CHRYSL

Vol XV - 2019

Post Graduate & Research Department of Chemistry
Auxilium College (Autonomous)
(Accredited by NAAC with A+ Grade with a CGPA of 3.55 out of 4 in the 3rd cycle)
Vellore-632006.

UG Quiz Competition on 29th August 2018

PG Quiz Competition on 19th September 2018

PG Paper Presentation on 29th January 2019

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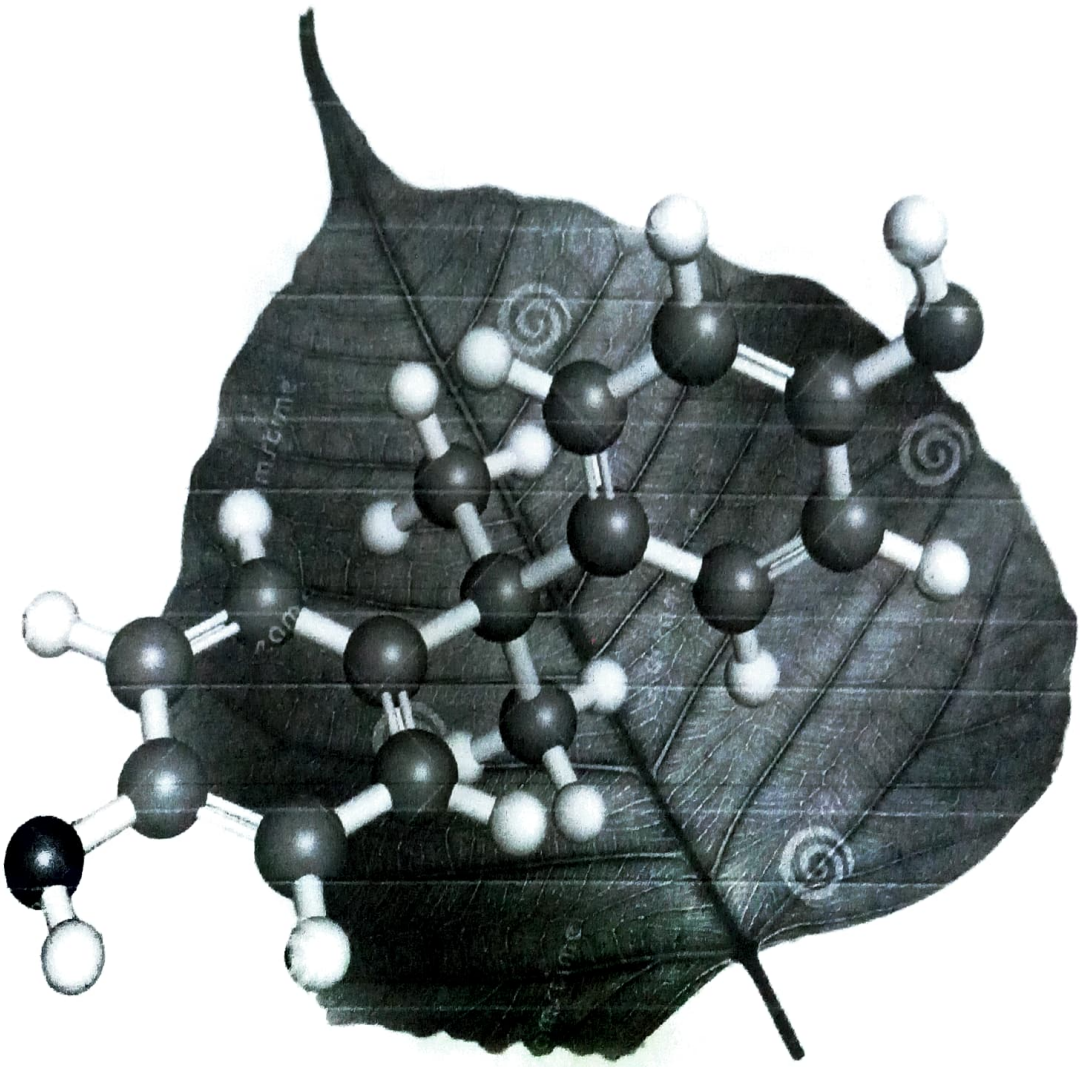

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From the HOD' s Desk

Dear Reader, It gives me immense joy in bringing out the 15th edition of the annual periodical, CHRYSL, "Chemistry Resonating in Young Students Lives" this academic year. This was born as a brainchild of the Faculty of the Department in 2005 to bring out the writing talents of the Chemistry students and also help readers to be educated about interesting aspects of Chemistry in one good reading with a collection of articles related to new discoveries, quiz, riddles, paintings, health, environment, recent trends in Chemistry etc.

Today in a technological driven era, writing and reading habits are slowly fading away. The faster we assimilate, the faster we forget and move on to exposure to the next novel things. There is knowledge explosion and everything is available at one press in the internet. What to read? What to watch? What to learn? What to remember? What to follow? Are all things available in the internet true and authentic? Where is the time? Is it necessary to get knowledge about too many things? These are all million dollar questions to be answered in the current scenario.

As we say "East or West, home is the best", though there are websites, soft wares, search engines etc, a book at hand always gives pleasant reading and helps one to treasure the information and knowledge it provides. Hence I consider the release of this periodical very significant as a student can gain immense information at one reading and treasure an edition for life time to feel proud of her creativity and contribution.

I wish all the readers an educative journey as they scroll through the pages. I congratulate the students who have contributed articles. May God bless all their efforts.

Dr. S. Jhancy Mary
Asso.Prof. of Chemistry & Head
Department of Chemistry
Auxilium College, Vellore -6

Editorial

Welcome to the Volume XV of CHRYSL, the annual periodical of the Department of Chemistry. We feel proud and exuberant with new hopes and expectations in releasing this issue which surely would unfold the interest of the students in relishing the different aspects of Chemistry.

The magazine is to be viewed as a launch pad for the students' creative urge. As the saying goes, **'Mind like parachute works best when opened'.** This initiative is to set the budding minds free, allowing them to explore the realm of imagination and experience..

Chemistry is encircled with truths and facts which had given a prominent position amidst other sciences that rule the world. ***I believe that the science of chemistry alone almost proves the existence of an intelligent creator*** **- Thomas Alva Edison.** We are sure that the positive attitude, hard work, sustained efforts and innovative ideas exhibited by our young students will surely stir the minds of the readers and take them to the world of joy. The reflection of the student's creativity and achievements is the epitome of the edition. I take the opportunity to thank all the contributors.

We express our sincere gratitude to our dynamic Principal Dr. (Sr.) Regina Mary for her constant support and guidance. We are thankful to all the students who dipped their oars into the turbulent ocean of Chemistry and have sailed it to the shore of publication.

Dr. R. Sangeetha Rani,
Asst.Prof. of Chemistry

Contents

1. Applications of Ultrasound in Assessing the Strength of Molecular Non-covalent Interactions in Liquid Mixtures

Dr. Venu Kannappan, Professor (Retired)
PG & Research Department of Chemistry, Presidency College, Chennai-600 005

RUSAC-Madame Marie Curie Endowment Lecture-I

Ultrasound is a form of energy just like electromagnetic radiation. The human ear cannot detect sound above 20kHz, which is the ultrasonic range (1MHz-20MHz). Many animals, such as bats and dolphins, use ultrasonic frequencies for communication and echolocation, as very high-frequency sounds have a short wavelength and can be used to develop a high-resolution picture of the surrounding world. There are number of fields in which velocity measurement is applied to assess the intermolecular interactions in binary and ternary liquid mixtures (Fig.1).

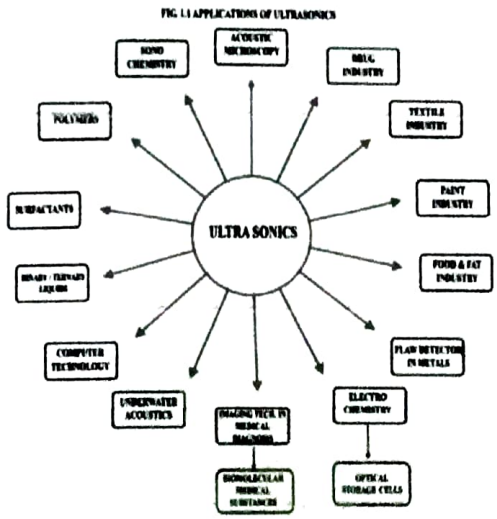


Fig.1: Applications of ultrasonic velocity measurements

This paper deals with two applications of ultrasonic waves in different fields. The first application is determination of isoelectric point of amino acids. Amino acids are building blocks of proteins and they exhibit both acidic and basic properties. Investigations on acoustic and thermodynamic properties of amino acids and peptides in aqueous and mixed aqueous solvents have been the area of interest of researchers. Isoelectric point is an important property which characterizes an amino acid and it can be used to separate amino acids in a mixture. There are several methods to determine the isoelectric pH of amino acids and ultrasound technique is a simple and non-destructive tool. Ultrasonic velocity is the highest at the isoelectric point of an amino acid. On the other hand apparent molal compressibility is very low at pI value of the amino acid. The values obtained by ultrasonic method agree well with those obtained by conductance method (Table 1).

Table-1: pI values of alpha-amino acids from different methods

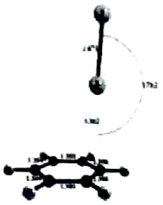
A-Amino acid	Ultrasonic method	Conductivity method	Literature value
Aspartic acid	2.9	2.9	3.0
Glutamic acid	3.1	3.1	3.1
Asparagine	5.4	5.4	5.4
Phenylalanine	5.7	5.7	5.9
Threonine	5.6	5.6	5.6
Glycine	6.0	6.0	6.1
Alanine	6.0	6.0	6.1
Valine	5.9	5.9	6.0
Isoleucine	6.0	6.0	6.0
Proline	6.3	6.3	6.3
Histidine	7.6	7.6	7.6

The second application is in the determination of charge transfer (CT) complexes. The significance of CT complexes in various fields including biochemical reactions has been reported in the literature. The formation of 1:1 complexes in binary and ternary liquid mixtures was observed and reported. Recently, we used ultrasonic method to identify CT complexes in different media and their stability constants and thermodynamic parameters were determined for some CT complexes formed between benzene derivatives (donors) and iodine (acceptor). Two methods have been used to determine stability complexes of CT complexes by ultrasonic method. They are Marwein-Bhatt and Yoshida-Osawa methods. The main drawback of these methods is 'K' values obtained by these methods are concentration dependent and they are used in binary systems containing donor and acceptor. Recently, we deduced an equation to determine 'K' values of CT and H-bonded complexes from the measured ultrasonic velocity at different concentrations in ternary systems. This equation has been applied to several systems to determine 'K' values as well as thermodynamic properties of these complexes. Table 2 contains 'K' values of certain CT complexes of iodine and aromatic hydrocarbons and they are compared with those values obtained by UV-visible spectral method.

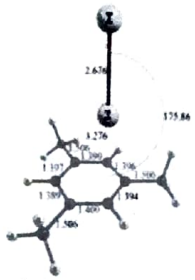
Table 2: Stability constant (K), free energy of formation (ΔG), relaxation time (τ), wavelength of maximum absorption (λ_{max}) and molar extinction coefficient (ε) for charge transfer complexes of alkylbenzenes with iodine in n-hexane medium determined by ultrasonic and spectrometric techniques at 303 K.(Acceptor: Iodine)

Donor	Ultrasonic Technique			UV Spectrometric Technique			Molar Absorptivity
	K/mol^{-1}	ΔG/kJ mol^{-1}	τ / fs	K/mol^{-1}	ΔG/kJ mol^{-1}	λ_{max}/ nm	ε/10^4, mol^{-1} dm^2
Benzene	21.2	-7.694	5.084	10.3	-5.875	260	0.1096
Toluene	27.7	-8.367	6.296	29.1	-8.493	285	0.1600
o-Xylene	48.9	-9.799	5.445	48.3	-9.768	288	0.2808
m-Xylene	66.4	-10.753	5.068	68.5	-10.648	288	0.2953
Mesitylene	70.7	-10.730	5.023	70.4	-10.720	294	0.3344

It can be seen from the data in Table 2 that the trend in 'K' values obtained in ultrasonic method is the same as that obtained by spectral method. Further, presence of methyl substituent in benzene enhances 'K' value. This is because methyl group is electron donating group. It is because of the same reason o-xylene, m-xylene and mesitylene form more stable complexes with I_2 in n-hexane than benzene. Further, 'K' value for o-xylene-iodine complex is less than that of m-xylene-iodine complex. This may be due to steric effect of adjacent methyl groups in o-xylene. DFT analysis of these complexes has been done and the optimized structures of two typical complexes are given in Figure 2.:



Benzene-I2 complex
Interaction energy:-17.00 kJ mol-^{1}



Mesitylene-I2 complex
-24.9 kJ mol-^{1}

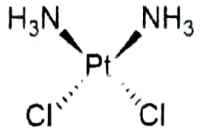
Fig.2: Optimized geometries of iodine-benzene and iodine-mesitylene complexes along with stabilization energies and notable structural parameters (Bond lengths are in Å & bond angles are in degrees).

It can be seen the interaction energy of benzene-I_2 complex is less negative than that of mesitylene I_2 complex indicating that the latter complex is more stable than the former. Due to stronger molecular interaction in mesitylene- I_2 system, iodine is closer to benzene plane in this system. These theoretical observations support our experimental results.

2. PLATINUM THERAPY

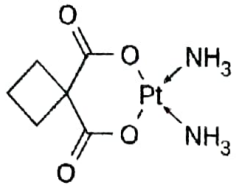
Platinum therapy is the use of platinum compounds which are cell damaging agents, for the treatment of specific cancers, including testicular, ovarian, lung, bladder, head and neck cancers. Platinum compounds produce changes in DNA structure, which causes cancer cell death (apoptosis). Platinum compounds currently used are cisplatin, carboplatin and oxaliplatin, either used alone or in combination with other chemotherapeutic drugs. Side effects of platinum therapy include general cell-damaging effects, such as nausea and vomiting, decreased blood cell, platelet production in the bone marrow (myelo suppression), and decreased response to infection (immune suppression), specific side effects including kidney damage (nephrotoxicity) and nerve damage (neurotoxicity).

CISPLATIN: It is currently used to treat testicular, ovarian, lung, bladder, head, and neck cancer. Cisplatin is extremely nephrotoxic (damages kidneys) and requires increased water intake and excretion before, during and after therapy. This is the major factor affecting dose, and kidney function must be carefully monitored.

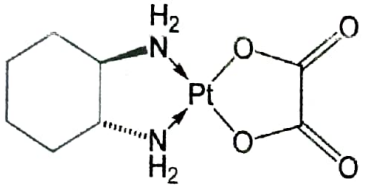


Cisplatin

CARBOPLATIN: Carboplatin, a derivative of cisplatin, is mostly used in the treatment of advanced ovarian cancer. It can also be used in the place of cisplatin to treat small cell lung cancer. It can also be used in the treatment of bladder, cervical, endometrial, head and neck carcinomas. The main drawback of carboplatin is its myelosuppressive effect. This causes the blood cell and platelet output of bone marrow in the body to decrease dramatically, sometimes as low as 10% of its usual production levels.



OXALIPLATIN: It is used with other drugs in stage (III) (duke's criteria) colon cancer after the removal of the primary cancer, and in the treatment of advanced colorectal cancer. Adverse effect of oxaliplatin includes pulmonary fibrosis.



Swetha K.
III B.Sc. Chemistry

3. NOBLE PRIZE WINNERS IN CHEMISTRY (2000 - 2018)

YEAR	NAME	COUNTRY	ACHIEVEMENT
2000	Alan J. Heeger	United States	For discovery and development of conductive polymers.
	Alan G. Macdiarmid	United States	
	Hideki Shirakawa	Japan	
2001	William S. Knowles	United States	Work on chirally catalyzed hydrogenation reactions.
	Ryoji Noyori	Japan	
	K. Barry Sharpless	United States	Work on chirally catalyzed oxidation reactions.
2002	John B. Fenn	United States	For development of soft desorption ionisation methods for mass spectrometric analysis of biological macromolecules.
	Koichi Tanaka	Japan	
	Kurt Wuthrich	Switzerland	For the development of nuclear magnetic resonance spectroscopy for determining three dimensional structure of biological macromolecules in solution.
2003	Peter Agre	United States	For the discovery of water channels.
	Roderick Mackinnon	United States	For structural and mechanistic studies of ion channels.
2004	Aaron Ciechanover	Israel	For the discovery of ubiquitin mediated protein degradation.
	Avram Hershko	Israel	
	Irwin Rose	United States	
2005	Yves Chauvin	France	For the development of the metathesis method in organic synthesis.
	Robert H. Grubbs	United States	
	Richard R. Schrock	United States	
2006	Roger D. Kornberg	United States	For studies of the molecular basis of eukaryotic transcription.
2007	Gerhard Ertl	Germany	For studies of chemical processes on solid surfaces.
2008	Osamu Shimomura	Japan	For the discovery and development of the green fluorescent protein.
	Martin Chalfie	United States	
	Roger Y. Tsien	United States	
2009	Venkataraman Ramakrishnan	United States	For the studies of the structure and function of the ribosome.
	Thomas A. Steitz	United States	
	Ada E. Yonath	Israel	
2010	Richard F. Heck	United States	For palladium catalyzed cross couplings in organic synthesis.
	Ei-ichi Negishi	Japan	
	Akira Suzuki	Japan	
2011	Dan Shechtman	Israel	For the discovery of quasi crystals.
2012	Robert Lefkowitz	United States	For the studies of G-protein couples receptors.
	Brian Kobilka	United States	

2013	Martin Karplus	United States	For the development of multiscale models for complex chemical systems.
	Michael Levitt	United Kingdom	
	Arieh Warshel	United States	
2014	Eric Betzig	United States	For the development of super-resolved fluorescence microscopy.
	Stefan W.Hell	Germany	
	William E. Moerner	United States	
2015	Tomas Lindahl	Sweden	For mechanics studies of DNA repair.
	Paul L. Modrich	United States	
	Aziz Sancar	United States	
2016	Jean Pierre Sauvage	France	For the design and synthesis of molecular machines.
	Fraser Stoddart	United Kingdom	
	Ben Feringa	Netherland	
2017	Jacques Dubochet	Switzerland	For developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution.
	Joachim Frank	Germany	
	Richard Henderson	United Kingdom	
2018	Frances Arnold	United States	For the directed evolution of enzymes.
	George Smith	United States	For the phase display of peptides and antibodies.
	Gregory Winter	United Kingdom	

Sneha S. &
Rithani A.L.
I B.Sc. Chemistry

4. STARCH BAGS (REGENO BAGS)

The most common polluters in this world are single use plastic bags. This year the New Year resolution was to ban plastics. On June 5th 2018, the Tamilnadu Government made an announcement towards making the state, plastic free under the provisions of Environment Protection Act, 1986. No industry or person shall manufacture, store, supply, transport, sell or distribute use and throw away plastic. The government has exempted polythene sachets used for packing milk, curd, oil and medical equipment. The use of plastics causes short term and long term environmental damage besides impacting the health. 80% of total plastic consumption is discarded as waste in India. The country generates 25, 940 tonnes of plastic waste daily.

Starch bags or Regeno bags can sustainably and effectively replace single use plastic carry bags. Regeno bio bags are 100% plastic free and are made entirely from vegetable starch, wastes of maize and other natural extracts. They are completely biodegradable in soil within 3-4 months leaving no toxic residues. These bags are harmless to plants, animals, soil and the entire environment. They do not affect the fertility of the soil. These bags look like plastic bags and can replace them in almost all applications, but do not contain any conventional plastic. The main advantages of these bio bags are as follows:

* They are recyclable with paper.
* They act as an oxygen barrier.
* They have natural antistatic properties.
* They are oil resistant.
* They contain no polyolefin plastic.
* They are safe if accidentally consumed by animals.
* They are dissolvable in high temperature above 80°C.They burn like paper and turn into ash unlike plastic.
* These bags have long shelf life and can be used for many years when stored properly, but they are biodegradable when exposed to soil.
* They have equivalent capacity to that of plastic bags i.e. they can withstand weight similar to that of plastic bags.
* They can replace plastics in multiple places like shopping bags; carry bags, garment bags, laundry bags, garbage bags, wrapping covers, pet waste bags and so on. They are eco friendly, biodegradable, compostable and recyclable.

"Regeno bags are not only what this planet needs, it's what this planet deserves".

Samyuktha A.D
III B.Sc. Chemistry

5. BENEFITS OF NANO-MACHINES BEING INJECTED INTO THE BODY

Nanotechnology has enormous potential to transform the field of medicine. By creating nano scale machines small enough to transverse inside the blood stream, disease and traumatic injuries can be diagnosed and treated with increased speed and sensitivity.

An important advantage of nanotechnology is the ability to inject large amounts of nano machines within a few milliliters of solution. The utilization of nano machines through injection into the body has been proposed for improving post-accident life saving interventions as well as new methods of infection treatment.

The Benefits of Injecting Nano machines during Post-Accident Life Saving

Nanotechnology has the potential to extend the deadline during post-accident life saving intervention. Nano machines could be injected into the body when a patient stops breathing and blood circulation ceases, providing extra time for stabilization. Respirocytes are hypothetical nano machines, in the form of artificial red blood cells, which would be utilized for transporting respiratory gases around the body. A respirocyte structure based on nano scale diamondoid pressure tanks, with an operational maximum of 1000 atmospheres of pressure, would be able to supply 200 times more respiratory gas molecules than natural red blood cells of the same volume. This makes respirocytes

particularly suitable for use during emergency trauma treatment because a single injection of a five mm dose of 50% respirocyte saline suspension would supply five trillion nano robots to the blood stream. This single dose would equal the gas-carrying capacity for all the blood in the human body.

Benefits of Nano machine Injection for the Treatment of Infection

The hypothetical nano machine is expected to require only 200 picowatts of power to trap and digest microorganisms in the blood stream at a rate of two microns of organic material per 30 seconds of power output. This would provide infection treatment that is around 1000 times faster than both natural phagocyte function and antibiotic-assisted phagocytic treatments. Microbivores may also produce treatment efficiency that is 80 times greater than macrophages, specialist immune system cells that fight infection in the body.

Aswini L.
I M.Sc. Chemistry

6. PLASTIC MADE FROM SUGAR AND CO_2

(Paper presented in the PG paper presentation programme at Auxilium College on 29th Jan 2019 and won the I Prize)

Scientists from the Centre of Sustainable Chemical Technologies (CSCT) at the University of Bath have successfully created a plastic that does not use harmful chemicals, and is biodegradable. It is made from nothing more than sugar and carbon dioxide. CO_2 is added to a naturally occurring sugar called thymidine at low pressures and at room temperature. The process creates a polycarbonate - a tough type of plastic used to make bottles, lenses for glasses and in scratch- resistant coatings for phones, CDs and, DVDs. Polycarbonates are typically made from petrochemicals, and these oil-derived plastics do not biodegrade, adding to our mountains of plastic waste.

Unlike petroleum-based polycarbonates, the plastics created by the team at the University of Bath can break down naturally. It's doesn't depend on high temperature to degrade unlike other biodegradable plastic. Instead, it can be degraded back into sugar and CO_2 using the enzymes found in soil bacteria. This process uses carbon dioxide instead of the highly toxic chemical phosgene, and produces a plastic that is free from BPA. Phosgene was used as a chemical weapon in World War I, responsible for 85% of the deaths caused by gas attacks.

Many polycarbonates contain bisphenol-A (BPA) which used in bottles and containers can leach into food and drink. This plastic is not only safer, but the manufacturing process is cleaner too. The US centers for Disease Control and Prevention found that 93% of people it tested had detectable levels of BPA in the urine. It has been linked to reproductive problems, diabetes and autism, and is banned in the manufacture of baby bottles. Thymidine is one of the units that make up DNA, it is already present in the body, it means this plastic will be bio-compatible and can be used safely for tissue engineering applications.

Lathapriya R.V.
I M.Sc. Chemistry.

7. CHEMISTRY QUIZ

1. Urea was prepared first time in the laboratory by heating

   Ans: Ammonium cyanate

2. More volatile hydride is

   Ans: PH_3

3. NH_4Cl on heating with NaOH liberates

   Ans: NH_3

4. PCl_5 exists but NCl_5 does not. This is because

   Ans: Absence of d orbitals in the valence shell of Nitrogen

5. Sulphur uses ..... orbitals for bonding in H_2S

   Ans: Pure p orbitals

6. SO_2 bleaches by

   Ans: Reduction

7. The formation of O_3 from O_2 is

   Ans: Endothermic & irreversible

8. The acid used in lead storage battery is

   Ans: HNO_3

9. F_2 combines with all non-metals directly except

   Ans: N_2

10. Helium is used in gas balloons instead of hydrogen because

    Ans: It is non-combustible

11. The noble gas used in atomic reactors

    Ans: Helium

12. Alloys used in making anchors, bolts, chains & wires

    Ans: Wrought iron

13. R-CN $\xrightarrow{SnCl_2+HCl}$ R-CHO. What is name of the above reaction?

    Ans: Stephen's reaction

14. Lower carboxylic acids are soluble in water due to

    Ans: Hydrogen bonding

15. H_2S is gas but H_2O is liquid because

    Ans: Absence of molecular association in H_2S

Srimathi M.
I B.Sc. Chemistry

8. CONVERSION OF CO_2 INTO FUEL

Scientists at a company part-owned by Bill Gates have found a way to convert CO_2 into gasoline, a cheaper way to extract carbon dioxide from the atmosphere and turn it into gasoline or other fuels, which could arm humanity with a new tool in the fight against climate change. "Carbon Engineering's DAC Scientists discovered a new technique that pulls carbon dioxide out of the atmosphere, and converts it into liquid gasoline, diesel or jet fuel. A similar process could be used to trap greenhouse gases, reducing the amount of heat-trapping substances in the atmosphere.

Canadian clean energy company Carbon Engineering, in partnership with researchers from Harvard, used little more than limestone, hydrogen and air for the process, which can remove one metric ton of CO_2 for as little as $94, the scientists say. It cleans up the environment, and produces eco-friendly liquid fuel at the same time.

A team of scientists claims to have discovered system which integrates two main cycles. The first cycle is the absorption of CO_2 from the atmosphere in a device called an "air contactor" using an alkaline hydroxide solution. The second cycle regenerates the capture liquid used in the air contactor, and delivers pure CO_2 as an end product. These cycles operate in tandem continuously, producing a concentrated stream of CO_2 gas as an output, and requiring only energy, water, and small material make up streams as inputs. Energy is used in such a way that no new CO_2 emissions are incurred, and so do not counteract what was captured from the air. The captured atmospheric CO_2 can be stored underground, used for enhanced oil recovery, or turned into low-carbon synthetic fuel.

The technique has been removing CO_2 from the atmosphere since 2015 from a small pilot plant in Squamish, British Columbia. Efforts are put in to building an industrial-scale version of the plant. Carbon Engineering is owned by several private investors, including Bill Gates. Instead of considering CO_2 as a hazardous gas occupying the whole world, let us make it useful, by recycling it. Recycling takes a little effort on your part, but makes a big difference to the whole world...

Sandhiya C.M.
I M.Sc. Chemistry

9. CHEMISTRY IN OUR DAILY LIFE!!!!

Chemistry is indeed in our everyday life. You yourself are a big bag of chemicals! What is astonishing is the amount of applications we make of the tough formulae from our chemistry classes in everyday life. You find chemistry in daily life in the food you eat, the air you breathe, cleaning chemicals, your emotions and literally every object you can see or touch. Some facts may be obvious but some others might surprise you. Let's find out the Chemistry in our everyday life:

* **Your body** - Your body is mostly water which is hydrogen and oxygen. Almost 99% of the mass of the human body is made up of six elements: oxygen, carbon, hydrogen, nitrogen, calcium, and phosphorus. Only about 0.85% is composed of another five elements: potassium, sulphur, sodium, chlorine, and magnesium. All are necessary to life.

* **Your emotions** - The emotions that you feel are a result of chemical messengers, primarily neurotransmitters. Love, jealousy, envy, infatuation and infidelity all share a basis in chemistry. The sweaty palms and pounding heart of infatuation are caused by higher than normal levels of norepinepherine. Meanwhile, the 'high' of being in love is due to a rush of phenylethylamine and dopamine.

* **Soaps and detergents** - Soaps are sodium or potassium fatty acids salts, produced from the hydrolysis of fats in a chemical reaction called saponification. Each soap molecule has a long hydrocarbon chain, sometimes called its 'tail', with a carboxylate 'head'. In water, the sodium or potassium ions float free, leaving a negatively-charged head. Soap is an excellent cleanser because of its ability to act as an emulsifying agent. An emulsifier is capable of dispersing one liquid into another immiscible liquid. This means that while oil (which attracts dirt) does not naturally mix with water, soap can suspend oil/dirt in such a way that it can be removed.

* **Onions**- As harmless as they look, these when cut can make you cry. There is a chemical reason behind this. When you cut an onion, you break cells, releasing their contents. Amino acid sulfoxides form sulfenic acids. Enzymes that were kept separate are free to mix with the sulfenic acids to produce propanethiol S-oxide, a volatile sulfur compound that wafts upward towards the eyes. This gas reacts with the water in tears to form sulfuric acid. The sulfuric acid burns, stimulating eyes to release more tears to wash the irritant away. Apparently, this water helps the dirt from eye to wash away. One useful tip we can remember is that if onion is cut under running water, most of the chemicals that make eyes water get washed away.

* **Ice floats on water**- Chemistry can explain why ice floats, while some substances sink when they freeze. Ice floats because it is about 9% less dense than liquid water. In other words, ice takes up about 9% more space than water, so a litre of ice weighs less than a litre of water. The heavier water displaces the lighter ice, so ice floats to the top. One consequence of this is that lakes and rivers freeze from top to bottom, allowing fish to survive even when the surface of a lake has frozen over.

* **Sunscreen**- Sunscreen uses chemistry to filter or block the sun's harmful ultraviolet rays to protect us from sunburn and skin cancers. Sunscreen combines organic and inorganic chemicals to filter the light from the sun so that less of it reaches the deeper layers of the skin. Sunblock, on the other hand, reflects or scatters the light away so that it doesn't reach the skin at all. The reflective particles in sun blocks usually consist of zinc oxide or titanium oxide. Sunscreens usually include sun blocks as part of their active ingredients. SPF stands for Sun Protection Factor. It is a number that we can use to help determine how long we can stay in the sun before getting sunburn. Since sunburns are caused by UV-B radiation, SPF does not indicate protection from UV-A, which can cause cancer and premature aging of the skin. Our skin has a natural SPF, partially determined by how much melanin we have, or how darkly pigmented our skin is. The SPF is a multiplication factor. Although the SPF only applies to UV-B, the labels of most products indicate if they offer broad spectrum protection, which is some indication of whether or not they work against UV-A radiation. The particles in sunblock reflect both UV-A and UV-B.

Bottled Water- Although bottled water has an expiration date, it doesn't actually go bad. Why is there an expiration date on a product that doesn't go bad? This is because all food and beverages, including water, have to carry an expiration date on its packaging to make it easier to standardize packaging. Some bottled water only carries its bottling date or a 'best by' date. These dates are helpful because the flavor of the water will change over time as it absorbs chemicals from its packaging. The flavour will not necessarily be bad, but it may be noticeable. Leaching of chemicals from packaging is a health concern, but as far as toxic chemicals go, one can get exposure to most of those chemicals from freshly bottled water as well as bottled water that has been on the shelf a while. A 'plastic' taste is not necessarily an indicator that the water is bad; absence of an unpleasant flavor does not mean the water is free from contaminants. While algae and bacteria will not grow in sealed bottled water, the situation changes once the seal has been broken. We should consume or discard water within 2 weeks after opening it.

Bhavya S.
II M.Sc. Chemistry

10. INVENTION OF CHEMICAL ELEMENTS

ELEMENTS	YEAR	SCIENTIST	PLACE
Phosphorous	1669	Henning Brand	Germany
Nickel	1751	Axel Cronsstedt	Sweden
Magnesium	1755	Sir Hymphry Dary	Great Britain
Hydrogen	1766	Henry Cavendish	Great Britain
Nitrogen	1772	Daniel Rutherford	Great Britain
Oxygen	1774	Joseph Priestly	Great Britain
Chlorine	1774	Karl Scheele	Sweden
Tungsten	1783	Fausto J.J. Elhoyar	Spain
Chromium	1797	Louis Vanquelin	France
Cadmium	1817	Friedrich Stromeyer	Germany
Silicon	1824	Jons Berzelius	Sweden
Bromine	1826	Antonic Baland	France
Aluminium	1827	Hans Christian Oersted	Denmark
Uranium	1841	Martin	Germany
Helium	1868	Sir William Ramsay	Great Britain
Fluorine	1886	Henri Moissan	France
Argon	1894	Sir William Ramsay & Baron	Great Britain
Radium	1898	Pierre & Marie Curie	France
Deuterium	1931	Harold Urey	USA
Plutonium	1940	G.T. Seaborg	USA

Lincy Vinola
I B.Sc. Chemi

11. TRENDS IN E-TEXTILES

(Paper presented in the PG paper presentation programme at Auxilium College on 29th Jan 2019)

Textile chemistry is a highly specialized field. It may create new products to meet spe needs. It applies the principles of chemistry to the production of textiles such as those us clothing, furniture, tire yarns, air bags and much more. The study of textile chemistry begins wi knowledge of fibers,

1. Synthetic (polymers and nanomaterials)
2. Natural (plant and animal based material)

E-textile is a type of fabric. It contains materials with electronic functionality and at the time textile characteristics. The development of electronic textiles supports the idea of elec devices worked into garment designs.

SOFT E-TEXTILES

The creation of new smart fabrics is named as SOFT (Self-Organized Framework on Textiles). It is used to determine harnesses of electronic signals in smart fabrics to detect, capture, concentrate and filter toxic chemicals. The research works are flexible, textile-supported electronic sensor based on materials known as metal organic frameworks (MOFs). Integrating these conductive, porous materials into cotton and polyester fabrics produce the E-textiles.

The development of high conducting textile for inter connection is crucial to minimize energy loss. Three types of materials that have been explored for the fabrication of high conductive textiles are Polymer based, Metallic based and Carbon based.

PROPERTIES

Flexible, large surface area for sensing, invisible to others; permeability, strength, thermal resistance, electrical resistance and stability to washing are the important properties.

ADVANTAGES

The new smart fabric can detect common toxic chemicals and the vehicle exhaust pollutants, nitric oxide and the corrosive poison that remains. Most rotten eggs and hydrogen sulphide were effectively identified by the soft system.

DISADVANTAGE

Need a suitable catalyst for decomposition process.

CONCLUSION

The advanced E-textile can be simple and it is a rapid approach in innovative fabricating materials for the future purpose.

Chanthini E.
II M.Sc. Chemistry

12. BEST FOODS FOR YOUR THYROID

1. Turmeric

This orange spice adds an instant wallop of flavor to your cooking, but, as it turns out, it is also a powerhouse for helping keep your thyroid in tip-top shape. Turmeric contains a chemical compound called curcumin. It can help block the formation of thyroid cancer cells.

2. Spinach

All leafy greens are good, but spinach might take the cake, especially when it comes to thyroid health. It has direct link between zinc deficiency and hypothyroidism.

3. Navy Beans

It can help to keep thyroid hormone level balanced. You can find iodine in most of Navy beans as your best source: In every cup, navy beans contain about 60 micrograms.

4. Brown Rice

Selenium, a naturally-found chemical element, helps balance out thyroid-hormone production. E.g. Brown rice

5. Eggs

Not only are eggs the perfect breakfast to start the day, these protein-filled magic foods also have a positive impact on thyroid health. Eggs contain almost all of the nutrients thyroid needs, including iodine, zinc, and selenium.

6. Apples

One a day keeps the doctor away the frequent apple consumption is linked to a decreased risk of thyroid cancer. Because it has iodine in it.

7. Oranges

Studies have also found that oranges can be linked to a decreased risk for thyroid cancer. Be careful, though, because many other citrus fruits have been found to have the opposite effect on your thyroid health. So if there is a craving for some Vitamin C, stick to oranges.

8. Almonds

Most nuts have some amount of selenium, which is a thyroid-healthy nutrient. But almonds also happen to have a high amount of magnesium.

9. Carrots

It might be a myth that carrots help our eyes, but it is no lie that they help our thyroid. Carrots contain high level of a micronutrient called beta-carotene, which the body can convert into either retinol or an antioxidant. And according to a study in Cancer, there is positive correlation between people with high levels of beta-carotene and people with healthy thyroids.

Megala D.
II M.Sc. Chemistry

13. PHYTOCHEMISTRY

Phytochemistry is the study of phytochemicals which are chemicals derived from plants. Phytochemistry strives to describe the structures of the large number of secondary metabolic compounds found in plants, the functions of these compounds in human and plant biology, and the biosynthesis of these compounds. Plants synthesize phytochemicals for many reasons, including protecting themselves against insect attacks and plant diseases. Phytochemicals in food plants are often active in human biology, and in many cases have health benefits. The compounds found in plants are of many kinds, but most are in four major biochemical classes,

* Alkaloids
* Glycosides
* Polyphenols
* Terpenes

Alkaloids

Alkaloids are bitter-tasting chemicals, very widespread in nature, and often toxic. There are several classes with different modes of action as drugs, both recreational and pharmaceutical. Medicines of different classes include atropine, scopolamine and hyoscyamine.

Glycosides

Anthraquinone glycosides are found in the laxatives senna, rhubarb and Aloe. The cardiac glycosides are powerful drugs from plants including foxglove and lily of the valley. They include digoxin and digitoxin which support the beating of the heart, and act as diuretics.

Polyphenols

Polyphenols of several classes are widespread in plants. They include the colourful anthocyanins, hormone-mimicking phytoestrogens, and astringent tannins. In Ayurveda, the astringent rind of the pomegranate is used as a medicine, while polyphenol extracts from plant materials such as grape seeds are sold for their potential health benefits. They have been continually studied in cell cultures for their different anti-cancer effects.

Plants containing phytoestrogens have been used for centuries to treat gynaecological disorders such as fertility, menstrual, and menopausal problems. Among these plants are Pueraria mirifica, kudzu, angelica, fennel, and anise.

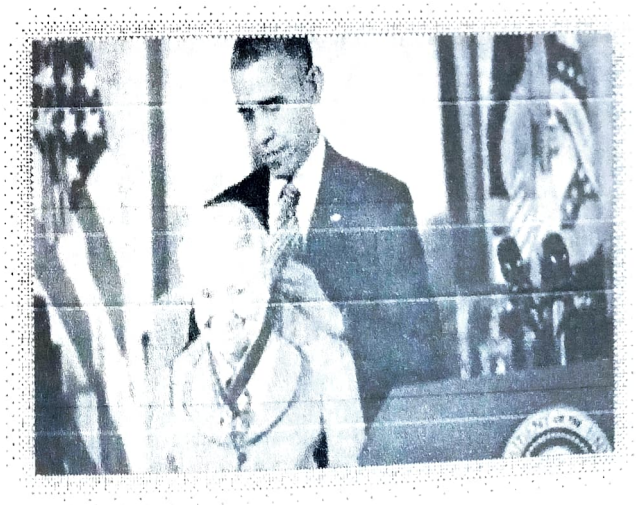
Terpenes

Terpenes and terpenoids of many kinds are found in resinous plants such as the conifers. They are strongly aromatic and serve to repel herbivores. Their scent makes them useful in essential oils, whether for perfumes such as rose and lavender, or for aromatherapy. Some have had medicinal uses: thymol is an antiseptic and was once used as a vermifuge (anti-worm medicine).

Praveena T.
II M.Sc. Chemistry

14. THE QUEEN OF CARBON SCIENCE

Mildred Dresselhaus, is one of the most celebrated scientist in America. She was an Electrical Engineer. She was known as the "Queen of Carbon Science."



Mildred Dresselhaus was born in Brooklyn, New York in 1930. She showed early promise in Physics. She earned numerous degrees and became a visiting professor at Massachusetts Institute of Technology (MIT) in 1967. She worked there for 57 years and made major advances in the study of Carbon and Electrical Engineering. She was also the

first woman to serve in many Science leadership positions and she pushed for women in the sciences throughout her career. Back in 2014, Mildred Dresselhaus was awarded the Presidential Medal of Freedom by President Barrack Obama. Mildred Dresselhaus began doing Research on the properties of carbon and carbon-based materials. She helped in pioneer nanotechnology, a field with game - changing implications for medicine, and clean energy production.

Dresselhaus was particularly noted for her work on graphite, graphite intercalation compounds, fullerenes, carbon nanotubes, spin-orbit coupling in semiconductors, and low-dimensional thermoelectrics. Her group made frequent use of electronic band structure, Raman scattering and the photophysics of carbon nanostructures. Her research helped develop technology based on thin graphite which allows electronics to be "everywhere," including clothing and smartphones. A giant in her field, Mildred Dresselhaus authored over 1,700 papers, had several physical theories named after her, and mentored generations of top scientists and engineers. At age 86, she was still active in her lab. She died in February 2017 at 86 years old.

Sr. Anita Dhar FMA
II M.Sc. Chemistry

15. BIODEGRADABLE CHIP

(Paper presented in the paper presentation programme at Auxilium College on 29th Jan 2019 and won the Second Prize)

Today there are far more chips on earth than people around. Millions of them are tirelessly at work in this busy world. If there would have been no chip then there would have been no names like ATM cards, Phone cards, Apple, Intel, Samsung, Nokia, Microsoft or Google, Multibillion dollar semi-conductor industries. There would be no internet. Then how our Prime Minister's dream of "DIGITAL INDIA" will come true? It is impossible!!!

Chips are mainly non-biodegradable. In order to produce the chip, the industries use large amount of hazardous chemicals which causes health problems as well as affect the environment by its toxic waste and by products. There is an alternate way to create an eco-friendly chip but there will be many questions which strikes our mind. For example, Is it possible to built a chip based on the principles of green chemistry? If yes, how the chip would be? Which can be its source? How is it efficient? Based on survey taken all over the world, India is placed fourth position in chicken production. You may be surprised why I am talking about chicken suddenly in between. To tell you the truth which you believe or not, we can use chicken's feather to produce a chip i.e "CHICKEN CHIP". There are some criteria given below to accept feathers in order to create a chip. They are light and tough enough to withstand mechanical and thermal stress. It has hollow fibers which has very low density with less weight. It has low dielectric constant (1.6). When dielectric constant is low, the chip will be faster in low power. Electron can move on feather based printed circuit boards at twice the speed as traditional circuit boards.

"Green chemistry is replacing our industrial chemistry with nature's recipe book. It's not easy, because life uses only a subset of the elements in the periodic table. And we use all of them, even the toxic ones." - Janine Benyus

Again the other process of nature friendly use of the production of chip is from wood i.e "WOOD CHIP". For this particular chip there is no need of cutting down the trees. We need wood products like wood based paper, wastes from lumber mills, etc. It is prepared from CNF i.e cellulose nano fibril or nano fibrillated cellulose. It is obtained by cutting woods into nano scale from which we get a very strong and transparent CNF paper. It is flexible and biodegradable. It has low thermal expansion co-efficient. While preparing this chip we have to undergo some challenges since wood is a hydroscopic material, it could attract moisture from air and expand itself. It can be overcome by epoxy coating over the surface of CNF. It gives smoother surface and act as moisture barrier to keep materials from expansion and contraction. Using less epoxy shorter will be the chip life. Just like gallium-arsenide, CNF needs a low radio frequency energy loss. So the wireless signal transmitted and received by the chip won't be degraded or blocked.

"Now the chips are so safe you can put them in the forest and fungus will degrade it. They become as safe as fertilizer" - Jack Ma

Some advantages of using eco-friendly chips are that the use of non-renewable resources can be avoided. It can increase our national security by decreasing our reliance on foreign resources. These techniques are inexpensive. E-wastes are most dangerous waste which can be largely minimized.

"HUMANS ARE THE ONLY CREATURE IN THIS WORLD WHO CUT THE TREES, MADE PAPER FROM IT AND THEN WROTE,'SAVE TREES' ON IT."

Abisha S.M.
I M.Sc. Chemistry

16. Chemistry Quiz

1) The reaction between methane and chlorine in diffused sunlight is
   Ans: Substitution
2) The alloy aluminium used for making magnet is
   Ans: Alnico
3) Which synthetic fibre is known as artificial silk?
   Ans: Rayon
4) Which variety of glass is heat resistant?
   Ans: Pyrex glass
5) Ruby is an oxide of
   Ans: Aluminium
6) Tobacco is preserved from drying out in
   Ans: Glycerol
7) The element used in lead pencils is
   Ans: Carbon

Rakshitha M.
I B.Sc. Chemistry

17. NANOREACTORS : BIG IMPLICATIONS IN CHEMISTRY

Nanoreactors offer a means of creating unique nanoscale chemical environments partitioned from the surrounding bulk space. Nanoreactors are tiny systems which facilitate specific chemical reactions, as a catalyst does. Many scientists have found them in biological systems, such as certain proteins. But chemists are also able to synthesise artificial nanoreactors to control chemical reactions.

The rise of nanoscience and nanotechnology has offered the opportunity for exploring chemistry in a variety of different types of nanoreactors, they are synthetically generated such as nanopores, nanopores, hollow nanoparticles, porous architectures, tubular nanostructures and biological structures such as protein pores and channels. Nanoreactors change the basic chemical nature of molecules and also alter the behaviour in chemical reactions. Nanoreactors can be exploited not only to speed up a reaction or make a new type of nanoparticle, but also to gain new fundamental understanding of a chemical system.

The nanoreactor systems explore the many ways they can deepen and enhance our understanding of the world around us. The unique, highly confined environment of a nanoreactor can result in significant changes to chemistry in comparison to that observed in the bulk solution.

Nanoreactors can also be used to emulsify water, create hydrofuels and play a helpful role in chemical industries. By using nanoparticles, personal care products like lotions, pharmaceutical creams, shower gels and deodorants are manufactured. The nanoreactors are used to increase usage of renewable energy and may also help to improve the world's environment. It can reduce pollution and increase fuel efficiency.

Priyadharshini C.
III B.Sc. Chemistry

18. CHEMISTRY QUIZ

1. Who is regarded as the father of modern chemistry?
   Ans: Antoine- Laurent de Lavoisier
2. Bleaching action of chlorine is by
   Ans: Decomposition
3. What is a mixture of potassium nitrate, powdered charcoal and sulfur called?
   Ans: Gun powder
4. Which is also called stranger gas?
   Ans: Xenon
5. The chemical used as a fixer in photography is
   Ans: Sodium thiosulphate
6. Which is produced during the formation of photochemical smog?
   Ans: Ozone

7. Which gas is used in cigarette lighter?

   Ans: Butane

8. The gas used for artificial ripening of green fruits is

   Ans: Ethylene

9. Contact lens is made from?

   Ans: Poly Vinyl Chloride

10. Due to rusting the weight of iron

    Ans: Increases

Deepika V.
III B.Sc. Chemistry

19. CHOCOLATES

Chocolate is a mixture of fat made from cocoa beans called cocoa butter and sugar known as cocoa mass. It deals with concept such as crystal formation and melting point. The sugar in chocolate is called cocoa mass and it is hydrophilic and cocoa butter hydrophobic. The result is that two are like oil and water and they do not mix. Cocoa butter, the main fat chocolate, is a lipid molecule. This means the atom within the nanomaterial have a specific order and are not randomly arranged, it is mainly depending upon tempering process. The degree of crystallinity of chocolate affects its properties namely its texture, melting point and importantly taste! Cocoa butter is polymorphic, which means it can exist as different crystalline forms. These are designed according to their stability and physical characteristics. It melts at body temperature, but not below it meaning it melts in our mouth but not in our hand. The process of forming its polymorph when making chocolate requires very slow cooling of melted ingredients. This sophisticated temperature control process is known as tempering. The slow cooling gives the lipids time to arrange in the most energetically favourable way. This gives it strength, but also smoothness. The well-ordered crystallinity of polymorph in cocoa butter is incredibly regular and takes time to form. It is important the melted cocoa butter is cooled slowly, to give the molecules time to pack tightly. In addition to being smooth, well ordered crystals are also very stable, so they do not melt easily.

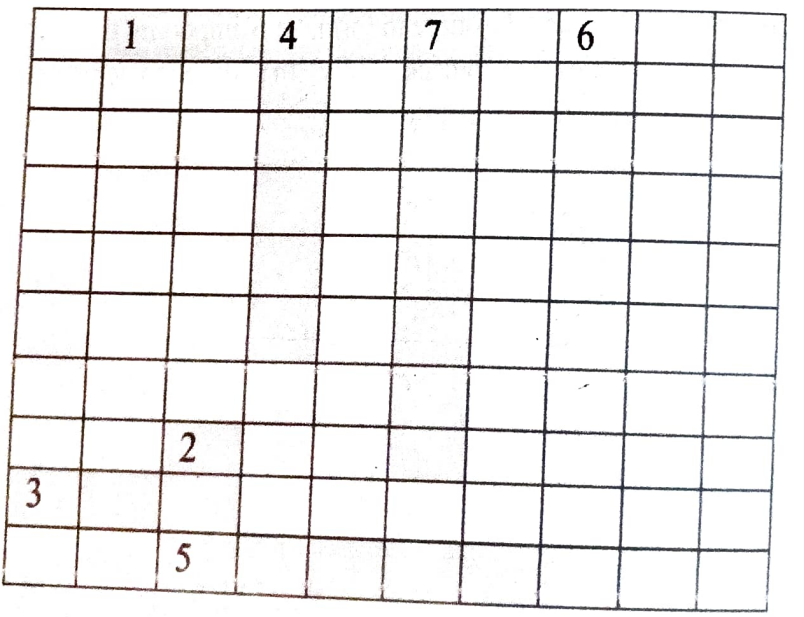
Rishitha P.
II M.Sc. Chemistry

20. TEN INTERESTING BASIC CHEMISTRY FACTS

1. Chemistry is the study of matter and energy and the interactions between them. It is a physical science that is closely related to physics, which often shares the same definition.
2. Chemistry traces its roots back to the ancient study of alchemy. Chemistry and alchemy are separate now, though alchemy still is practiced today.
3. All matter is made up of the chemical elements, which are distinguished from each other by the numbers of protons they possess.
4. The chemical elements are organized in order of increasing atomic number in the periodic table. The first element in the periodic table is hydrogen.
5. Each element in the periodic table has a one or two-letter symbol. The only letter in the English alphabet not used on the periodic table is J. The letter q only appears in the symbol for the placeholder name for element 114, ununquadium, which has the symbol Uuq. When element 114 is officially discovered, it will be given a new name.
6. At room temperature, there are only two liquid elements. These are bromine and mercury.
7. The IUPAC name for water, H_2O, is dihydrogen monoxide.
8. Most elements are metals and most metals are silver-colored or grey. The only non-silver metals are gold and copper.
9. The discoverer of an element may give it a name. There are elements named for people (Mendelevium, Einsteinium), places (Californium, Americium) and other things.
10. Although you may consider gold to be rare, there is enough gold in the Earth's crust to cover the land surface of the planet knee-deep.

Preethi A.
II M.Sc. Chemistry

21. PUZZLE



1. ⇨ _____ is a heterocyclic compound with the formula C_4H_4S (9)
2. ⇩ Transfer _____ (3)
3. ⇨ Definition:_____ is the name of the element with atomic number 50 and it is represented by symbol Sn (3)
4. ⇩ Trans_____ (6)
5. ⇨ Tert-butyl _____ (7)
6. ⇩ Periodic table contains full of _____ (8)
7. ⇩ Vapour _____ (8)

ANSWERS:

1. THIOPHENE 2. RNA 3.TIN 4. ISOMER 5. ALCOHOL 6. ELEMENTS 7. PRESSURE

Saranya M.
I M.Sc. Chemistry

22. ENZYMES

Enzymes are catalysts that drive reaction rates forward. Most catalyst, but not all, is made up of amino acid chains called proteins that accelerate the rate of the reaction in chemical systems. They are high molecular weight compounds made up principally of chains of amino acids linked together by peptide bonds. Enzymes can be denaturized and precipitated with salts, solvents and other reagents. They have molecular weight ranging from 10,000 to 2,000,000.

The living cell is the site of tremendous biochemical activity called metabolism. This is the process of chemical and physical change which goes on continually in the living organism. Build-up of new tissue, replacement of old tissue, conversion of food to energy, disposal of waste materials, reproduction all these activities we characterize as "life".

This building up and tearing down take place in the face of an apparent paradox. The phenomenon of catalysis makes possible biochemical reactions necessary for all life processes. Without enzymes, these reactions take place at a rate far too slow for the pace of metabolism. Enzymes are known to catalyze more than 5,000 biochemical reaction types. Most enzymes are proteins, although a few are catalytic RNA molecules. The latter are called ribozymes. Enzymes specifically come from their unique 3D structures. Like all catalysts enzymes increases the reaction rate by lowering its activation energy.

A typical enzyme molecule can convert 1,000 substrate molecules per second. The rate of an enzymatic reaction increases with increased substrate concentration, reaching maximum velocity when all active sides of the enzyme molecules are engaged. The energy is then said to be saturated, the rate of the reaction being determined by the speed at which the active sites can convert substrate to product.

Enzyme activity can be inhibited in various ways. Competitive inhibition occurs when molecules very similar to the substrate molecules bind to the active site and prevent binding of the actual substrate.

Ramya R. I M.Sc. chemistry

23. WHAT'S BEHIND SMELLY WINE

"Liberation of Hydrogen Sulfide from Dicysteinyl Polysulfanes in Model Wine"

Aging often improves the flavor of wine, but sometimes the beverage emerges from storage with an unpleasant smell. One of the prime culprits is hydrogen sulfide (H_2S), which can give the affected wine an aroma of sewage or rotten eggs. Researchers have now identified some potential sources of this stinky compound.

H_2S is a volatile sulfur compound that is produced naturally during fermentation. Most of it disappears or is removed in subsequent winemaking steps, but it can reemerge after bottling. Ironically, it might derive from polysulfanes and other sulfur byproducts created during H_2S removal.

The researchers created a model wine containing a mixture of polysulfanes and then treated it with antioxidants such as sulfur dioxide and ascorbic acid, which are often added to wine as preservatives during bottling. The scientists then identified and measured the concentration of a variety of sulfur compounds in the wine during six months of storage. They found that polysulfanes containing four or more linked sulfur atoms per molecule tend to decompose during wine storage, correlating with a rise in H_2S. In addition, the polysulfane decomposition and H_2S release occurred more frequently in the wine treated with sulfur dioxide than in untreated wine or wine treated with ascorbic acid. The findings provide strong evidence that polysulfanes were the source of re-emergent H_2S, though this conclusion will need to be confirmed in real wines. Confirming such a role for polysulfanes could help identify practical ways to manage the re-emergence of stinky sulfur compounds, one of the major faults in bottled commercial wine.

Mohana priya. A.
I M. Sc chemistry

24. LIST OF CHEMICAL INGREDIENTS PRESENT IN COSMETICS

1. Sodium lauryl sulphate --- shampoo, bodywash, facewash and foundation.
2. BHA (beta hydroxyl acid) --- exfoliants and perfumes.
3. Triclosan and triclocarbon --- deodorant and anti- bacterial soap.
4. Aminophenol, Diaminobenzene, Phenylenediamine --- Hair dye, shampoo.
5. Parabens --- make up, shaving gel, moisturizer and spray tan products.
6. Polyethylene --- scrubs, bodywash, make up.
7. Retinyl palmitate, retinyl acetate, retinoic acid and retinol --- lip products, sunscreen and anti ageing products.
8. Petroleum distillates --- Mascara.
9. Oxybenzone --- sunscreen creams
10. Toluene and formaldehyde --- nail polish and nail products.
12. Hydroquinone --- skin lighteners

Riya M.P
I B.Sc Chemistry

25. CHEMISTRY QUIZ

Try answering the questions given below:

1. The most commonly used bleaching agent is -----
2. The purest form of iron is -----
3. The National Chemical Laboratory is situated in -----
4. The single acid which dissolves gold is -----
5. The Greek term "atomos" means
6. The gas used for artificial ripening of green fruits is -----
7. What is used to avoid melting of ice?
8. Reactive metals are extracted by -----
9. ------ is used to produce artificial rain
10. Natural rubber is a polymer derived from -----
11. What is the chemical name of Borax?
12. The milk of magnesia is used for the treatment of -----
13. Soda lime is often employed to remove both ---- & ----
14. Tincal is mineral of -----
15. Carnallite is the mineral of ---------- alkaline metal
16. ------- is Sylvite
17. Slaked lime is used in the manufacturing of -------
18. -------- is called dry ice
19. Plaster of Paris is obtained from ----------
20. Mortar is a mixture of -------

Answers:

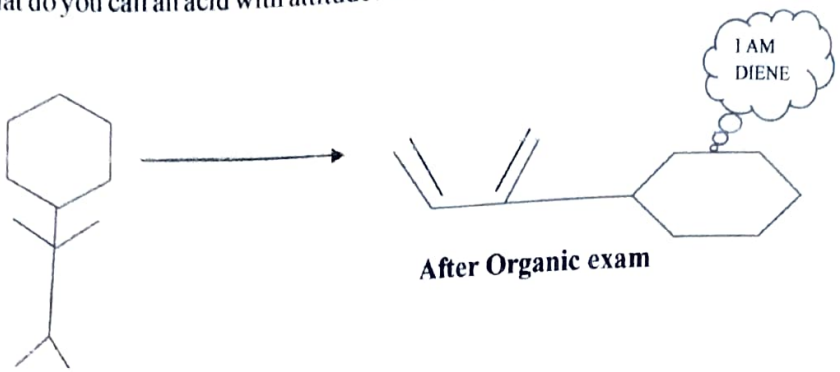
1. Chlorine	2. Wrought iron	3. Pune	4. Aqua regia	5. Indivisible
6. Ethylene	7. Gelatine	8. Electrolysis	9. Silver iodide	10. Isoprene
11. Sodium tetraborate	12. Acidity	13. CO_2 & H_2O	14. Boron	15. Mg
16. KCl	17. Cement	18. Solid CO_2	19. Gypsum	

20. Slaked lime, sand and water

Taslim Unnisa R. DDLT
I B.Sc. Chemistry

26. CHEMISTRY RIDDLES

1. Don't drink water while studying because chemistry says concentration decreases on adding water.
2. What do you call an acid with attitude? A-MEAN-OH-ACID



After Organic exam

Before Organic exam

3. Helium walks into a bar, the bar tender says "we don't serve noble gases here".

   Helium doesn't react

4. Two chemists go into a restaurant.

   The first one says "I think I will have H_2O".

   The second one says "I think I too have H_2O".

   And he died (because H_2O_2 is toxic)

5. The proton and neutron are walking down the street. The proton says, "Wait, I dropped an electron. Help me look for it". The neutron says "Are you sure?"

   The proton replies "I'm positive".

6. A neutron walked into a restaurant. He asked, "How much for a juice? The server offers him a warm smile and says,

   "For you, no charge".

7. Why did the chemist sole and heel his shoes with silicone rubber?

   To reduce his carbon footprint.

8. The small piece of sodium that lived in a test tube fell in love with a Bunsen burner. "Oh Bunsen, my flame," the sodium pined. "I melt whenever I see you," The Bunsen burner replies,

   "It's just a phase you are going through."

9. Why do chemists enjoy working with ammonia?

   Because it's pretty basic stuff.

10. What did the solution in the burette tell the solution in the conical flask on titration?

    "Let's meet at the end point".

Deepika V.
III B.Sc. Chemistry

27. ELEMENTS IN OUR HUMAN BODY

Oxygen (65%) and hydrogen (10%) are predominantly found in water, which makes up about 60 percent of the body by weight. It is practically impossible to imagine life without water.

Carbon (18%) is synonymous with life. Its central role is due to the fact that it has four bonding sites that allow for the building of long, complex chains of molecules. Moreover, carbon bonds can be formed and broken with a modest amount of energy, allowing for the dynamic organic chemistry that goes on in our cells.

Nitrogen (3%) is found in many organic molecules, including the amino acids that make up proteins, and the nucleic acids that make up DNA.

Calcium (1.5%) is the most common mineral in the human body nearly all of it found in bones and teeth. Ironically, calcium's most important role is in bodily functions, such as muscle contraction and protein regulation. In fact, the body will actually pull calcium from bones (causing problems like osteoporosis) if there's not enough of the element in a person's diet.

Phosphorus (1%) is found predominantly in bone but also in the molecule ATP, which provides energy in cells for driving chemical reactions.

Potassium (0.25%) is an important electrolyte (meaning it carries a charge in solution). It helps regulate the heartbeat and is vital for electrical signaling in nerves.

Sulfur (0.25%) is found in two amino acids that are important for giving proteins their shape.

Sodium (0.15%) is another electrolyte that is vital for electrical signaling in nerves. It also regulates the amount of water in the body.

Chlorine (0.15%) is usually found in the body as a negative ion, called chloride. This electrolyte is important for maintaining a normal balance of fluids.

Magnesium (0.05%) plays an important role in the structure of the skeleton and muscles. It also is necessary in more than 300 essential metabolic reactions.

Iron (0.006%) is a key element in the metabolism of almost all living organisms. It is also found in hemoglobin, which is the oxygen carrier in red blood cells.

Fluorine (0.0037%) is found in teeth and bones. Outside of preventing tooth decay, it does not appear to have any importance to bodily health.

Zinc (0.0032%) is an essential trace element for all forms of life. Several proteins contain structures called "zinc fingers" help to regulate genes. Zinc deficiency has been known to lead to dwarfism in developing countries.

Copper (0.0001%) is important as an electron donor in various biological reactions. Without enough copper, iron won't work properly in the body.

Iodine (0.000016%) is required for making of thyroid hormones, which regulate metabolic rate and other cellular functions. Iodine deficiency, which can lead to goiter and brain damage, is an important health problem throughout much of the world.

Selenium (0.000019%) is essential for certain enzymes, including several anti-oxidants. Unlike animals, plants do not appear to require selenium for survival, but they do absorb it, so there are several cases of selenium poisoning from eating plants grown in selenium-rich soils.

Chromium (0.0000024%) helps regulate sugar levels by interacting with insulin, but the exact mechanism is still not completely understood.

Manganese (0.000017%) is essential for certain enzymes, in particular those that protect mitochondria the place where usable energy is generated inside cells from dangerous oxidants.

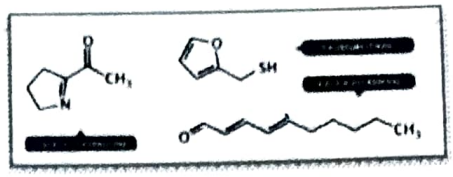
Molybdenum (0.000013%) is essential to virtually all life forms. In humans, it is important for transforming sulfur into a usable form. In nitrogen-fixing bacteria, it is important for transforming nitrogen into a usable form.

Cobalt (0.0000021%) is contained in Vitamin B12, which is important in protein formation and DNA regulation

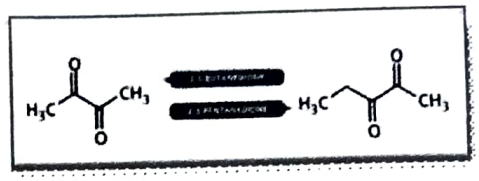
Christina Mary Shamina A.
I M.Sc. Chemistry

28. THE CHEMISTRY OF POPCORN

Popcorn flavour & Aroma Compounds

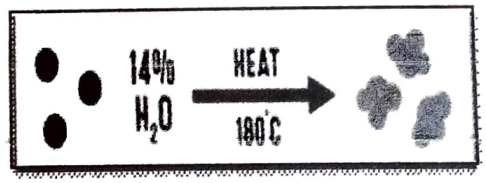


Many aroma compounds are given off by freshly prepared popcorn. Some of the most significant are 2-acetyl-1- pyrroline (which is a contributor to the roasty, popcorn-like aroma), (E,E)-2,4-decadienal (which has a fatty, fried aroma) and 2-furfurylthiol (which in isolation has a roasted coffee-like aroma). A range of other pyrazine, pyridine, and phenol compounds also contribute to flavour and aroma.



Flavourings added to popcorn can also contribute to the aroma. For example, butter-flavoured popcorn can include the compounds 2,3-butanedione (diacetyl) or 2,3-pentanedione. These compounds can cause respiratory problems in workers that inhale them while manufacturing the flavourings the condition they can cause is known as 'popcorn lung'.

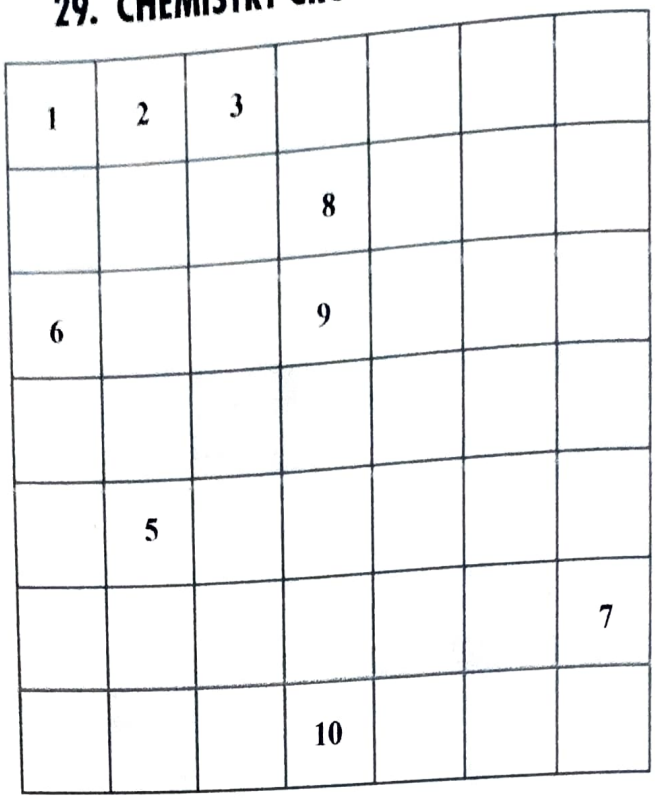
What Makes Popcorn Pop?



The content of popcorn kernels is about 14% water. When the kernels are heated, this turns into water vapour at water's boiling point. However, it is trapped by the kernel's shell until the pressure builds up enough to crack through. The 'pop' is due to the escape of this pressurized water vapour, rather than the cracking of the kernel's shell. The molten starch bursts through the shell then rapidly cools, giving popcorn its fluffy appearance.

Elamathi R.
I M.Sc. Chemistry

29. CHEMISTRY CROSSWORD PUZZLE



LEFT TO RIGHT :

1. The alkali metal which is used for battery
5. The element which is hard and ductile
8. The fourth most abundant element
9. The element which is sometimes caused goitre
10. The element which is an inert monoatomic gas is

TOP TO DOWN :

2. The element which is discovered by French chemist Bernard Courtois is
3. The element which is a weakly radioactive metal
6. One of the low abundant element in solar system
7. The element with diamond cubic Structure.

ANSWER : 1. Lithium 2. Iodine 3. Thorium 5. Nickel 6. Boron 7. Sn
8. Iron 9. Zinc 10. Neon.

R.Divya
II B.Sc. Chemistry

30. INTERESTING INFORMATIONS IN CHEMISTRY

1. **UNESCO celebrates 150 years of Chemistry's Periodic Table:**

The UN Education, Scientific and Cultural Organization kicked off the "International Year of the Periodic Table of Chemical Elements on 29th January 2019.

2. **Salt helps to retard the formation of ice on road surfaces:**

Water freezes at 0°C. However if there is an impurity in water it freezes at a lower temperature. If salt is spread on wet roads, the salt and water mixture will have a lower freezing point than pure water, which means its freezing point will be below 0°C. In cold countries salt is spread on road to prevent ice forming on wet streets when the temperature drops to 0°C or below. The more the salt, the lower the freezing point so when a lot of salt is dropped on the roads, no ice is formed even when the temperature drops several degrees below zero.

3. **Hardening the Road: Why the road is being covered with water?**

This process is known as curing. A chemical reaction occurs between cement and water and this causes the cement concrete to harden. The longer the concrete remains moist, the harder and stronger it becomes. The chemical reaction between cement and water produces heat. So another function of the water is to absorb this heat which could otherwise prevent the concrete from hardening properly. When a large amount of concrete is used as in dams, chilled water is used to remove heat generated by the chemical reaction.

4. **Rosy Hands: Have you observed how your hands look when light is focused on them?**

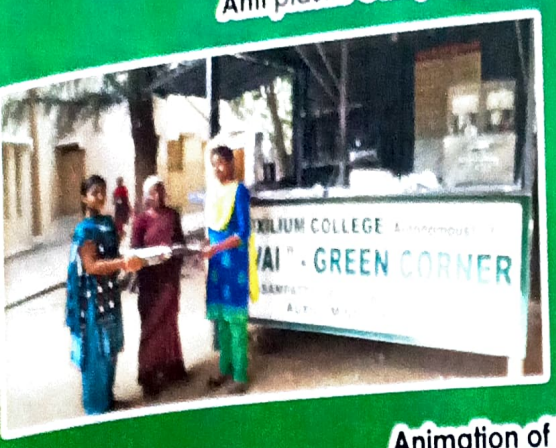
There was a power failure and I was waiting for the lights to come again. I had a torch with me. I noticed that if I partly obstructed the beam of light, the palm of my hand appeared reddish in color. **Why?**

When you place your hand over the beam, the flesh and skin act as filters. A filter is any material that absorbs some of the colors in light and allows others to pass through. Red filters, for example, absorb all colors except red which passes through. So the hand appears reddish in parts because the red blood under the skin acts like a red filter.

Dr. R.Sangeetha Rani,

Assistant Professor in Chemistry

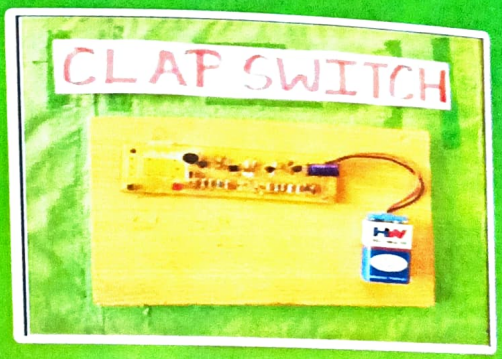
Anti plastic Campaign- Distribution of Paper bags to the canteens



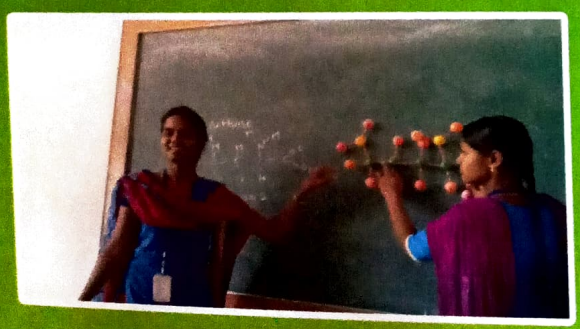
Animation of the Value - Sharing

Conversion of electrical energy into mechanical energy

Clap Switch

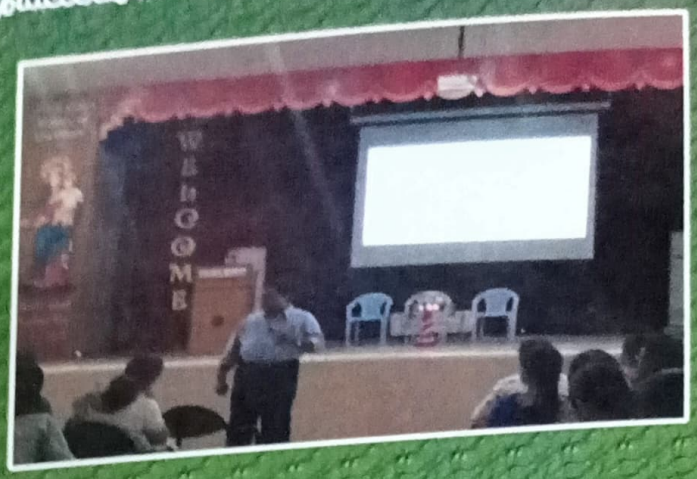


Model Making by II M.Sc. Chemistry Students for Innovative Component



Inaugural Lecture by Dr. Rangaraj Selvaraj,

Assistant Professor, Sultan Qaboos University, Muscat, Sultanate of Oman on 23rd July 2018



RUSAC – Madame Marie Curie Endowment Lecture – 1 delivered on 13th October 2018

by Dr. Venu Kannappan, Professor (Retired), Department of Chemistry, Presidency College, Chennai