACT Events"


PERIODIC TABLE MARCH


National
Chemistry Day
ACADEMIC HEIGHTS

ACT's FOOTPRINTS

A
commemorative
souvenir dedicated to the

20 YEARS

of Association of
Chemistry Teachers'
Glorious Journey

Tête-à-Tête

with Dr. D. V. Prabhu

Dr. D.V. Prabhu is a Founder Secretary General of Association of Chemistry Teachers. Dr. Prabhu is also a former head & adjunct professor in the Dept. of Chemistry, Wilson College, Mumbai. Let's read out while he shares his fascinating journey with ACT...

By - Dr. Umesh Chandra Jain

Question 1 : When did you start your journey as a Chemistry educator and how many years have you dedicated to the field? A short message for Youth, Chemistry Educators, Chemistry Enthusiasts & lovers.

Answer: I joined the Chemistry Department of Wilson College, Mumbai as a lecturer in 1972 and since then, have been actively involved in Chemistry education. Even after my retirement as the Head of the department in 2008, I continued as an Adjunct Professor guiding research.- Thus I have dedicated almost 48 years to the profession as a teacher and researcher.

I have thoroughly enjoyed my years as a Chemistry educator. Chemistry is a very fascinating subject always on the move. In India, Chemistry is a very popular subject and a large number of students opt for Chemistry at the UG and PG levels. There are plenty of opportunities in Chemistry for young people whether in industry, research or education. As a central Science, Chemistry has developed strong links with other Sciences especially Physics & Biology giving rise to several interdisciplinary subjects with exciting prospects. Our Youth should pursue some of these frontier area disciplines.

Question 2: What inspired and motivated you behind carrying out such a dynamic platform i.e. ACT with HBCSE? And who has been your source of inspiration behind this journey? What are the greatest challenges you faced during this journey? How did you overcome them?

Answer: Chemistry teachers had for a long time felt the need to form an association for exchange of ideas and interaction and to organize subject related activities. Several informal meetings were held, at a meeting held at Homi Bhabha Centre for Science Education (TIFR), Mumbai in October 2000, it was decided to launch the Indian Association of Chemistry Teachers. The impetus for this launch came from HBCSE (TIFR) and the idea of formulating IACT was conceptualized by HBCSE (TIFR). Several eminent Chemistry teachers and scientists from all over the country endorsed the new organization. The association was formally launched during the first National Convention of Chemistry Teachers (NCCT) held on September 8, 2001 at HBCSE with Prof. N Sathyamurthy of IIT-Kanpur as the Founder President.

One of the early challenges was to convince teachers to become members of the association and get involved in its activities which included the Chemistry Olympiad programme at different platforms, appeals were made to teachers to enlist as members and information pamphlets were sent to colleges and universities.

Question 3: How has your journey been with ACT as a founding member?Since you have seen ACT since its birth,how do you feel after watching ACT grow and expand ?

Answer: From humble beginnings, ACT has become a national registered organization of Chemistry educators and is now in its 20th year of dedicated service to the teaching fraternity. As a founding member,it gives me great satisfaction to see the growth of the association and its increasing reach to Chemistry teachers all over the country. Over the years, the activities have spread to all parts of the country. The activities have increase exponentially and new activities have been initiated.

Question 4 : Since inception, ACT has achieved many milestones and has been successful in bringing Chemistry teachers together from almost every part of India. What according to you is the next roadmap for the growth of ACT ?

Answer: ACT has been successful in bringing Chemistry teachers together on a common platform to organize subject related activities aimed at innovating Chemistry education. ACT is playing a major role in motivating students to pursue Chemistry as a lifelong vocation. These activities are spread throughout the length & breadth of the country.

Some of the milestones in the eventful journey are:

1) International Conferences on "Education in Chemistry" in 2010 and 2014 wherein experts from USA, UK and India deliberated on the pedagogy of teaching of Chemistry and research in Chemistry at the tertiary level. Both conferences generated a lot of interest in teachers to pursue studies in Chemistry Education.

2) International Conference on 'Modern Trends in Chemical Sciences including Green Chemistry' in 2018. These international conferences provided an exposure to the practices followed in universities abroad.

3) Teacher Training Workshops organized in collaboration with Royal Society of Chemistry (London) and DST, New Delhi gave a new dimension to the teaching of Chemistry in our colleges.

4) One of the pioneering activities is the Concept Test in Chemistry for undergraduate students which is probably the only test for B.Sc. students in the country.

5) Recent activities include the Web Workshop on Designing Multiple Choice Questions (August 2020) and Research Convention comprising a series of webinars on various aspects of research in Chemistry (October-December 2020). The annual National Convention of Chemistry Teachers (NCCT) held in October/November is an eagerly awaited event for Chemistry Teachers.

ACT awards in difference categories, were instituted in 2012 to recognize the distinguished contributions of Teachers to Chemistry Education and Research.

Since 1999, ACT has played an active role in the organization of National Standard Examination in Chemistry (NSEC) which is the first stage examination leading to participation in the Indian National and International Chemistry Olympiads .Many ACT members are actively involved in the Chemistry Olympiad programme.

Roadmap for the future - ACT will have to reach out to all corners of our vast country and involve all teachers, especially from the smaller cities and towns in its work.

Chemistry teaching and experimentation have to be made innovative and responsive to the changing needs of industry and research.

There should be more involvement of technology in our teaching methods.We should build up a vibrant synergistic relationship between academia, industry and research institutions. Tieups with prestigious societies like Indian Chemical Society, American Chemical Society and Royal Society of Chemistry (London) and International Science Teachers'organizations should be strengthened and collaborative activities like conferences should be organized more often.

Question 5 : What sort of paradigm shift do you observe in Chemistry Education? How has education transformed in the last two decades? What is your opinion regarding the research system in Indian institutes/colleges in India ?

Answer: In the last few years we are seeing a very gradual shift from the traditional chalk and talk method of classroom teaching to technology driven teaching. This has been more pronounced during the recent COVID-19 crisis. A hybrid of offline and online teaching may well be the teaching model of the future. Teachers have to be prepared to accept these changes and equip themselves with the necessary skills. Perceptible changes are seen in the teaching of Science especially in experimentation.The Chemistry Olympiad has played an important role in bringing about changes in the examination system. The innovative nature of the Olympiad questions and experiments is reflected to some extent in the examinations held in our country.

In our country, we have several world class research centre pursuing research in the frontier areas of Science but the vast majority of colleges and universities do mediocre research. Thus there is a need to improve lab culture and improve the quality of research. Sufficient funds should be made available to improve laboratory infrastructure so that reasonably good work can be done and research papers can be published in good journals. Teachers in colleges should undertake projects in collaboration with industry so that students get an exposure to quality experi mental work which will help them in their future careers.

Question 6: What are your views on the new National Education Policy 2020? What other reforms could you propose in India's Higher Education System?

Answer: The new National Policy on Education 2020 promises to be a watershed in Indian Education and has proposed several radical measures for reforming the Indian Education-System. These measures, if properly implemented will do wonders for our educational system. The last NEP 1986 focused on "Operation Black Board" to strengthen primary education in the country. NEP 2020 lays emphasis on skill oriented education to develop in the students, skills which will be needed to meet the challenges of the 21st century.

NEP 2020 focuses on - 1) An universal access to primary education to all Children. 2) Proper assessment at different levels to measure the learning outcomes of students. 3) Increasing use of technology in education. NEP 2020 offers an alternative to the present examination centric and rote learning model wherein syllabus completion and pass percentages are the only goals to be achieved.
The policy seeks to dismantle the present rigid divisions between curricular, cocurricular, and extracurricular activities to give students an holistic and well rounded eduation.All stake holders-teachers, policy planners, government,-funding-agencies, parents and students will be involved in decision making at all levels.

Investment in research should be increased many fold to power India's journey towards the 4th Industrial Revolution. Creation of world class research centres and improving the quality of research will make India a global hub of knowledge.

All these proposed reforms auger well for the future of education in our country.Teachers and educationalists have the onerous responsibility to ensure the proper implementation of NEP 2020. Teacher organizations like Association of Chemistry Teachers (ACT) will have to play a catalytic role in the transformation of the Indian education system.

THE ROLE OF CHEMICAL SCIENCE IN TECHNOLOGY

Dr. Shraddha Sinha
Vice President, ACT-North Zone
Department of Chemistry
B.B.D.N.I.I.T. Lucknow

Chemical science is the branch of science dealing with composition of substances and their properties and reactions. Time stands witness to the fact that building material for all kinds of studies lies in the hands of chemical science. It is the most integral part of modern technology. Chemistry is a platform science contributing to fundamental aspects of a range of other sciences such as biotechnology, energy, environment, genetics, medicines and materials. Chemical science has been the backbone of development of technology since ages.

Chemical science is the backbone for all breakthroughs in technology. Chemical science have made a large contribution in " Green Revolution"- a massive expansion of agricultural production that helped to feed the world's population, while it grew from 1.7 billion to 7 billion during the 20th century. It has also contributed to new technologies for food processing, preservation and storage which facilitated the development of global food enterprises. Subsequently chemistry has continued to provide innovations such as high performance fuels and light weight durable rechargeable batteries and fuel cells, supporting a range of new technologies in such diverse areas. Pharmaceutical chemistry has contributed enormously to improving life expectancy through development of medical sciences for the treatment of many fatal diseases.

Today all superpowers like China, U.S.A. and India have strong defence equipments for the security of their citizens. People are advancing to the Moon and Mars because of the major role played by chemical sciences. Over all, during the last century chemical sciences have contributed enormously in the development of technology from the Bronze age to the Technology age ●

Excerpts from

Duologue

with Dr. Brijesh Pare

Dr. Brijesh Pare is a President for Association of Chemistry Teachers. Dr. Pare is also a Professor & Head, Dept. of Chemistry with Madhav Science PG College, Ujjain. As a President for ACT, let's hear out to Dr. Pare as he shares his vision for taking ACT to newer heights...

By - Dr. Umesh Chandra Jain

Question 1: When did you start your journey as a Chemistry educator and how many years have you dedicated to this field?

Dr. Pare: I started teaching at UG and PG levels in 1987.

Question 2: What inspired and motivated you behind carrying out such a dynamic platform i.e. ACT with HBCSE? And Who has been your source of inspiration behind this journey?

Dr. Pare: Apart from classroom teaching I have always been interested in doing chemistry education-related activities. I was engaged in doing various popular chemistry Quiz for young students and gradually got involved in designing quality questions intended to inculcate interest in chemistry learning. Urge to do something out of the classroom as well prompted me to join ACT in 2003.

Question 3: What are the greatest challenges you faced during this journey? How did you overcome this?

Dr. Pare: Teaching first-year students chemistry has always been a challenge as most of the students were either interested in learning maths or biology. Chemistry is of course a central science but was equally distanced by both the students of streams. Teaching various abstract concepts in chemistry has always been a challenge but utilizing well-organized and designed analogy helped a lot in teaching.

Question 4: How has your journey been with ACT as a founding member of ACT?

Dr. Pare: I joined ACT in the quite initial years of its formation. When I joined Prof N Satyamurthy was the president followed by Prof Saiprakash, Prof SR Gardre, Prof S Jain, Prof SD Samant and Prof DC Deka. These are all great visionary chemists and humanitarian.

Question 5: Since you have seen ACT since its birth, How do you feel after watching ACT grow and expand?

Dr. Pare: ACT has traveled a great distance and acted in accordance with the mandate and its constitution. The past 20 years have been quite fruitful and the organization grew brick by brick.

Question 6: You have always motivated Chemistry Teachers from all over India to popularize Chemistry at different education levels? According to you, up to what extent the teachers have become successful in promoting and popularizing chemistry?

Dr. Pare: Off late, the chemistry teaching has improvised immensely due to various reasons. ICT-enabled teaching is there. Faculty members are aware of Pedagogy more than before.

Question 7: Since its inception, ACT has achieved many milestones and has been successful in bringing Chemistry Teachers together from almost every part of India, What according to you is the next roadmap for the growth of ACT.

Dr. Pare: ACT is the largest and only association of chemistry teachers in India at the national level. Over the years ACT has made substantial progress and the credit goes to all the past presidents, zonal level office bearers and the general secretary Prof DV Prabhu. Prof Prabhu has been working tirelessly since the birth of ACT. Now the time has ripe for ACT to take the flight. ACT needs to collaborate with the various leading overseas associations of chemistry teachers and work with them.

Question 8: What sort of paradigm shift do you observe in Chemistry Education. How education has transformed in these two decades?

Dr. Pare: The contemporary paradigm shift in chemistry education is taking place from Lower-Order Cognitive Skills (LOCS) teaching to know, to Higher-Order Cognitive Skills (HOCS) learning to think. This shift is going to help the development of science/chemistry students' capabilities of dealing with the complex systemic problems of the real-world The development of HOCS – including critical thinking, question asking, systemic thinking, evaluative thinking, decision making, problem solving and transfer – are particularly useful. In terms of how to do it, the transfer from the theory to practice is provided in the context of chemistry education, via both research- and practice-based HOCS-promoting teaching strategies and the corresponding assessment methodologies.

Question 9: What are your views on the New National Education Policy 2020? What other reforms could you propose in India's Higher Education System?

Dr. Pare: New education policy 2021 looks quite promising. Excellent provisions have been made for science/chemistry education. A blended teaching-learning has to be brought into practice. Critical thinking, creativity, problem-solving, collaboration and communication have to be incorporated into teaching-learning.

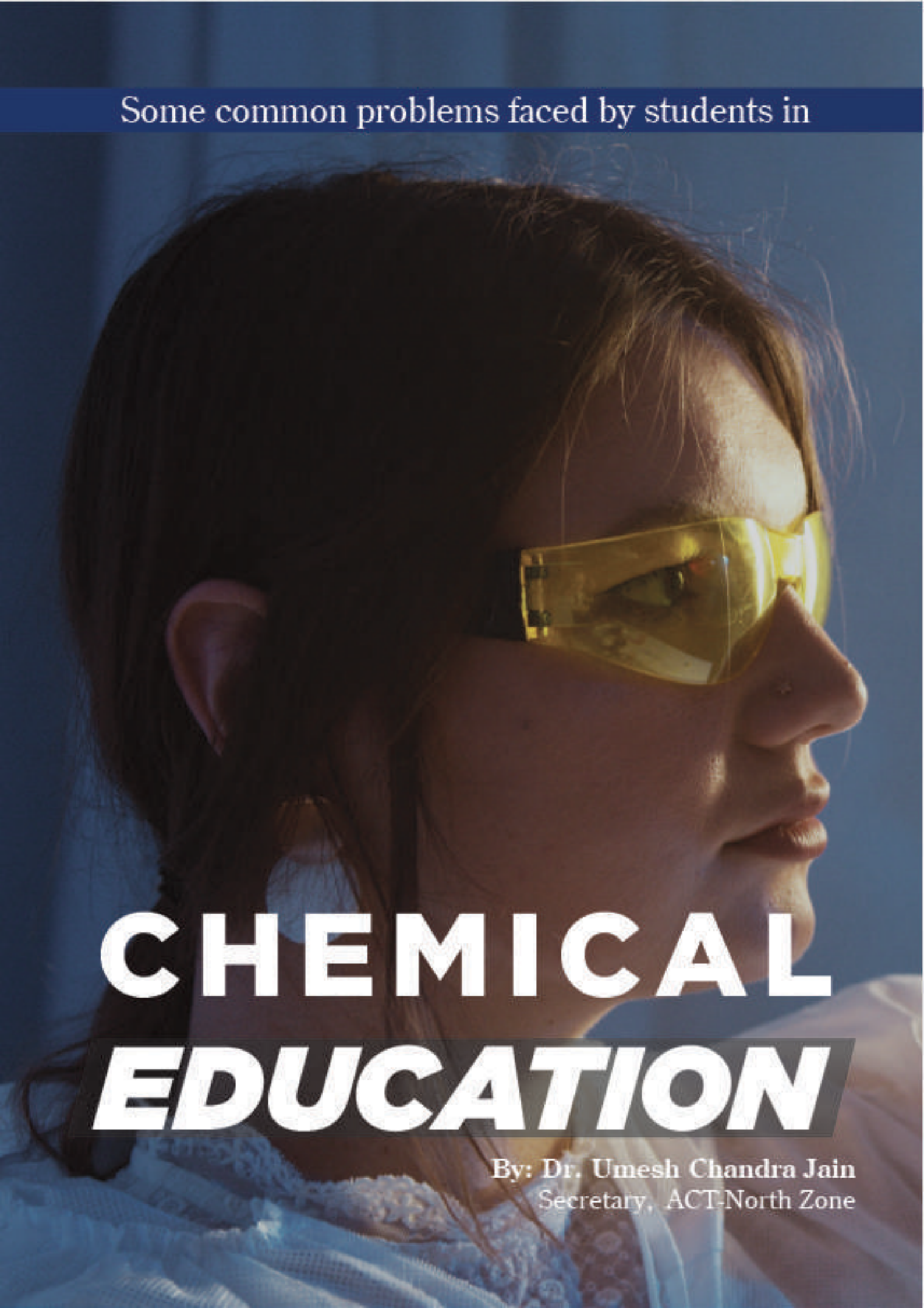
Question 10: What is your opinion regarding the research system in Indian Institutes/Colleges in India?

Dr. Pare: Within ACT we need to talk specifically about research in chemistry education. As a matter of fact, there is a need to take the research level to the next higher level. Education practices are going on well but hardcore research needs to be catalyzed.

Question 11: A short message for youth, chemistry educators, chemistry enthusiasts and lovers?

Dr. Pare: Chemistry is central science and always there is a lot of scope in terms of doing something new in various fields of research and industry. Synthesis is the heart of chemistry that makes chemistry a charming subject.

Some common problems faced by students in



CHEMICAL EDUCATION

By: Dr. Umesh Chandra Jain
Secretary, ACT-North Zone

"Chemistry" is one of the most fascinating & curious subject amongst students. The structures and various equations make it different from others. This is the only subject which has many practical life applications. Chemistry has provided us with more comforts for a happier and a healthier life. It touches almost every aspect of our life, our culture and our environment. There is no aspect of our life that is not affected by the developments in Chemistry. In fact, it is the single branch of science which profoundly influences the existence of human beings and their habitat. It has influenced our life so much that we do not realize that we come across about 50,000 chemicals every day. It can be concluded that Chemistry is the greatest benefactor of humanity.

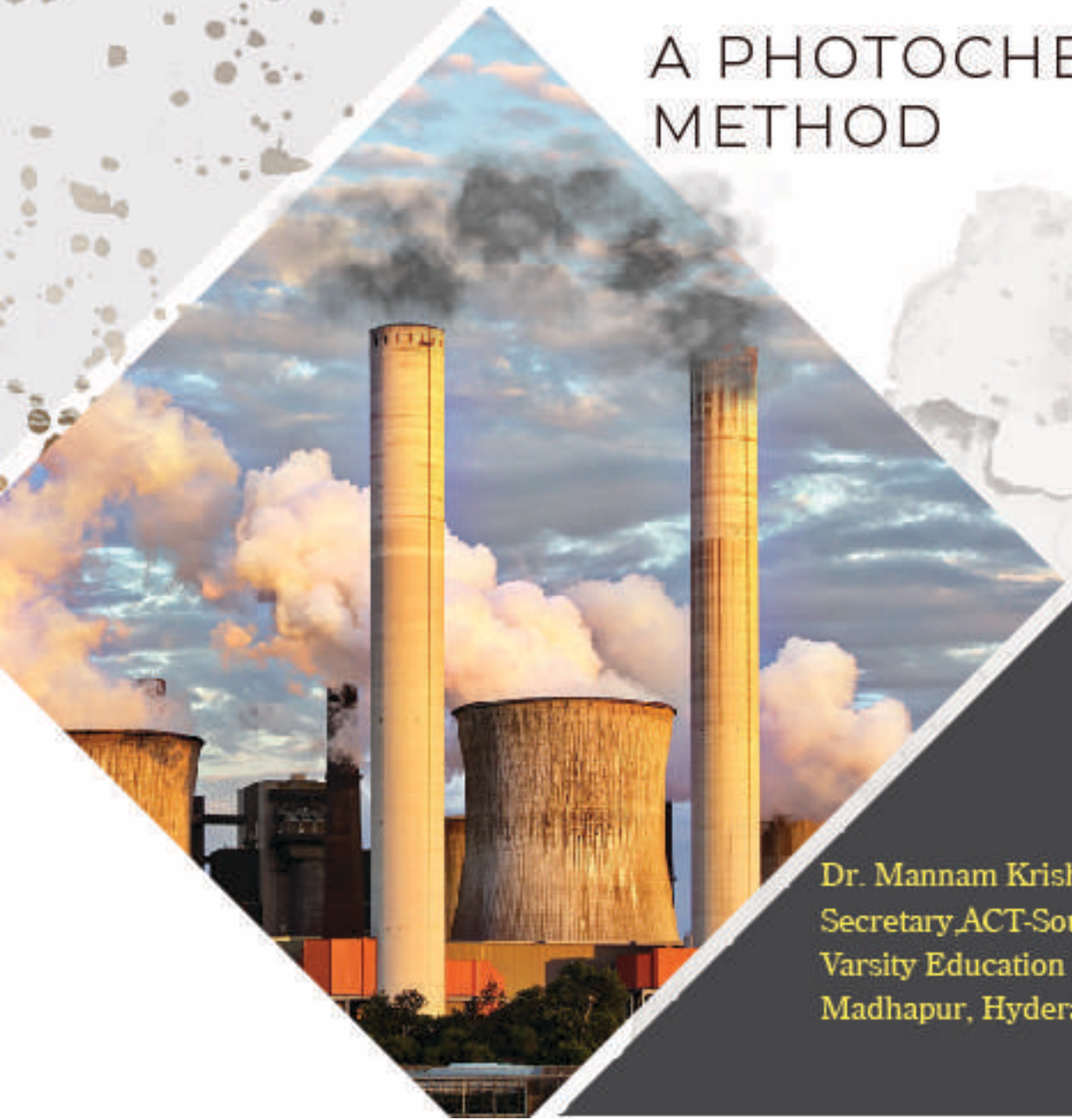
But unfortunately, nowadays the craze of chemistry subject is decreasing day by day as this subject is not presented in a way as it should be. Many common problems faced by students at school and college level are lack of logical reasoning and practice for solving HOTS. They find difficulties in formula writing, balancing of chemical equation, retaining the name of compounds. In Organic Chemistry, the name reactions, conversions and reaction mechanisms are hard to retain for them. If we talk about the practical aspect of chemistry, the lack of basic practical knowledge especially in detecting the cations and anions is common. Therefore, here only the interest of students deprives. Killing of curiosity in the subject takes place. And finally, the students run away from this devastating subject of colours.

What teachers need is to go deep into these problems and find some logical solution so as to cope up with the situation of such chemical minds. Teachers must prepare well in advance with high knowledge before they deliver the lecture. For conversions in organic chemistry the descending and ascending series along with the change in functional group should be made practised using less no. of steps. HOTS questions in organic chemistry are the modified form of name reactions. Teachers must pay emphasis on this part. Low cost 3D models should be used in teaching techniques.

I know that most students are averse to revision and poor in their grasp of anything to do with numbers. Provided chaps with specially designed worksheets which are then discussed inside the class or in groups. This is accepted better. It also sharpens the students' problem solving aptitude. Once they start solving problems; their confidence touches new heights. Soon they not only solve problems for themselves but for others in the class. While solving problem ignited minds should solve all sorts of problems as if they are given to eat moongfali. If such problems are minimised the future aspect of chemistry shall reach the heights of the sky by itself. The further scopes and developments in the areas of Chemistry will grow rapidly in next coming years. Therefore, the need of an hour is to think on such problems, implement them and let the chemistry sustain in the hearts and minds of our youngsters.

REDUCTION OF CO_2

A PHOTOCHEMICAL METHOD



Dr. Mannam Krishna Murthy
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Carbon dioxide is a familiar atmospheric pollutant and is a green house gas. It is mainly responsible for global warming. The average temperature of the earth is increasing, which leads to droughts and climate changes.

The reduction of Carbon dioxide is so important as it is addressing one of the important issues associated with the Globe as well as human life. Electrochemical and Photochemical methods are now employed to reduce the atmospheric carbon dioxide content.

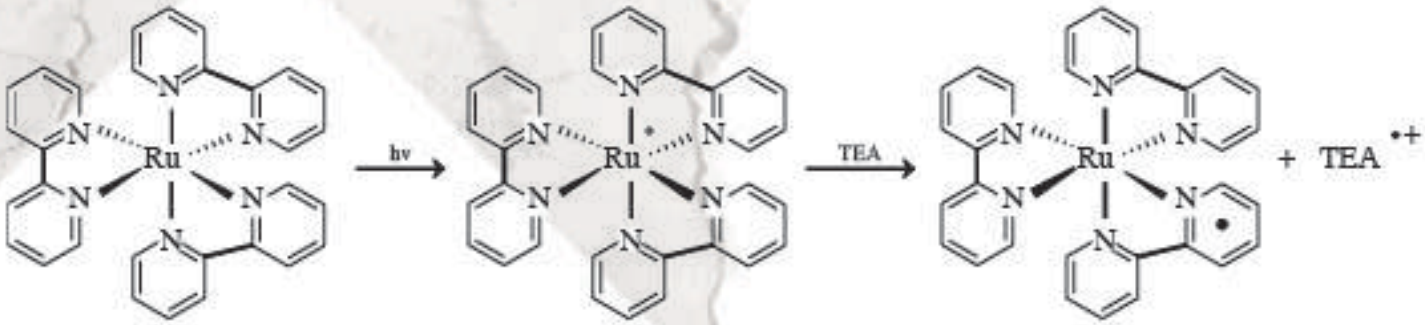
Photochemical reduction involves oxidation-reduction reaction generated from the photoexcitation of another molecule, called photosensitizer. The photosensitizer must be able to absorb light within the ultraviolet and visible part of the energy received by earth from sun. Molecular sensilizers that meet this criterion often include a mental center, as the d-orbital splitting in an organometallic species often falls with in the solar energy reaching the earth. The photochemical reduction process begins with the excitation of the photosensitizer, which causes the movement of an electron from the metal center into the functional ligands. This is termed as a 'Metal-to-ligand Charge Transfer' process.

Successful photosensitizers have a long lived excited state. This is due to the interconversion from singlet state to triplet state, that allow time for electron donors to interact the metal center. Triethanolamine, triethylamine and benzyl-1,4-dihydronicotinamide are in use now as common donors in the photochemical reduction as process. An example of photoexcitation using triethylamine (TEA) and Ru(bpy)3 is illustrated here.

The net result is a lone electron, originating from the metal, residing in the aromatic bipyridine moiety of the organometallic species. After excitation carbon dioxide coordinates with the inner coordination sphere of the reduced metal. It may be noted that absorption of sum lost and catalytic reduction occur at the same metal center or on different metal centers. Photosensitizer and catalyst may be tethered through an organic linkage that provides electronic communication between the species.

Common products of photochemical reduction of carbon dioxide include formic acid, carbon monoxide, formate and methyl alcohol.

Several catalysts are now reported to be used in the photochemical process of reducing atmospheric carbon dioxide. Some non metal photo catalysts like pyridine and N-heterocydic carbones are also reported.



E-WASTE MANAGEMENT

NEED OF THE HOUR

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Summary:

All appliances which use electricity like cell phones, television sets, CD players, computers, printed circuit boards, radios, tube lights printers which are not in use and are scrapped are away called as e-wastes. Electronic waste is piling up around the world at a rate of the million tons per year. Theses unwanted electronic products pollute the environment and cause number of health hazards. Hence, it is the need of the hour to follow proper management techniques for the disposal of E-wastes. People should also realize the adverse effects of E-wastes and buy electric gadgets only where there is an absolute need for it.

Introduction:

E-wastes are electric and electronic appliances, and gadgets that are not in use. Advancement in technology contributed lot of e-wastes like cell phones, CD-players, printers, fax machines, computers and so on. These unwanted electronic products fill the landscape rapidly, pollute the environment and cause health hazards . Proper management techniques should be used to recycle these products else they create too many nuisances to the environment.

Causes:

As technology improves day by day, market is flooded with gadgets to ease human lives. People are attracted towards these gadgets through advertisements and offers. They forget the ill-effects of buying many numbers of mobile phones and computers. If we buy a phone, we will be provided a charger and an ear phone that also counts to e-waste .

The progress in science and inventions paved ways from TV's to LED TV's, watches to smart watches, ordinary tooth brush to electronic tooth brush and so on. The answer for the question, "Why there is more number of e-wastes now a days?" is the poor quality of products available in market. The products are made in such a way to become obsolete soon that means they are not made to last more than two years, so that people buy a new one .

How it destroys the environment?

It is necessary to know the things that are used to produce a gadget. The key part of every cell phone is its electronics. Hardwares that are used to manufacture a phone are printed circuit board, battery, mobile case and so on. Toxic e-waste contains hazardous materials that are harmful to the environment as well as human health. E-waste consists of metals such as lead, chromium, nickel, cadmium and mercury. People discard e-waste in many ways. Some give it to waste management shop, some throw in dust bin, sometimes it is thrown into the sea which pose major threat to the marine organisms. When we throw these E-wastes containing metals and plastics which does not decompose, affects soil and ends up in soil pollution. Heavy metals are resistance to decomposition in natural condition and remain as the most persistent pollutants in the environment. The heavy metals if exceeds its limit in the earth crust, it will be existing as a pollutant in the environment.

Developing countries face adverse health effects due to discarded electronic and electrical devices. Europe disposed 100 million phones in every year and the USA discards 30 million computers each year. It is expected that in India alone e-waste from cell phone increase 18-fold by 2020 .The environmental protection agency estimates that only 15-20% of e-waste is recycled, the rest go directly in to landfills and incinerators. Developing nations has become the dumping yard for e-waste. The simplest method to destroy e-waste is tossing them into an open fire in order to melt plastics and burn away non-valuable metals. But this method releases carcinogens and neurotoxins into the air, contributing to acrid, lingering smog containing dioxins and furans, which may cause dangerous health hazards.

How it affects human lives?

Dioxins and furans can cause a number of health effects. The most well known member of the dioxins/furans family is TCDD. The U.S. Environmental Protection Agency (EPA) has reported that it is likely to be a cancer causing substance to humans. In addition, people exposed to dioxins and furans have experienced changes in hormone levels. High doses of dioxin have caused a skin disease called chloracne. Animal studies show that animals exposed to dioxins and furans experienced changes in their hormone systems, changes in the development of the fetus, decreased ability to reproduce and suppressed immune system. Infertility rate increases due to the exposure of lead from cathode ray tubes in monitors . It affects the nervous and reproductive system. It can cause intellectual impairment in children. Accumulation of Cadmium in high dosage into the human body leads to damage in kidneys and the usage of Mercury in flat-screen displays, can damage the central nervous system and also Chromium in its +6 oxidation state, is highly carcinogenic. Polyvinyl chloride (PVC) is a chlorinated plastic used in some electronic products and for insulation on wires and cables. Chlorinated dioxins and furans are released when PVC is produced or disposed of by burning. These chemicals are highly persistent in the environment and many are toxic even in very low concentrations.

How to overcome the problem?

Self discipline should be encouraged among human beings. We should teach every one the proper method of disposing e-waste . Reduce and recycle are the important things to be followed. One should buy a gadget only where there is a need. E-waste should be managed properly.

Why recycle e-waste?

* To avoid burning and landfills.
* To overcome air pollution and soil pollution.
* To protect valuable metals like gold, Silver etc.,
* To conserve natural resources.
* If not recycled, e –waste becomes a serious threat to environment and human lives .

Conclusion:

In order to improvise the e-waste management, each individual should have the awareness about the disposal hazards of e-waste. It is also responsible for the industries to use high quality standard materials for the manufacture of electronic items, which will have longer life. Industries should also consider the usage of bio-compatible materials for the better disposal in the future.

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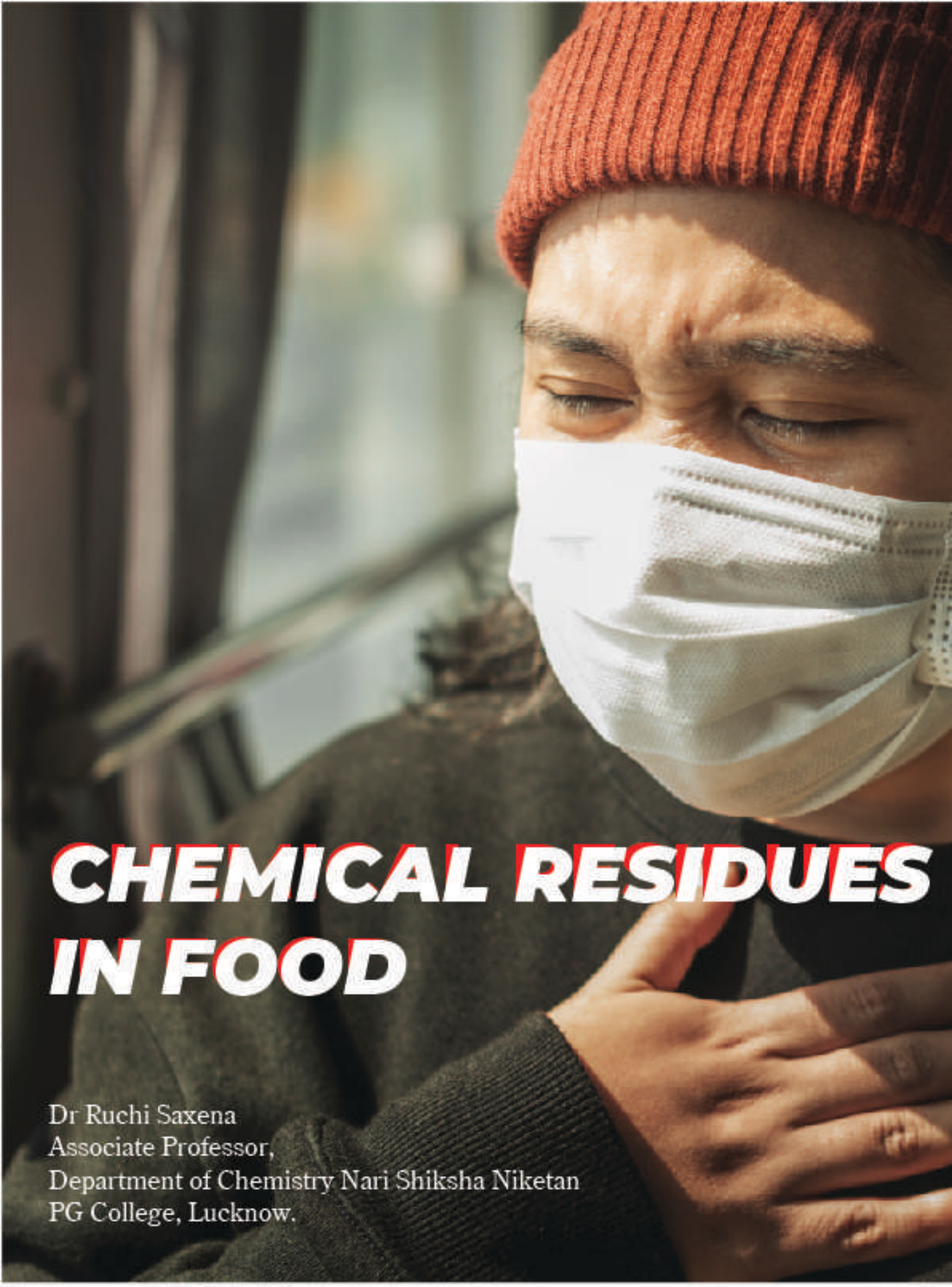

CHEMICAL RESIDUES IN FOOD

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A BURNING HEALTH ISSUE

Is our food safe? This question arises as the food that we consume is often found to be containing chemical residues as a result of indiscreet use of pesticides, veterinary drugs, food additives, pollution and also radioactivity. The use of pesticides in agriculture has led to occurrence of a variety and substantial quantity of chemical residues in fruit, vegetables, foods grains such as wheat and rice, meat, dairy, wine and honey. Food producing animals when treated with antibiotics, hormones or anabolic, drugs, leave chemical residues in the animal's meat and milk. Food additives like preservatives, colour and adulteration are themselves chemical residues. Foods and feed can become contaminated by radionuclides due to various natural causes and processes even though all food and drinking water naturally contains radioactivity. Chemical residues generally have a negative impact on the quality of the food or feed and are a risk to human or animal health or a barrier to trade.

Agro-chemical or pesticide residues are organochlorines, organophosphates, carbamic, thio-carbamic carboxylic acids and their derivatives, urea derivatives, heterocyclic compounds (benzimidazole and triazole derivatives), phenol and nitro phenol derivatives, hydrocarbons, ketones, aldehydes and their derivatives, fluorine containing compounds, copper-containing compounds, metal organic and inorganic compounds.

Antibiotics and Hormones as residues of bacitracin, chinolones, chloramphenicol, nitrofuransβ-Lactams (Penicillin), streptomycin, sulphonamides, tetracycline-polycyclic naphthacene carboxamide.

Food additives, preservatives, food colour and adulterations are lactic, citric and acetic acids, sodium diacetate, sodium benzoate, sodium propionate, potassium sorbate, methyl para ben, sodium nitrite, sulphur dioxide. Inorganic pigments used as dyes, indigo, carmine, iron oxides, aluminium , gold and silver, ascorbic acid etc. Adulterations are brought about by pebbles, dust, stones, straw, weed seeds, damaged grain, lead chromate, chicory, tamarind seeds powder, chalk powder, washing soda, urea etc.

Pollution metals such as lead, mercury, arsenic, dioxins, and polychlorinated biphenyls (PCBs) also make way into our food as chemical residues.
Radioactive fallout was observed after tsunami when radionucleosides were detected in seafood in India, various foods in the Balkans, and food and drinking water in Japan and even Switzerland. In order to provide ample food to the ever growing world population the use of pesticides in agriculture, use of preservatives for having a longer shelf-life and also making carbonated drinks, addition of colour for making the food attractive have led to serious impact on the health and well being of human beings.

The pesticides achieve their intended use of killing pests by disrupting their nervous system. Due to similarities in brain biochemistry, there is much speculation that these chemicals can have a negative impact on humans as well. There are epidemiological studies that show positive correlations between exposure to pesticides through occupational hazard. These, tends are significantly higher than that ingested by the general population through food. Similarly occurrence of certain cancers too is found to be more prevalent as an occupational hazard. The pesticide residues that are attached tend to be lipophilic and can bio-accumulate in the body

and have detrimental effects. For example In

China in August 1994, a serious incident of pesticide poisoning of sweet potato crops occurred in Shandong province, China. Because they used the highly-toxic pesticide named parathion instead of trichlorphon. It resulted in over 300 cases of poisoning and 3 deaths.

Children are especially vulnerable to exposure to pesticide residues especially as infants and children consume higher amounts of food and water relative to their body-weight have higher surface area (i.e. skin surface) relative to their volume, and have a more permeable blood-brain barrier.

Neurotoxins and Presence of pesticide metabolites in urine samples have been implicated in disorders such as attention deficit hyperactivity disorder (ADHD), autism, behavioural and emotional problems, and delays in development.

The consumption of animal products has seen the transfer of antibiotic resistant bacteria to humans, having immunopathological effects, allergy, mutagenicity, nephropathy (gentamicin), hepatotoxicity, reproductive disorders, bone marrow toxicity (chloramphenicol) and even carcinogenicity (sulphamethazine, oxytetracycline, furazolidone). The most important adverse effect of antibiotic residues is the transfer or antibiotic resistant bacteria to the humans due to the mobile properties of resistance. Addition of preservatives and colour cause liver and stomach disorders, kidney failure severe allergic reactions including stomach and skin irritations, gallbladder cancer, paralysis, cardiac arrest, and increased LDL cholesterol. The dyes are highly carcinogenic that have the potential to cause different types of cancer.

Adulteration of food stuff leads to metal toxicity, cancer, lead poisoning, tumours, variations in blood pressure and other stomach related disorders, liver damage, low blood sugar,mouth sores and increased risk of cancer.

Pollution of arsenic, selenium, lead, thallium and polycyclic aromatic hydrocarbons (PAHs) make way into food as chemical residues to causes gastric cancer, for example lead and cadmium from an iron mine in Morocco resulted in concentrations of cadmium lead in grains causing liver cancer. In China, cadmium from a zinc smelter contaminated leafy and root vegetables particularly. These are just a few examples of chemical residues found in our food.

Actions to prevent or to reduce contamination of foods and feeds is found under Emergency Preparedness & Response of the WHO.

Compliance of food and feed contaminant levels to internationally accepted maximum levels for particular uses has to be demonstrated by monitoring and survey programmes, following measurement principles and procedures subjected to international acceptance. Moreover, the correct application of those principles and procedures in practical situations will have to be demonstrated by an appropriate quality assurance system, involving the use of validated analytical procedures.

It remains to be seen how effectively these procedures are brought into practice by government authorities, academics and by people's participation.

Rasayan Shastra:

Chemistry in Ancient India

Prof Neera Sharma
Member, ACT-North Zone
Hindu Collage
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Ancient India was not only a land of sages and seers but also a land of scholars and scientists. Indian scientific and technological accomplishments are among the oldest in the world and covered all the major branches of human knowledge and activities, including mathematics, astronomy, physics, chemistry, medical science and surgery etc. Over a period, India has progressively and perceptibly paved way for development in the field of 'Chemical Practices' from Indus valley civilization to (pre and post) Vedic period to medieval India and now in the present era. Its contributions in all the fields have been influential in the development of human civilization like metallurgy, extracting chemicals from plants for medicine, making of alloys, pottery & glazes, cosmetics, perfumes, dyes, soap, glass etc. Many theories and techniques discovered by the traditional Indians have created and reinforced the basics of contemporary science and technology.

Swedani Yantra was used for continuous slow heating of ingredients

Brief of ancient Scriptures:

Chemistry in Ancient India was called Rasayan Shastra, Rasatantra, Rasa Kriya or Rasa Vidya, means 'Science of Liquids'. According to ancient scriptures Rigveda, Yajurveda and Atharaveda, it is evident that Chemistry finds its origin in India at around 1000 BC. According to Rigveda, tanning of leather, dyeing of cotton, making of pottery (Northerns Black Polished Ware) were practiced during the period 1000-400 BC. The text of Yajurveda clearly states that Gold, silver, Copper, Tin, Lead and Iron were known to the vedic people. Lot of natu- presently we call them as chemistry principles were adopted by vedic people. This is very clearly reflected in Mahabharata and Arthashastra of Kautilya. In early civilization, metallurgy has remained an activity central to all civilizations from the Bronze Age and the Iron Age, to all other civilizations that followed.

Amazing information about the chemical practices on metals, ores, their quarries, compounds and alloys is available in other ancient texts written by then renowned 'Ras Shastris' like Ras Ratnakar (by Nagarjuna), Ras Ratna Samuchay (by Vagbhatt), Rasanava (by Govindacharya), Ras Prakash Sudhakar (by Yashodhar) and many more. Many chemical names have been described in 'Ras Ratna Samuchay' like Maharas, Upras, Samanyaras, Ratna, Dhatu, Vish, Levan & Kshar along with some poisonous substance which were used for medicinal purposes. The book also mentioned the conduct of experiments in laboratory and use of the instruments like Dol Yantra, Swedani Yantra, Patan Yantra, Adhaspadan Yantra to name a few. Renowned Chemist Nagarjuna mentioned in his text the detail methods of preparing mixture of various metals, purification of mercury and other metals & their use for medicinal purpose.

Sushruta Samhita explained the importance of alkalies and classified it into three categories mrdu, tiksna and madhyama. Varahamihira in Vrihat Samhita wrote about alum and sulphate or iron as mordants for dyeing of textile fabrics.

The Tiryakpatan Yantra was used for purification of mercury

Various cement preparation and their types which were applied to temples and other buildings were also mentioned. A vast number of statements and materials presented in the ancient Vedic literature can be shown to agree with modern scientific findings and they also revealed a highly developed scientific content in these literatures. The great cultural wealth of this knowledge is highly relevant in the modern world.

In Ancient India, an important role in the development of chemistry was made by Ayurveda which used a variety of minerals. Intellectuals of the society tried to identify and use different plants and other materials as medicines for curing diseases and for longevity. The medicinal treatise Charaka Samhita discussed 150 types of diseases with further subdivisions, 341 medicinal plants, 177 medicinal substances of animal origin, and 64 medicinal substances from Mineral origin. Sushruta, known as father of surgery, had designed number of surgical devices and equipments which are of use even today.

During that time, many fermentation products were developed for giving patients during operations, which act as modern anaesthesia drugs. Metal and medicinal plant combinations and preparations started with Nagarjuna, the great alchemist of India and the founder of Rasa Shastra. Charaka Samhita and Sushruta Samhita were two celebrated Ayurvedic treatises on medicine and surgery that contains 'Chemical knowledge' of medicines.

Ancient Indians achieved great progress in Alchemy (the older form of chemistry) which flourished in the medieval period. The texts of Indian alchemy (Rasavidya) reveal that it primarily dealt with gold-making and elixir syntheses. Elixir or Rasayana was a substance that could transform other base metals in to gold and silver, as well as confer longevity and immortality when taken internally. Owing to the heavy weight, silvery white and shiny appearance, fluidity, and property of readily combining with other substances, Mercury (known to be Maharasa) was considered as the most potent of all substances and as possessing divine properties.

The potions containing mercury were supposed to give longevity and immortality, thus making it the main ingredient of the powders used in the transmutation and as elixirs. Numerous alchemical texts were written between the ninth and the fourteenth centuries like AD Rasahrdayatantra by Govind Bhagwatpad, Srasaratnakara by Siddha Nityanatha, Srasendracudamani by Somadeva etc. Mercury had to undergo 18 processes before it could be used for transforming either metals or human body. These processes were as follows:

1. **Svedana:** steaming or heating using water bath
2. **Mardana:** grinding
3. **Murchana:** swooning or making mercury lose its form
4. **Utthapana:** revival of form
5. **Patana:** sublimation or distillation
6. **Rodhana:** potentiation

7. **Niyamana:** restraining
8. **Sandipana:** stimulation or kindling
9. **Gaganabhaksana:** consumption of essence of mica
10. **Carana:** amalgamation
11. **Garbhadruti:** liquefaction (internal)
12. **Bahyadruti:** liquefaction (external)
13. **Jarana:** calcinations
14. **Ranjana:** dyeing
15. **Sarana:** blending for transformation
16. **Sankramana:** acquiring power of transformation or penetration
17. **Vedhana:** transmutation
18. **Sevana:** becoming fit for internal use

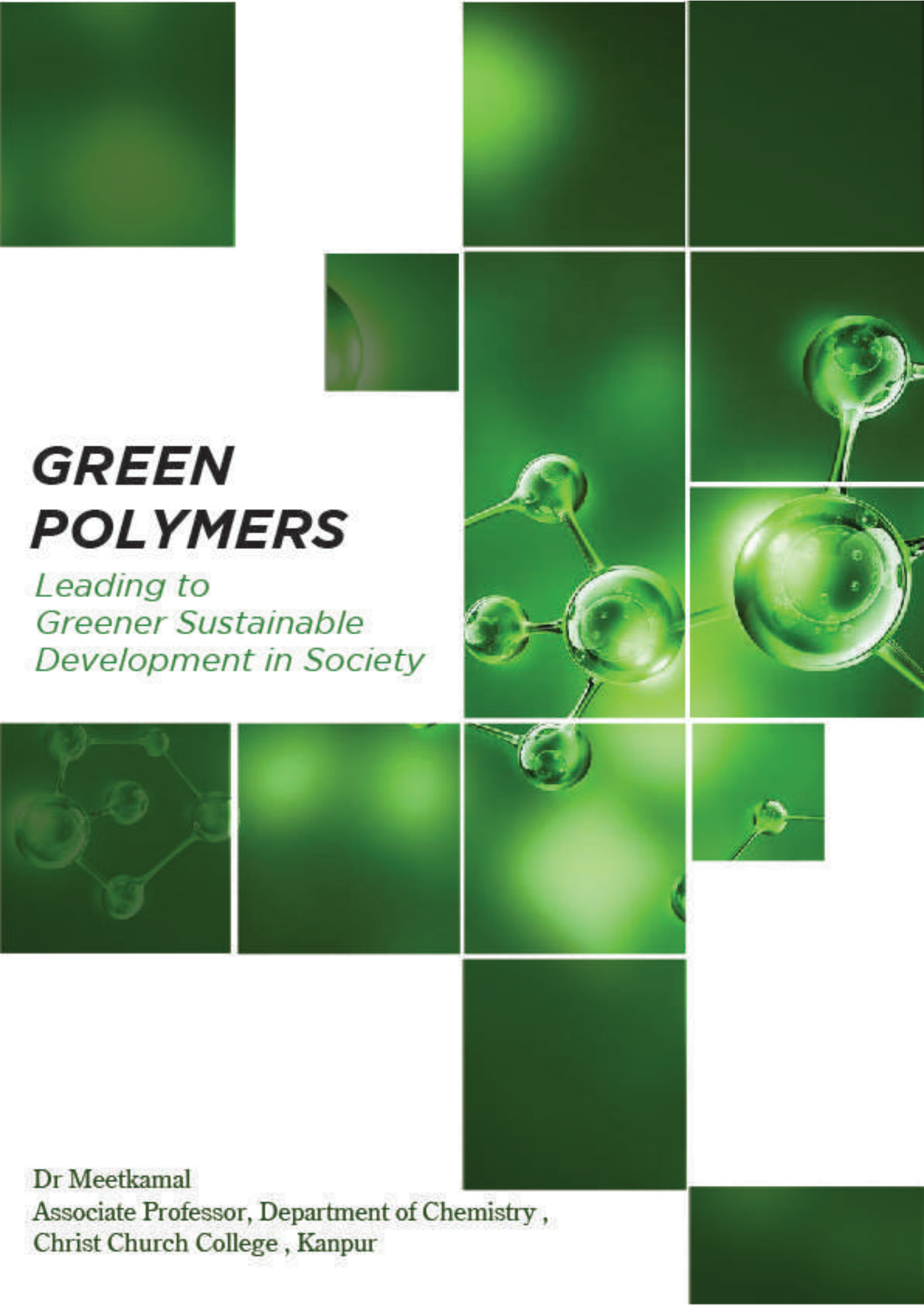
Making of Glass, Soap, Cosmetics and Perfumes, Pottery, Alcoholic liquors, Metallic products, Firearms, Dyeing of clothes and tanning of leather etc. were the major chemical arts and crafts in the early periods.

As a result of this expanded activity, the alchemical knowledge increased. Following were the major chemical products that contributed to the development of chemistry:

This apparatus, Kosthi Yantra, was mainly used for extracting minerals.

Understanding and pursuing the ideas mentioned in ancient scriptures, in conjunction with modern technological advances may yield greater scientific knowledge and will help in overcoming present challenges related to environmental balance, energy harvesting, pollution, pharmaceuticals etc. Correlation studies of the medicinal plants used for curing diseases mentioned in the ancient books with the chemical constituents which are used as generic drugs may throw light on the design of medicines significantly.

The Adhahpatan Yantra was a modification of the Pahana yantram, an apparatus used for sublimation and distillation.



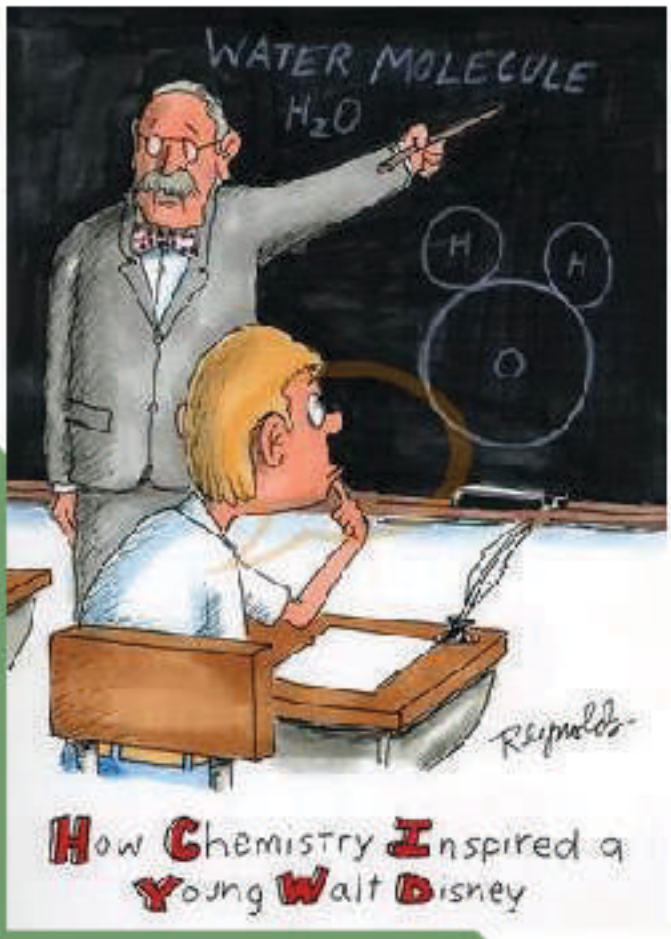
GREEN POLYMERS

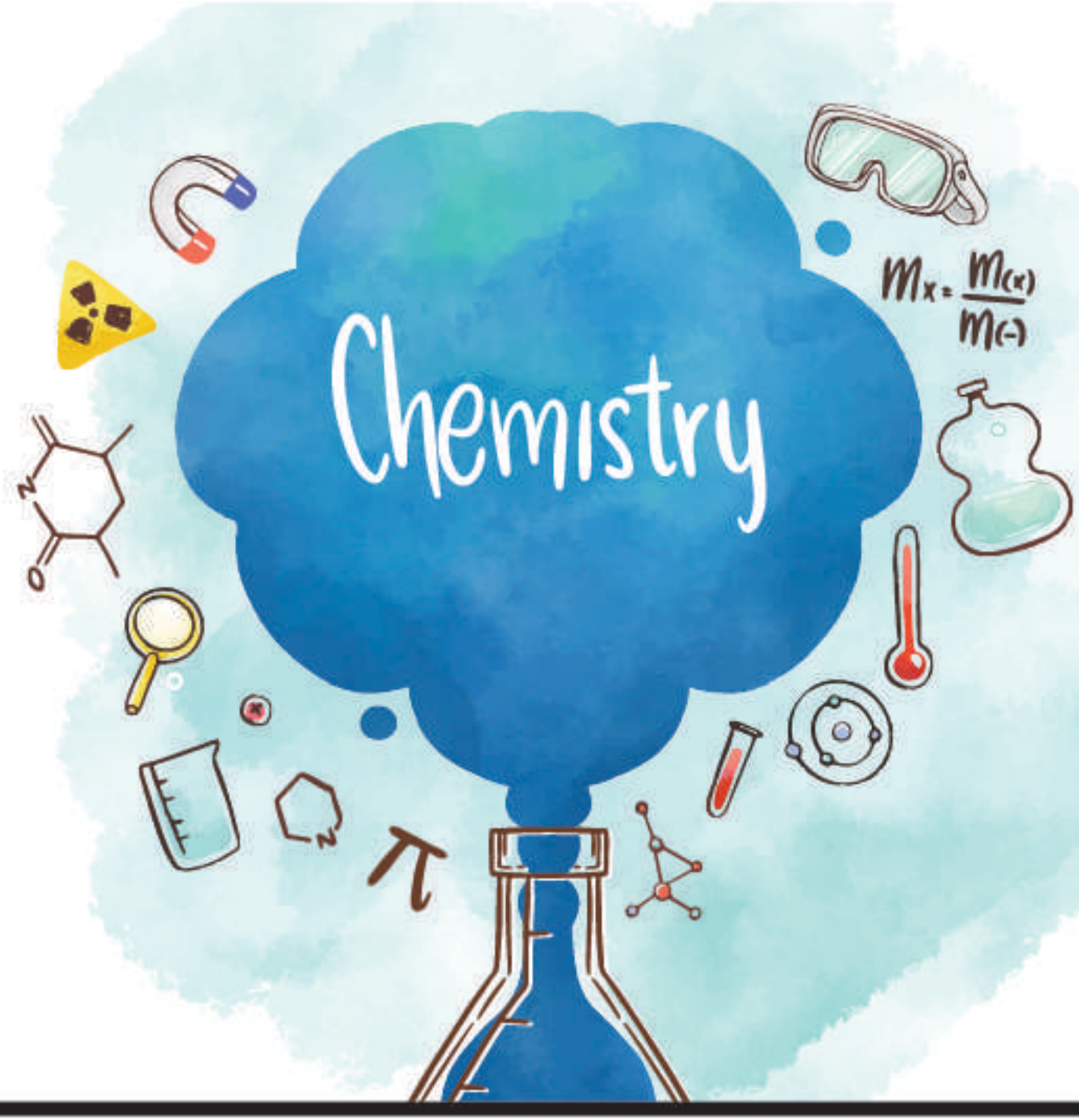
Leading to Greener Sustainable Development in Society

Dr Meetkamal
Associate Professor, Department of Chemistry ,
Christ Church College , Kanpur

Without polymers, modern life would be impossible because polymers secure the high quality of life and serve as pacemakers for modern technologies.Modern polymer technology has green routes Properties are readily tuned by varying monomer type, sequence of monomer incorporation, polymerization processes, polymer superstructures, and processing technologies. Polymers that degrade by per oxidation followed by bio assimilation of the oxidation products (oxo-biodegradable polymers) are in general more environmentally acceptable ('green') than the biologically produced hydro-biodegradable polymers. First kind of biopolymers are naturally occurring polymers such as cellulose, starch, and PHAs. Among the second kind, there are poly(lactic acid), that can be synthesized from biologically-obtained lactic acid, or even polyethylene, when it is produced from ethylene obtained from bio-ethanol. Bioplastics are biopolymers with plastic properties. Bioplastics synthesized by living organisms are generally biodegradable; and chemically synthesized polymers, especially those derived from petroleum, are generally non-biodegradable, while those that are "bio-based" (i.e., obtained using a biologically produced substrate such as bio-ethanol), have several degrees of biodegradability. Polyethylene and polypropylene, whether bio-based or not, are considered non-biodegradable, even when there have been claims of slow degradation of these polymers . There are exceptions to the relationship between biological origin and biodegradability, as not all biopolymers are biodegradable, and not all biodegradable polymers are biopolymers. There are some plastics obtained from non-biological processes that can also be biodegraded, such as poly(ε-caprolactone) and the petroleum derived polymer poly(butadiene adipate-co-terepthlate and there are also polymers synthesized by microorganisms that are not biodegradable, such as polythioes thers, obtained by the polymerization of mercaptoalkanoic acids by PHA syntheses.Currently, there are many different biodegradable bioplastics. Among these, we found blends containing natural polymers, such as

starch and cellulose; and polymers synthesized chemically from different substrates, such as poly(lactic acid), poly(ε-caprolactone), and others. Starch can be blended with other compounds to obtain polymers which could be used for several applications, but this material is quickly damaged in contact with water. Poly(lactic acid) is not normally degraded by microorganisms, but it is easily hydrolyzed and can be composted. PHAs are natural bioplastics produced by many bacteria from different substrates. In sharp contrast to the other bioplastics mentioned above, these polymers are totally biodegradable, as all microorganisms that naturally accumulate PHAs can degrade them. Moreover, PHAs can also be degraded by many other microorganisms, both bacteria and fungi, under either aerobic or anaerobic conditions.These polymers are synthesized naturally by a wide variety of bacterial species as a reserve for carbon and energy. Nowadays, PHAs continue to attract increasing industrial interest as renewable, biodegradable, biocompatible, and extremely versatile thermoplastics . PHAs are the only water-proof thermoplastic materials available that are fully biodegraded both in aerobic and anaerobic environments. Two classes of PHAs are distinguished according to their monomer composition: short-chain length (SCL) PHAs and medium-chain length (MCL) PHAs. SCL-PHAs are polymers of 3-hydroxyacid monomers with a chain length of three to five carbon atoms, such as poly(3-hydroxybutyrate) (PHB, the most common PHA); whereas MCL-PHAs contain 3-hydroxyacid monomers with six to sixteen carbon atoms. All of them are optically active R-(—) compounds. This versatility is partly due to the wide substrate range of the PHA-synthesizing enzymes, and gives PHAs an extended spectrum of associated properties which is a clear advantage vis-a-vis to other bioplastics. The current scenario is highly promising for the development of sustainable PHA production bioprocesses which could fulfill our needs for biopolymers applications.





A pedagogical approach for chemistry in context of validities of science education

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National curriculum framework-2005 states that a good science education is true to the child, true to life and true to science. Here; true to child means that the science we teach should be understandable to the child and be able to engage the child in meaningful and joyful learning. True to life means that the science we teach should relate to the environment of the child, prepare her for the world of work and promote in her concerns for life and preservation of the environment. True to science means the science we teach should convey significant aspects of science content at appropriate level and engage the child in learning the processes of acquiring and validating scientific knowledge.

Chemistry is a branch of science that deals with matter and changes in matter around us. Chemistry should also follow the objective of science education because it is an integrated part of science especially in elementary school science.

An education is valid if it follows to achieve the aims of education through various subjects at school. With the same context, some criteria have been made for chemistry teaching which is reflection of objective of science teaching stated in our national curriculum framework for science education.

In this article, I am trying to relate the criteria of science education that may be replicated in chemistry class of a teacher for having the best and joyful learning of chemistry education.

The six different validities given in National curriculum framework refer to cognitive, content, process, historical, environmental and ethical aspects of a science curriculum. They should provide fundamental basis for science learning and teaching. These validities should not be limit for the teachers. Actually they provide freedom to the teacher to plan a variety of experiences to seek participation of her students in learning process. Let us see few examples that satisfy the required validity and along with them the counter examples that illustrate the topics not reflecting the required validity in chemistry education.

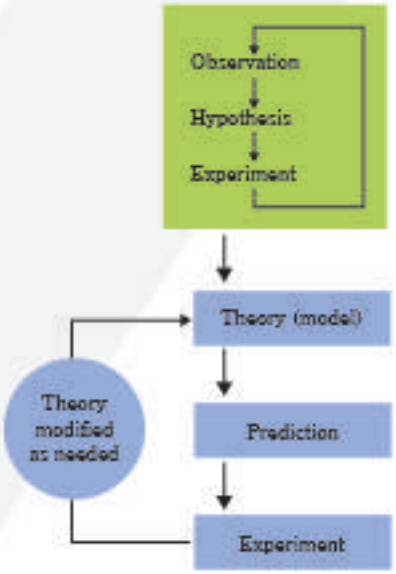
Cognitive validity implies that the content should be age proper and applicable so that children can understand them. The way of transaction of the content should be according to the level of the child. Example: Up to upper primary level, the basic concepts of matter are executed qualitatively taking concrete examples from their surroundings. At the secondary stage, the ability

intellectual perceptive develops. Therefore, children are introduced to separate a required matter from the mixture using different type of physical methods of separation.

In elementary stage, the chemical methods of separation like electrolysis is only given as a method to separate hydrogen and oxygen from water using electric current. At higher secondary stage, children are ready to understand the broader concepts of matter like theories of atomic concept, evolution of atomic concept, lets peep inside the atom etc. Theory of ion and atom at higher secondary stage satisfies cognitive validity. Based on this reasoning we decide which topic should be taken up at which stage. Teaching observation of colloid in upper primary classes, and teaching surface chemistry in higher classes also satisfy cognitive validity. If we take a counter example: Teaching surface chemistry in higher classes or teaching colloid's observation in upper primary classes do not satisfy cognitive validity.

One more point to emphasis in inclusion of cognitive validity is, everyday science is evolving and we are creating new knowledge. Now the question arises, how to include these knowledge means everyday knowledge in textbooks?

For Content Validity, it requires that curriculum must convey significant and scientifically correct content. We should not teach grossly incorrect science in our effort to simplify it. The idea that an electron pairs are equally shared in all covalent bonds should be reconstructed as electron pairs are not shared equally in all covalent bonds. In some, one atom attracts the electron pair more than the other atom (i.e., a difference in electronegativity) and causes the electron pair to be closer to it than to the other atom. Let's take some counter example: Explaining matter is destroyed during burning do not fulfil the requirement of content validity. During teaching chemistry, one can give examples from carbon chemistry to fulfil the objective of this validity by teaching that humans have been making and using charcoal for about 6,000 years. Charcoal is made by heating wood in the absence of oxygen (air). The use of charcoal in metallurgy was a necessary technology for making bronze and iron during the Bronze and Iron Ages. During the Bronze Age, charcoal was used in the production of pure copper, which could then be combined with tin to make bronze. Steel is made from iron containing about 2% carbon and see how this 2% of carbon gives strength to steel.



Process validity is an important criterion of a good science curriculum. It helps children in learning to learn science. In chemistry class, students should be asked how do you tackle the problems that confront you in real life? Think about your way to school. If you live in a city, traffic is certainly a problem you challenge daily. How do you choose a way or path to go to school? Or how do you decide which vehicle is suitable to reach to school at fast. Usually in such cases, one person explores all the possible routes to go to school and select the shortest and longest way to reach to school. However, you can find the best route only by trying several of them and comparing the results. After a few experiments with the various possibilities, you probably will be able to select the best way. What you are doing in solving this everyday problem is applying the same process that scientists use to study nature. The first thing you did was collect relevant data.

Then you made a prediction, and then you tested it by trying it out. This process contains the fundamental elements of science. The fundamental elements are Making observations (collecting data), Suggesting a possible explanation (formulating a hypothesis) and Doing experiments to test the possible explanation (testing the hypothesis) Scientists call this process the scientific method. One of life's most important activities is solving problems—not "plug and chug" exercises, but real problems—problems that have new facets to them, that involve things you may have never confronted before. Through process validity, it should be dealt with sincere efforts that science is not magical or supernatural. Colour change in chemistry is resultant of reaction process not mystic.

Historical validity means that science teaching should not convey a static image of science. It should be informed by historical perspective enabling the learner to appreciate how the concepts of science evolve with time with better and more reliable theories. Satisfying historical validity helps the learner to view science as a social enterprise and to understand how social facts influence the development of science. Example: The Periodic Table in Chemistry was earlier based on atomic weight, later based on atomic number, and finally explained by quantum theory. The concept of atom from the point of Democritus and then from the point of Thomson, how an idea exists for 400 years and becomes a belief of society and how these beliefs are shaken by getting some counter examples or due to some different observations undertake the requirement of historical validity. Counter example: Teaching Pauli's exclusion principal to understand atom without any reference to the earlier atomic model & theory; teaching sub atomic particles without reference to the historical debate between the continuous and corpuscular pictures of matter do not meet the requirement of historical validity. Today's understanding of any concept is appreciation of earlier effort should be well transacted in the classroom of chemistry.

Environmental validity means that science teaching should be contextualised and related with the child's environment. It's a kind of ecological ethics and it should be weaved in a way that curriculum of science should enable the learner to appreciate the issues at the interface of science, technology and society. We should consider and believe that the children know much from everyday experience and they do a lot of chemistry in their everyday life. Encouraging children to build models of relating global warming with carbon dioxide emission from burning of wood and increasing number of automobiles; relating neutralisation of acid with base with ways of treatment of soil to decrease alkalinity or acidity are some examples satisfying environmental validities. There is also counter example: Teaching indicators in a school in tribal areas without any field visit to the surrounding area and creating opportunity to prepare paper indicators, cloth indicators or flower indicators; teaching concepts of carbon without any sensitisation to air pollution does not satisfy environmental validity.

Ethical validity means science education should promote values of morality, independence, teamwork, liberty from fright and preconceptions, and anxieties for life and the environment. Example: Encouraging children to report the investigational and observational data honestly and judgmentally, enquiring into the reasons for withdrawal from standard or expected value, if any, establishes ethical validity. There are several counter example: Being insensitive to dispose the matter after any activity or experiments in schools and homes, spoiling in cutting of trees and cruelty to animals does not satisfy ethical validity.

In conclusion of this small article, I wish to say that every chemistry educator should try at best level to fulfil the validity of science education during chemistry teaching. By following the above mentioned six validities, we can create a scientific temper which is a way of life. Here, way of life means it helps an individual and a society in action and in thought. Chemistry teaching class following the six validities of NCF-05 science education opens an opportunity for being an individual with quest mind, observer for real world, to make and test the hypothesis on every observation through analysis, experimentation, model making and proper communication of recordings.

COVID-19

MORE THAN A NATURAL CALAMITY

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The COVID-19 pandemic is a complex global crisis without contemporary precedent. In just about every country around the world, the pandemic response is taking up the bulk of resources, expertise, time and effort .From bushfires to pandemics, in January 2020, as devastating bushfires drove thousands of Australians to evacuate their homes, China imposed a lockdown in Hubei province to mitigate the outbreak of a novel coronavirus disease we now know as COVID- 19 .By the end of the January , as the bushfires began to die out, COVID-19 had emerged as a global pandemic that by late December, had caused more than 1.6million deaths around the world. There were double trouble for citizens of Australia. Modern society's role in causing the pandemic in the first place. Land use involves deforestation and conversion of other land cover types to mostly agriculture, leading to about a quarter of the total cumulative greenhouse gas emissions to date. (Now, however, 21st century fossil fuel emissions and some forest regrowth have increased to the point that land use is only one tenth of annual emissions equivalent.)

As we decrease the area of animal habitat, especially in the tropics, forcing more animals into populated areas, it has been suggested that human-wildlife contact is increased, promoting virus transfer, as was apparent with Ebola.So the same thing (land use) that contributes to climate change, also exacerbates viral transfer. This is a doubly positive feedback in that human population explosion leads to both increased land use for agriculture and greater population density and thus transmission of Covid -19, under a number of different titles: "sanitary crisis", "health emergency", "natural disaster?.Climate change is also a driver of zoonoses. Greenhouse gas emissions–primarily the result of burning fossil fuels–cause changes in temperature and humidity, which directly affects the survival of microbes.

A 2016 UN Environment Programme (UNEP) report flagged zoonosis as an issue of global concern. On average, three new infectious diseases emerge in humans every year; and 75 per cent of all emerging infectious diseases in humans are now zoonotic. A new rapid assessment by UNEP and ILRI (International Livestock Research Institute) on zoonotic suggests that epidemics will become more frequent as the climate continues to change. COVID-19, the pandemic that has shaken the world, will perhaps change our lives forever. Often, we now talk of a 'pre-COVID' world, where business was as usual, and a 'post-COVID' world which is the new normal.

Four focus areas, encompassing the above challenges, have been identified, where science and technology can play a vital role.

- Building a preventive and responsive public health system, which urges for research funding on One Health-based programme.
- One Health is a concept that examines the outcomes of environmental factors like climate change and habitat destruction, on the health of humans, animals (including wild and farmed) and environment, and responds to these as a whole.
- Careful diagnostics of disease outbreaks through scientific methods and addressing the gaps in our healthcare and health systems through intersectional action
- The inequality and marginalization of some communities were brought out amidst the pandemic, highlighting the need for social security

In the tumultuous times we face, data science has been at the forefront of detecting and

and predicting COVID-19. Data scientists at John Hopkins have been leveraging machine learning to predict risk scores for the disease based on clinical data. However, the impact of the pandemic indicates that uncertainty would be a significant hallmark of a post-COVID world. Consequently, data science would consider the ambiguous nature of the environment to play a key role in the coming times..

A recent McKinsey report indicates that consumers have gradually adopted digital and online channels to interact with firms. Over-the-top (OTT) and video-on- demand (VOD) markets are witnessing high growth as media consumption is on the rise. Consumers are also increasingly looking to gaming for entertainment.

Scientists are seeing a connection between air pollution damage from fine particulate matter (PM2.5) and other pollutants to lung problems that make people more susceptible to COVID-19.This connection between lung damage from air pollution and COVID-19 is strong as shown by the high death rates from COVID- 19 among people who live near Louisiana's "Cancer Alley." Allegheny County in Pennsylvania, which includes Pittsburgh, is among the 310 U.S. counties with both the highest relative density of major air pollution sources and highest relative rates of COVID-19 deaths, according to a report from the NRDC. Genetic diversity builds disease resistance among animal populations and decreases the chances of outbreaks of high-impact animal diseases, according to a 2017 IPBES(Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) report. Conversely, intensive livestock farming can produce genetic similarities within herds and flocks, reducing resilience and making them more susceptible to pathogens

But there are four pre-emptive strategies that governments can adopt to counter the compound risks of COVID-19 and natural hazards.

• Identifying possible pandemic-natural disaster hybrid scenarios including worst-case scenarios is critical; this requires the building of new hybrid forecast models that combine existing pandemic projection models and natural hazard forecasting.
• Emergency responses to extreme events can be modified in advance by considering seasonal weather forecasting models.
• Re-design of policy responses is needed to address different natural hazards with a focus on social distancing. Policy changes must be introduced to a wide range of post-disaster activities, ranging from emergency aid distribution to providing shelter.
• Supporting relief agencies serving lower income communities or regions and their governments is important as impacts of compound effects on these areas are likely to be disproportionately high.

While the primary focus of many governments is on managing the COVID-19 crisis, planning for potentially concurrent natural disasters is also crucial to ensure communities are adequately prepared for the complexities that could arise from overlapping crises.

A lot more research is needed to see if the doses studied would be safe and effective against the virus in humans Therefore, in the arrival of vaccines and medicines for viruses that are animal-borne, we have no option left but test, trace, test, and care. Most of the economies have locked-down to avoid the spread, which has a positive impact on flattening the curve. Therefore, let us understand the ecosystem better and formulate policies that can help in sustaining the environment, with focus on development and growth. For the human race to survive, we must have a healthy planet with fewer diseases by changing our lifestyle, consumption, and production and most importantly, policies related to the sustainability of the environment

Embracing digital:
Enhancing the Quality
of Chemistry Teaching-Learning

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The hallmark of an education system is that it should change with the changing times. In this digital age higher education in India is witnessing a huge transformation due to information and communication technology (ICT) and other disruptive technologies such as artificial intelligence (AI), machine learning, gamification, internet of things etc. Technology is an enabler which helps achieve the vision of the person who is using it. ICT–enabled higher education is totally changing the way the teachers teach and the students learn. It can help students acquire 21st century skills like digital literacy, problem solving, analytical reasoning, innovative thinking, creativity, and effective communication which are essential modern skills required for enhancing the employability and becoming entrepreneurs.

The ICT-enabled teaching and learning can substantially improve both the theoretical and practical components of Chemistry teaching. It, however, requires manifold efforts on the part of the teachers. They need to learn the usage of digital tools besides embracing ICT empowered pedagogies like Flipped classroom along with Bloom's Taxonomy for assessment of students' potential in a more objective and transparent manner.

Firstly, Chemistry teachers ought to have a sound knowledge of the subject. Secondly, they must empower themselves in the use of the digital tools for documentation, multi-media enriched presentation, computation by spreadsheets, online lecture delivery, screen capture with touch pen writing, audio-visual recording and editing, to name a few. They should also know how to draw the chemical structures, help the students to visualise the molecules in 3D environment as well provide the students with the appropriate animation and simulations with a view to enabling the students to understand the complex concepts in the simplest manner. This can certainly make the chemistry learning a fun for student.

A Gen-next Chemistry Teacher must be able to not only provide the available Open Educational Resources but also create his/her own e-resources in the form of multimedia enriched e-content and Massive Open Online Courses (MOOCs) in four quadrant format. Good quality e-content can play an important role in the knowledge gained by the student/learner. The content selected by the teachers for the purpose of sharing it with students must meet the criteria of facilitating an in-depth understanding of the subject, encouraging thinking on the subject and promoting creativity.

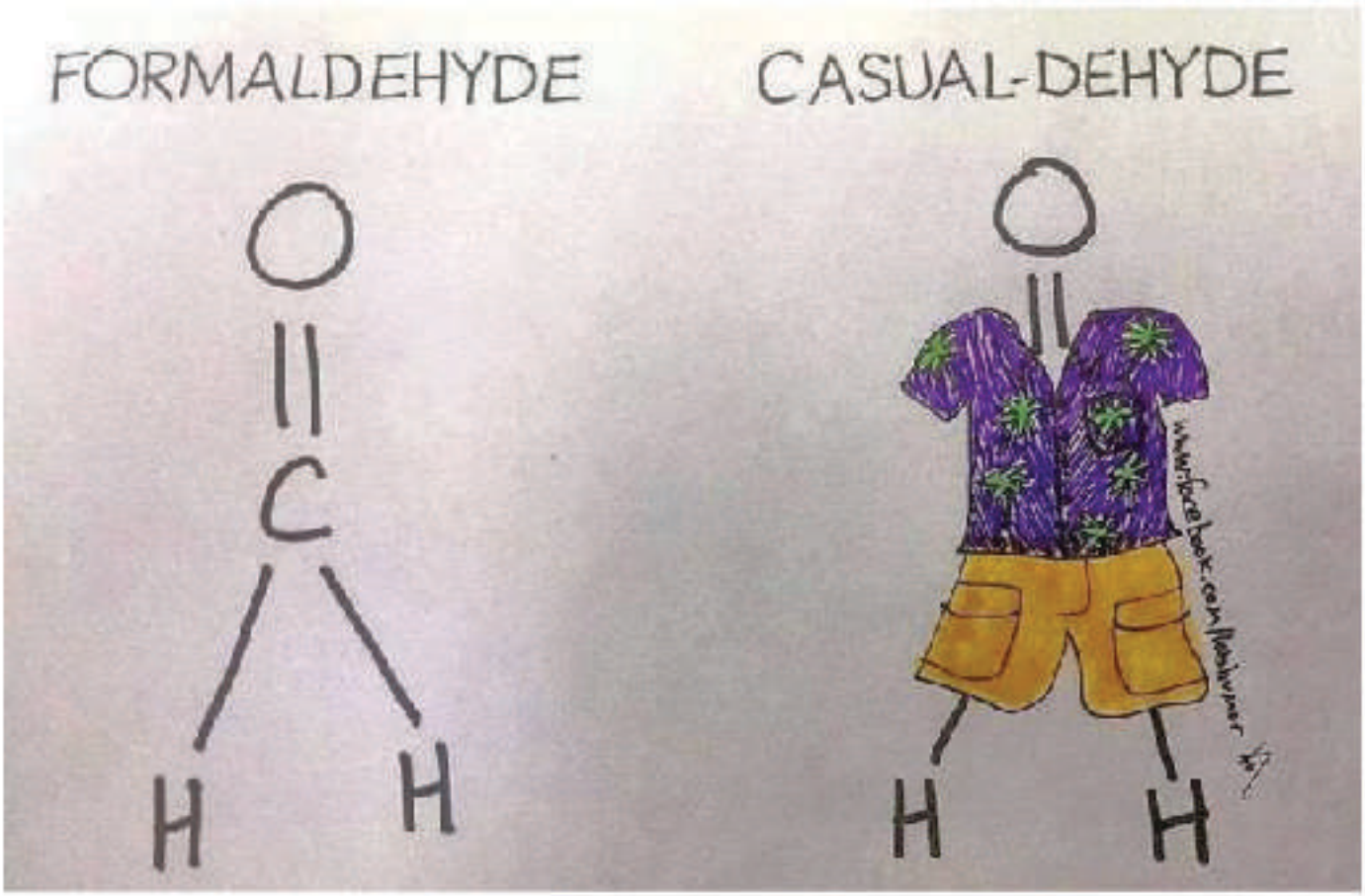
As envisioned in National Education Policy (NEP) -2020, the focus needs to be brought on "regular formative assessment" for learning rather than the summative assessment that promotes today's 'coaching culture' or rote-learning. To achieve this, efforts need to be done towards making digital question banks which can facilitate a teacher to make different type of online quizzes with randomised and
adaptive quizzes with automatic grading as well as manually graded assignments. Each question must be tagged as per the Taxonomy of Educational Objectives proposed by Bloom and modified by Anderson and Krathwohl. According to the Revised Bloom's Taxonomy learning is a six-level hierarchy starting from lower-order thinking skills (LOTS)
thinking skills (LOTS) to higher order thinking skills (HOTS): remember, understand, apply,analyze, evaluate and create. While creating a quiz or assignment, teachers must try to use all types of questions in the formative assessments.

Using ICT tools, new type of questions like interactive crosswords, audio and video based questions can be formed which have the potential of decreasing the rote learning attitude.

The new-age teachers must also know the usage
of Learning Management Systems than to the other atom.(LMS) to create
virtual class and provide the e-content as videos, ppts, notes, along with quizzes, assignments and discussion forums. The students can access this in anytime and anywhere mode. Best part of putting resources in a LMS is that the teacher can re-use all these
resources for next batch of students after improvising them rather than wasting their time again and again for years on the black-board. The analysis of learners can be done quickly and timely feedback can be provided.
Teachers should also know how to effectively use the analytical tools in the LMS to analyse the learning paths of their learners and provide them timely feedback and measures for correction.To
effectively implement Flipped classroom model, the video can be shared with the students on the LMS as home-work, teacher can see whether the student has watched the video or not, and in classroom, teacher can further discuss around the video and take the classroom in interactive mode through problem solving, group discussion, etc. This will help develop curiosity and inquisitiveness amongst learners which are the essentialities for the inculcation and promotion of scientific temperament.
While discussing in class, emphasis must be laid not only to the reactions or concepts directly, but also to application, interesting facts, environmental hazards and safety aspect. For example, the hydrogen gas, if filled in balloons as cheaper alternative to helium gas, causes severe accidents. This may be cited as an example to the students. Teachers need to ascertain it whether or not our chemistry students know how to test it while buying a balloon? While teaching them about polymers, they can be provided with cases of plastic pollution. Similarly, they may be asked if they can think of making some biodegradable polymer as a solution?
The Chemistry Practicals are an important and integral component of chemistry education which help developing analytical skills in addition to other life skills in students. ICT enabled teaching of
chemistry practicals as e-Labs and Virtual labs can provide students a virtual and multimedia enriched self-learning. E-Labs are video or animation-based experiments and can be beneficial for students to not only come better prepared before the experiment is to be conducted in laboratory, but also provide revision as many times without wasting harmful chemicals again and again. Virtual labs on the other hand, are simulation-based experiments made with gaming technology along with artificial intelligence (AI) & can provide a new dimension to teaching of labs where the students can do any permutation-combination and see the results, which may not be possible to carry out in real! Efforts need to be done to make these for higher education and provide them to teachers.

Chemistry, a fascinating field of study, is a central science with immense applications covering all aspects of our life. Chemistry teachers must develop the learners in a holistic manner by touching upon the missing and hidden areas in the curriculum around the "syllabi". This can be done by extending a few topics to cross the man-made chemistry boundaries through inter-disciplinary and multi-disciplinary approach. Examples can be quoted from history for being ethical and truthful while documenting an experiment's value or writing a paper and how they can lead to more innovations. For example, although Ninhydrin was first described in 1910 when when Siegfried Ruhemann mistakenly prepared the compound. Following this, many other scientists quoted the use of ninhydrin for testing amino acids and proteins on paper chromatograms along with warnings to avoid contact between bare skin and any surfaces to come into contact with the reagent. Despite these warnings, which clearly indicated the ability of ninhydrin to develop fingerprints, the reagent was not applied in a forensic context until 1954 which was smartly noticed by Odĭn and von Hofsten. This is so sensitive a test that it was documented for another interesting application in 2013 for surgical procedures for protein detection on surgical equipment!

All this is possible when we, as chemistry teachers stop utilising our time in classrooms for just sharing the information which can now be accessed by every student in a few seconds. Accessed by every student in a few seconds. By becoming tech savvy smart chemistry teacher, through Flipped classroom methodology let us co-learn with our learners, facilitate them so that they can solve problems of the society and are better prepared for job requirements while being a responsible Indian citizen.



Chemistry of
Deodorants and Antiperspirants

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Sweating or perspiring is an essential and natural biological process of a human body. The main function of sweat is to keep our body at a constant temperature of approximately 37°C by means of evaporative cooling. When an extra heat is produced by the body due to the happenings such as over-stimulation of nerve muscles for stress, fever, physical exercise or even for a hot and humid environment, sweating takes place. 2020 promises to be a watershed in Indian Education and has proposed several radical measures for reforming the Indian Education

There are two sweat glands that produce sweat in our body viz., eccrine gland and apocrine gland. When internal temperature rises, the eccrine glands secrete water to the skin surface, where heat is removed by the process of evaporation.

These glands are the most abundant and produce most of the sweat in the underarms, open directly onto the surface of the skin. On the other hand, apocrine sweat glands, which are usually associated with hair follicles, are triggered by emotional stress causing a fatty sweat secretion to the skin, where local bacteria break it down into odorous fatty acids. However, unlike the eccrine glands, apocrine sweat glands have a little or nothing to do with the temperature regulation of the body. The apocrine gland does not develop until puberty, and thus, young children are found with reduced body odor.

Sweat is odorless by its nature. The major components are water, sodium chloride, proteins, carbohydrates, and ferric and ammonium salts. There exist certain bacteria in our skin that can break down the chemical entities present in sweat causing an unpleasant odor. The bad smell is mainlay caused by trans-3-methyl-2-hexanoic acid. Our body consists of several million sweat glands that can produce liters of sweat in a hot environment and thus provides plenty of opportunity for odors to develop.

In early days of human civilization, people practiced the body odor control process by maintaining personal hygiene. Whether by the method of washing with soap and water or by dunking in a river, lake or a pond, people have been practicing body odor control from pre historic era. By the advent of perfumes, the ancient Egyptians like to take a scented bath followed by the application of scented oils (perfumed oils) onto the underarm to cover up bad smells. In 17th century, with the development of French Perfume Industry, the general use of fragrances as body odor control process has been initiated, a practice that continued well into the 19th century.

In the modern era, people are fortunate enough to have ways of preventing and covering up body odor, namely antiperspirants and deodorants. Although, both antiperspirants and deodorants are used to reduce body odor, their working principle is different from each other. While antiperspirants reduce sweat, deodorants increase the skin's acidity making it less attractive for bacteria. The Food and Drug Administration (FDA) Trusted Source considers deodorants to be a cosmetic product as it controls the skin bacteria population and mask body odor as it forms. On the other hand, antiperspirants are considred as the Over-The-Counter (OTC) drugs, because it prevents the biological process of sweat formation. The first modern commercial deodorant 'Mum', which kills odor-producing bacteria,

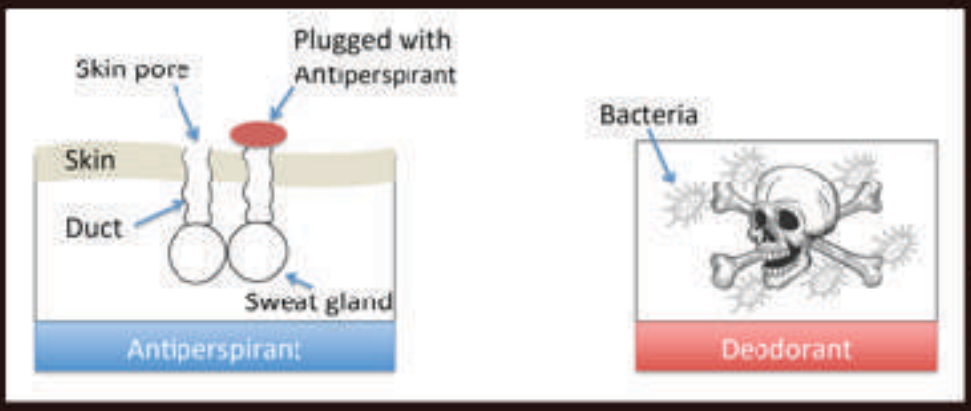
was developed and patented by Edna Murphey of Philadelphia in the year 1888 and the first antiperspirant 'Everdry', which prevents both sweat-production and bacterial growth, was introduced in the year 1903.

Deodorants

Deodorants are personal care products that are applied on the skin, most commonly on the underarms to minimize the odor caused by the bacterial breakdown of sweat. Deorants are commercially available in the form of Spray, Roll-on, Gel, Solid etc. They are typically some alcohol-based products and often contain pleasant-smelling fragrances to mask odor. Conventional deodorants are often made with antibacterial agents such as triclosan, chlorhexidines, alcohols etc. A variety of essential oils derived from orange, grapefruits, eucalyptus, rosemary, mint, geranium, lavender etc are added to the deodorant as the scenting agents. Other perfume components include phenethyl alcohol, geraniol, citronellol, menthol, and linalool. Emulsifiers or surfactants are often used to produce a homogeneous mixer with uniform consistency of the product. Typical examples of emulsifiers used in deodorants are stearic acid, cetyl alcohol, propylene glycol and glycerin. In order to maintain the pH of the deodorant, diethnaloamine, triethanolamine and boric acid is used as a pH adjuster and buffering agent. Alcohols play the role of solvents to carry the ingrediants and also possesses antibacterial property.

Antiperspirants

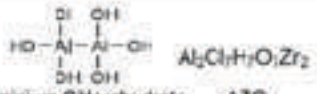
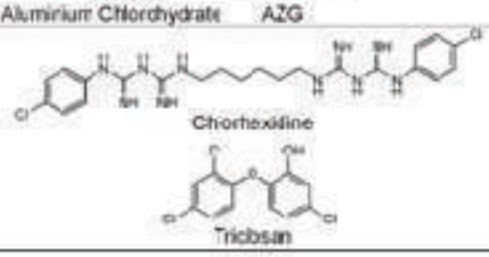
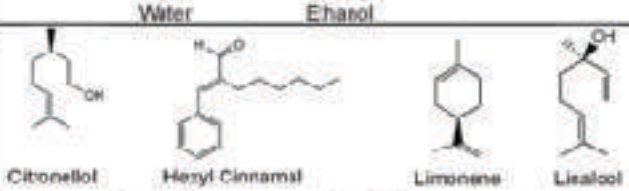
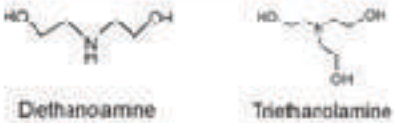
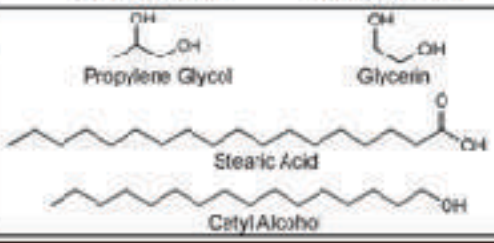
Antiperspirants are products whose primary function is to inhibit sweat or perspiration. As a result of this, less bacterial breakdown occurs, resulting in a decrease in the amount of odor produced. The active ingredients in antiperspirantsusually include aluminum-based compounds that temporarily block sweat pores. Blocking sweat pores reduces the amount of perspiration that reaches your skin. A few commonly used antiperspirant active ingredients are aluminum chloride, aluminum chlorohydrate complexes and aluminum zirconium complexes. The detail of the essentaial ingradients are tabulated below (Table 1).



Functioning of Antiperspirants and Deodorants

Thus, it is evident from the above discussion that deodorants and antiperspirants are two distinct types of products; one fight against the smell producing bacteria and the other reduces the formation of sweat in our body. Although they reduce body odor and become a part of our daily life, both these products have few disadvantages including ineffectiveness and side effects. Most of the deodorants contain

potentially harmful chemicals, such as aluminum, parabens and propylene glycol. According to the NCI (National Cancer Institute), these chemicals can cause estrogen-like behavior in the body and that an excess of this hormone may encourage the development of breast cancer. Further, the presence of alcohols (ethanol) may also cause the skin to become dry, tight and itchy and to have reduced elasticity on frequent use of these products. Nevertheless, with a proper knowledge of chemistry on body odor production and control, we can expect further improvements in the formulation of more efficient and safer deodorants and antiperspirants.

Active Ingredients	Examples
Al-based Compounds	 Aluminium Chlorohydrate AZG
As sweat blocking agents	
Antibacterial Agents	 Chorhexidine Triclosan
To kill the smell producing bacteria	
Solvents	 H_2O Water Ethanol
To carry the active ingrediants	
Fragrances	 Citronellol Hexyl Cinnamal Limonene Linalool
To cover up the unpleasant smells/odor	
Preservatives	 Sodium Benzoate Parabens
To extend the shelf life of the product	
Moisturizers	 Citric Acid Glycerin
For smooth and softening of skin	
pH Controller	 Diethanoamine Triethanolamine
To assure the correct pH value of the product	
Emulsifiers	 Propylene Glycol Glycerin Stearic Acid Cetyl Alcoho
To obtain homogenity and uniform consistency of the product	

Sources:

1.Scharnper, T. J. Chem. Edu. 1993, 70(3), 243.

2.Bora, S. J. and Sarmah P. Basic Analytical Chemistry, 1st Edn, 2020.

FAMOUS CHEMISTS

There have been many famous chemists throughout history who have made discoveries and breakthroughs that have changed the world. Here are just a few of them:

Robert Boyle (1627 - 1691) Robert Boyle is often considered the first modern chemist and one of the founders of chemical science. He also pioneered the scientific method. He developed Boyle's Law which states that, under a closed system with constant pressure, the pressure and volume of a gas are inversely proportional.

Joseph Priestley (1733–1804) As well as being a philosopher, political theorist and dissenting clergyman, Joseph Priestley was the first scientist to discover oxygen. In August 1774, Priestley isolated what he called an 'air' that appeared to be completely new. It wasn't until March 1975 that he wrote to several people about this new air, when he conducted new experiments into it.

Priestley shut mice in a tight-sealed container filled with the new air and found they could survive longer than with normal air. Although he didn't know it at the time, Priestley had discovered oxygen.

Antoine Lavoisier (1743 - 1794) Antoine Lavoisier was a French chemist who is sometimes referred to as the "father of modern chemistry". He developed the "law of conservation of mass" which states that for any closed system, the mass of the system must remain constant over time. He also proved that sulphur was an element and named the elements oxygen and hydrogen.

John Dalton (1766 - 1844) John Dalton was an English chemist who helped to develop the atomic theory about atoms and elements. In 1803 he presented the first list of atomic weights for a number of substances. Dalton is also known for his work researching color blindness.

Amedeo Avogadro (1776 - 1856) Amedeo Avogadro was an Italian scientist who came up with Avogadro's law which states that equal volumes of all gases contain the same number of molecules when under the same conditions of pressure and temperature. The Avogadro constant was named after him.

Sir Humphry Davy (1778 - 1829) Sir Humphry Davy is best known for using electrolysis to isolate and discover many elements. He is credited with isolating or discovering sodium, calcium, boron, barium, magnesium, iodine, chlorine, and potassium. He also invented a safety lamp for miners called the Davy lamp. Rosalind Franklin (1920 - 1958) Rosalind Franklin was an English chemist and physicist who contributed to the discovery of the DNA double helix. Her X-ray diffraction image of DNA played an important role in its discovery. She also performed important research into the polio and TMV viruses.

Jons Jacob Berzelius (1779 - 1848) Jons Jacob Berzelius was a Swedish chemist who is most famous for helping to develop the notation for writing chemical formulas. He also played a role in discovering and isolating many elements including silicon, thorium, cerium, and selenium. Many chemical terms are credited to Berzelius such as "allotrope" and "catalysis." He is called the father of Swedish chemistry.

Alfred Nobel (1833 - 1896) Alfred Nobel was a Swedish chemist and inventor who invented dynamite. He was a prolific inventor and held 350 patents. He is perhaps most famous for starting the Nobel Prize. The element nobelium is named after Alfred Noble.

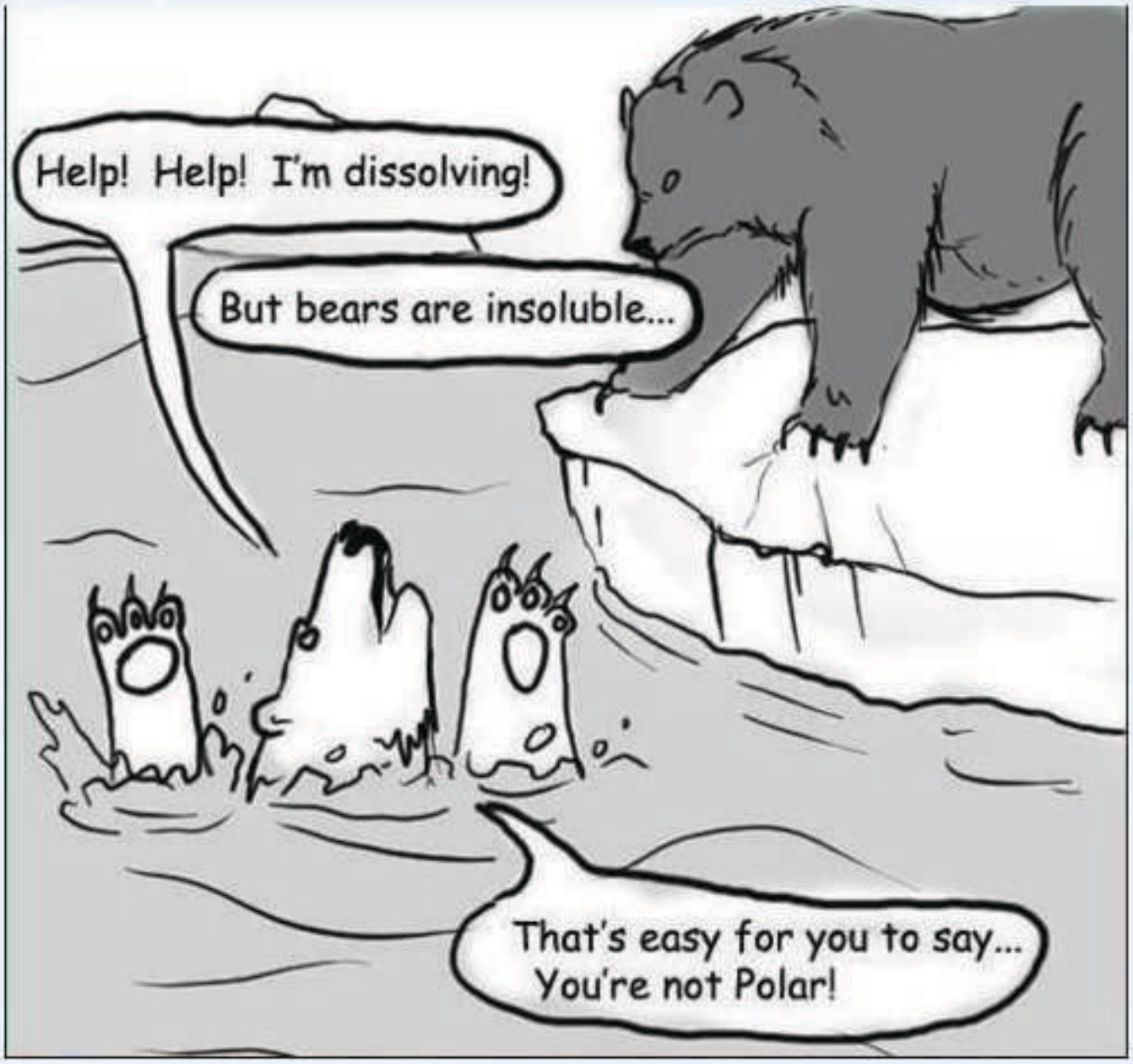
Dmitri Mendeleev (1834 - 1907) Dmitri Mendeleyev was a Russian chemist who came up with the first periodic table of the elements which he published in 1865. He was able to predict the discovery of many more elements using the table.

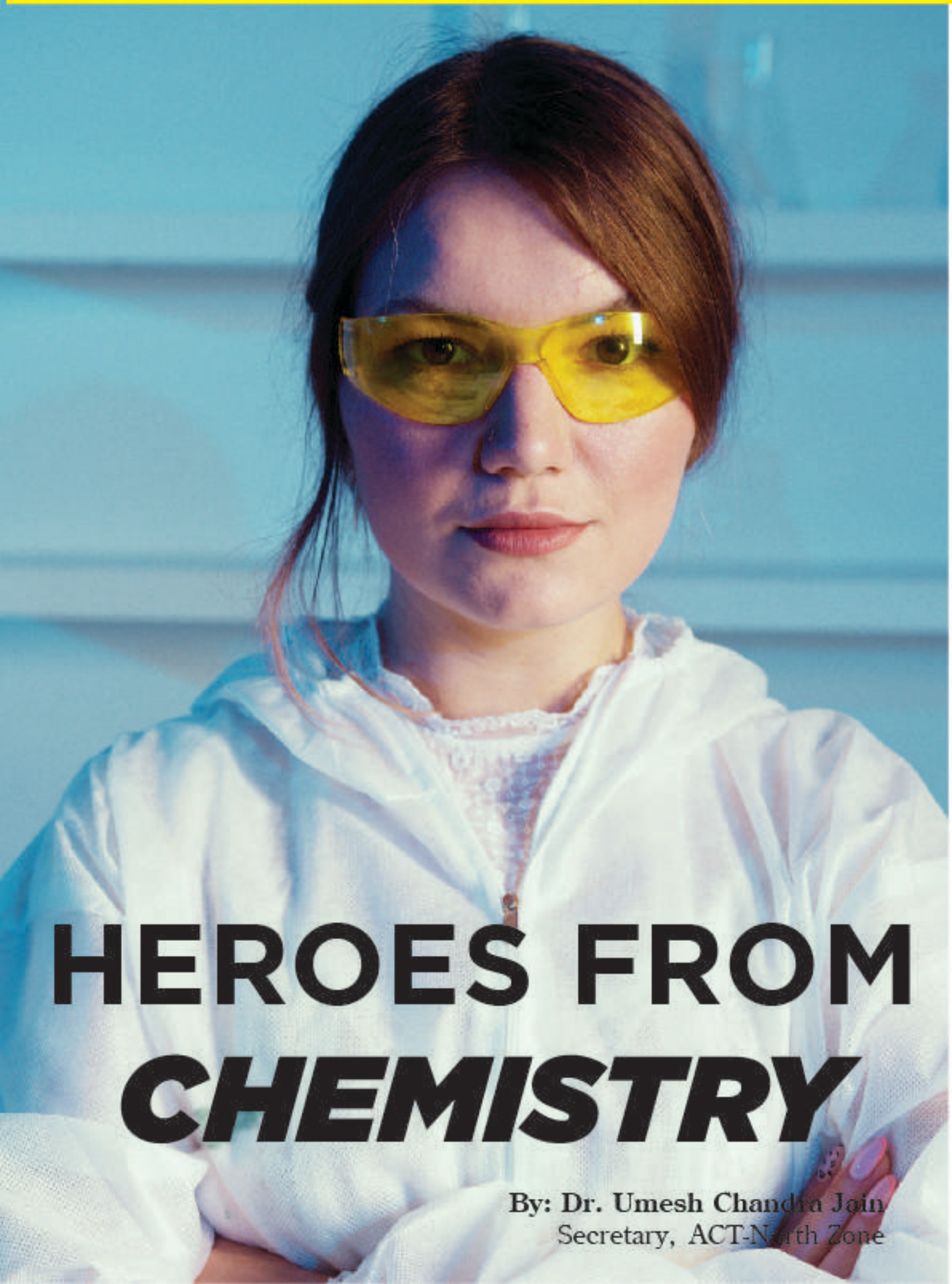
Marie Curie (1867-1934) Marie Cure was a Polish chemist who coined the term radioactivity. She also discovered the elements polonium and radium. She was the first woman to win the Nobel Prize and won the award twice, once for physics in 1903 and again for chemistry in 1911. The unit for measuring radioactivity, the Curie, is named after her and her husband Pierre. Go here to learn more about Marie Curie.

Niels Bohr (1885 – 1962) Founded quantum mechanics when he remodelled the atom so electrons occupied 'allowed' orbits around the nucleus while all other orbits were forbidden; architect of the Copenhagen interpretation of quantum mechanics.

Dorothy Hodgkin (1910–1994) Winning the Nobel Prize in Chemistry for her research in protein crystallography, Dorothy Hodgkin is widely considered a pioneer in her area of work. After gaining both undergraduate and PhD degrees from the University of Cambridge, she developed the technique of X-ray crystallography, which determines the 3D structures of molecules.

Hodgkin confirmed the structure of vitamin B12 and decoded the structure of penicillin, findings that are vital for work in the field of structural biology today.





HEROES FROM CHEMISTRY

By: Dr. Umesh Chandra Jain
Secretary, ACT-North Zone

Heroes come from amongst ourselves only. Given opportunity one performs extraordinarily and perseverance of the same raises him to the stature of a hero. Admitted, Chemistry can boast of only few such names. I know, being a chemistry teacher myself; I have to cut a very sorry figure in national and international fora Nonetheless chemistry has number of people who could lay claim to the evasive title of hero. They lay the foundation and are the real pillars of an endless achievement. But it is the people who oversee; steal the show. It is true in traditional or non-traditional fields; in most of engineering achievements, innovations and field of commercial development. I take modest pride in the fact that chemistry is at the root of improving the quality of human life.

There have been umpteen numbers of people whose inquisitive nature has brought out immense possibilities of innovative exploration. I am shocked that chemistry has no role models. One has only to be sensible to see and feel. All scientific, technological or even commercial advancement has become possible only because of chemistry. Who can forget John Dalton, a man whose contribution towards atomic theory and laws of multiple proportions stands undisputed. Quantum Mechanics, which is basic to the entire modern science; was invented by Werner Heisenberg. If that is not enough here are a few names that have made human kind proud. Who doesn't know James Chadwick, the man behind the discovery of neutrons And again Louis de Broglie for his contribution towards dual nature of particle. Alfred Nobel, the inventor of dynamite and also the institutor of Nobel Prize is s name widely regarded and revered throughout the world. If that is not enough here is one; Marie Curie who stands heads and shoulders above most heroes, A student of Henry Becquerel; Madam Curie is regarded almost as the discoverer of radioactivity. The list, to my feeling, is endless. There are number of people who contributed to the ideas, principles and knowledge of chemistry but for some reason or the other they remain unsung and unheard of. Heroes are still in the process of making. People contributing new ideas, people organizing quizzes, people conducting seminars and workshops or even people teaching chemistry are our heroes of tomorrow.

There may be impediments which are quite sizable. Lack of recognition at local level is one that breaks the heart of a genuinely dedicated contributor. Efforts of such people should be appreciated, partly as a reward and partly as an encouragement. Efforts must be made that bonafide and sincere worker does not fall to frustration and depression. The examination system also needs to be modified. The theory and the practical part must go hand in hand, where sincere assimilation should be brought forth. The undue pressure of obtaining good marks sits too heavily on the minds of most pursuers.

The coaching system in most countries is playing havoc with the original geni. It packs the minds of the student with a readymade formula to earn marks and not earn something on their own. It is not that I am a teacher of chemistry but because chemistry is the soul of not only science but of our day to day life. I can't think of a tingle of chemistry in it. Look for heroes look with retinol. Is it not chemistry?

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Some valuable words from legends....

The meeting of two personalities is like the contact of two chemical substances: if there is any reaction, both are transformed.

- Carl Jung, 1875-1961

Chemistry, unlike other sciences, sprang originally from delusions and superstitions, and was at its commencement exactly on a par with magic and astrology.

- Thomas Thomson, 1773-1852

We think there is color, we think there is sweet, we think there is bitter, but in reality there are atoms and a void.

- Democritus, C.460-C.370 BC

We must reason in natural philosophy not from what we hope, or even expect, but from what we perceive.

- Humphry Davy, 1778-1829

I feel sorry for people who don't understand anything about Chemistry. They are missing an important source of happiness!

- Linus Pauling, 1901-1994

Still I had a lurking question. Would it not be better if one could really 'see' whether molecules as complicated as the sterols, or strychnine were just as experiment suggested?

- Dorothy Hodgkin, 1910-1994

A fact acquires its true and full value only through the idea which is developed from it.

- Justus Von Liebig, 1803-1873

The country which is in advance of the rest of the world in chemistry will also be foremost in wealth and in general prosperity.

- William Ramsay, 1852-1916

Scientist believe in things, not in persons.
- Marie Curie, 1867-1934

Time is the best appraiser of scientific work, and I am aware that an industrial discovery rarely produces all its fruit in the hands of its first inventor.
- Louis Pasteur, 1822-1895

A tidy laboratory means a lazy chemist.
- Jons Jacob Berzilius, 1779-1848

The triumphs of engineering skill rest on a chemical foundation.
- Horace G. Deming, 1885-1970

Chemistry is necessarily an experimental science: its conclusions are drawn from data, and its principles supported by evidence from facts.

- Michael Faraday, 1791-1867

The energy produce by the breaking down of the atom is a very poor kind of thing. Anyone who expects. Anyone who expects a source of power from the transformation of these atoms is talking moonshine.

- Ernest Rutherford, 1871-1937

Group Photo of ACT Executive Council (2020-2022) taken at HBCSE, Mumbai from year 2020

PERIODIC TABLE OF CHEMICAL ELEMENTS

WITH DISCOVERER, YEAR & PLACE OF DISCOVERY

Dmitri Ivanovich Mendeleev (1834-1907)

Atomic Number	1
Symbol	H
Name of Element	HYDROGEN
Mass Number	[1.008]
Year of Discovery / Place of Discovery	1766 (ENGLAND)
Name of Discoverer	Henry Cavendish

Henry G.J. Moseley (1887-1915)

s-Block | d-Block | p-Block (Except Helium, He)

Period	1/IA	2/IIA	3/IIIB	4/IVB	5/VB	6/VIB	7/VIIB	8 (VIII)	9 (VIII)	10 (VIII)	11/IB	12/IIB	13/IIIA	14/IVA	15/VA	16/VIA	17/VIIA	18/ZERO
1	1 H HYDROGEN																	2 He HELIUM
2	3 Li LITHIUM	4 Be BERYLLIUM											5 B BORON	6 C CARBON	7 N NITROGEN	8 O OXYGEN	9 F FLUORINE	10 Ne NEON
3	11 Na SODIUM	12 Mg MAGNESIUM											13 Al ALUMINIUM	14 Si SILICON	15 P PHOSPHORUS	16 S SULFUR	17 Cl CHLORINE	18 Ar ARGON
4	19 K POTASSIUM	20 Ca CALCIUM	21 Sc SCANDIUM	22 Ti TITANIUM	23 V VANADIUM	24 Cr CHROMIUM	25 Mn MANGANESE	26 Fe IRON	27 Co COBALT	28 Ni NICKEL	29 Cu COPPER	30 Zn ZINC	31 Ga GALLIUM	32 Ge GERMANIUM	33 As ARSENIC	34 Se SELENIUM	35 Br BROMINE	36 Kr KRYPTON
5	37 Rb RUBIDIUM	38 Sr STRONTIUM	39 Y YTTRIUM	40 Zr ZIRCONIUM	41 Nb NIOBIUM	42 Mo MOLYBDENUM	43 Tc TECHNETIUM	44 Ru RUTHENIUM	45 Rh RHODIUM	46 Pd PALLADIUM	47 Ag SILVER	48 Cd CADMIUM	49 In INDIUM	50 Sn TIN	51 Sb ANTIMONY	52 Te TELLURIUM	53 I IODINE	54 Xe XENON
6	55 Cs CESIUM	56 Ba BARIUM	57-71 La-Lu LANTHANIDES	72 Hf HAFNIUM	73 Ta TANTALUM	74 W TUNGSTEN	75 Re RHENIUM	76 Os OSMIUM	77 Ir IRIDIUM	78 Pt PLATINUM	79 Au GOLD	80 Hg MERCURY	81 Tl THALLIUM	82 Pb LEAD	83 Bi BISMUTH	84 Po POLONIUM	85 At ASTATINE	86 Rn RADON
7	87 Fr FRANCIUM	88 Ra RADIUM	89-103 Ac-Lr ACTINIDES	104 Rf RUTHERFORDIUM	105 Db DUBNIUM	106 Sg SEABORGIUM	107 Bh BOHRIUM	108 Hs HASSIUM	109 Mt MEITNERIUM	110 Ds DARMSTADTIUM	111 Rg ROENTGENIUM	112 Cn COPERNICIUM	113 Nh NIHONIUM	114 Fl FLEROVIUM	115 Mc MOSCOVIUM	116 Lv LIVERMORIUM	117 Ts TENNESSINE	118 Og OGANESSON

f-Block (Inner Transition Elements)

Lanthanides	57 La LANTHANUM	58 Ce CERIUM	59 Pr PRASEODYMIUM	60 Nd NEODYMIUM	61 Pm PROMETHIUM	62 Sm SAMARIUM	63 Eu EUROPIUM	64 Gd GADOLINIUM	65 Tb TERBIUM	66 Dy DYSPROSIUM	67 Ho HOLMIUM	68 Er ERBIUM	69 Tm THULIUM	70 Yb YTTERBIUM	71 Lu LUTETIUM
Actinides	89 Ac ACTINIUM	90 Th THORIUM	91 Pa PROTACTINIUM	92 U URANIUM	93 Np NEPTUNIUM	94 Pu PLUTONIUM	95 Am AMERICIUM	96 Cm CURIUM	97 Bk BERKELIUM	98 Cf CALIFORNIUM	99 Es EINSTEINIUM	100 Fm FERMIUM	101 Md MENDELEVIUM	102 No NOBELIUM	103 Lr LAWRENCIUM

By:- Dr Subhash Prasad Singh, A N College, Patna

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