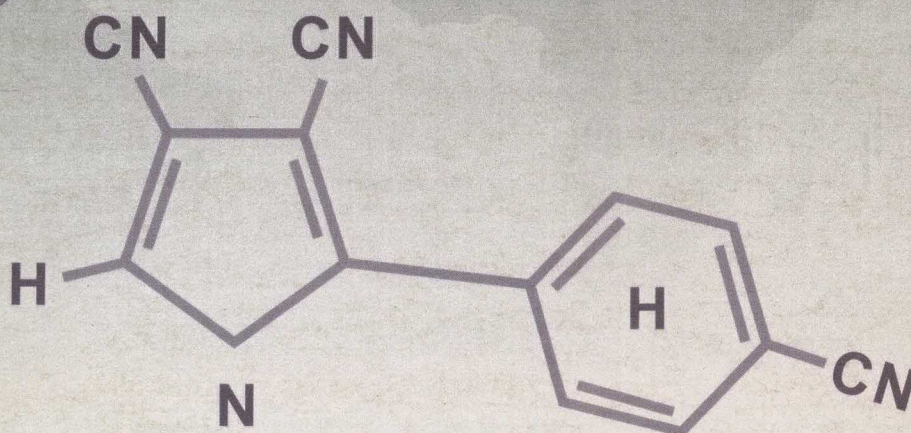
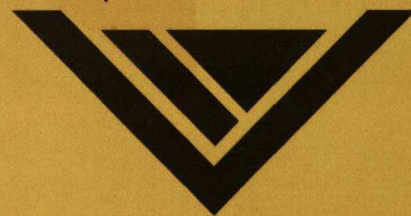


FROM THE CHEMISTRY BENCH-2015
ANNUAL NEWSLETTER



DEPARTMENT OF CHEMISTRY
SHILLONG COLLEGE
LAITUMKHRAH-793003, SHILLONG



Editorial Board

The Department of Chemistry Shillong College, was established in the year 1963 under the supervision of founder Principal (Late) Prof S.C. Datta. The Department had a humble beginning when Shri (Late) P.V.R.Rao, a part time Lecturer in Chemistry was looking after the department along with Shri Kalipada Nath as demonstrator, till Shri P. Deb (Late) joined the College as a full time Lecturer in Chemistry in 1964 and continued as the Head of the department till his death on 21st July 1988. Dr. S. K. Gupta took over as the Head of the Department since then and served till his retirement on 1st February, 2006. Shri T. J. Kharbhih steered the department until his untimely demise on 26th November, 2012. Dr. M. N. Bhattacharjee is now looking after the affairs of the department. The present faculty members of the department are:

Dr. M. N. Bhattacharjee

Dr. D. L. Buam

Shri K. Umdor

Dr. C. Masharing

Dr. B. M. Laloo

Smt. L. Pathaw

In these fifty two long years of its existence, the department has churned out innumerable graduates in the subject and has been witness to many changes. The department is also actively involved in projects sponsored by the college and the UGC , NER. The students of the department are also actively involved in departmental projects through field trips and small study tours.

This newsletter is a first of its kind from the department. It aims to encourage students as well as faculty to delve more into the hows and whys of the world of chemistry. It also makes mention of some prominent activities of the college. This newsletter offers a small compilation of articles, fun-facts, jokes and short write ups regarding the subject and other matters of interest and humour. We hope that this small effort will encourage the future students to contribute to the newsletter annually.

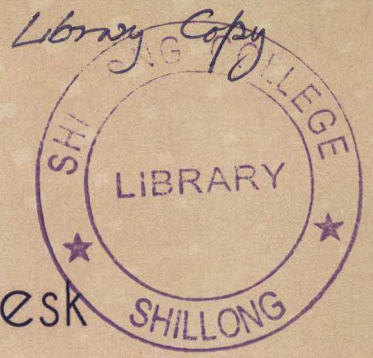
Here's to small beginnings.

Dr. Badaker M. Laloo (Editor)

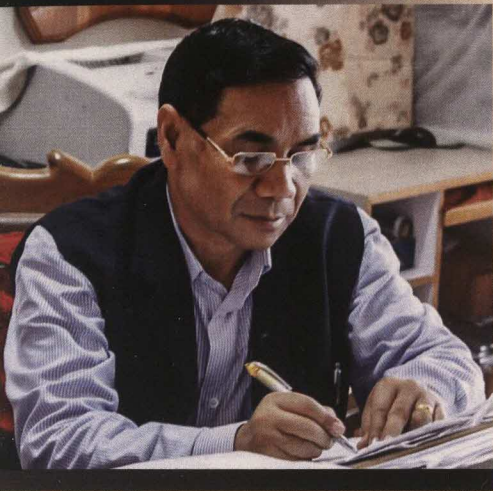
Wanshanlang Kharmawphlang (Student Editor)

Biscora Umdor (Student Editor)

Lawandasshisha Warjri (Student Editor)



From the Principal's Desk



Dr. K. D Ramsiej

It gives me immense pleasure to see the department of chemistry come up with an annual newsletter which is also the first of its kind for the department. I would like to extend my appreciation to the faculty as well as the students for taking this initiative. This is a good start and I hope the future will see many more publications from the department. I would like to encourage the students to develop and inculcate a love for the subject that should reflect not only in their academic performance but also in a wider sense, by keeping up with the latest news, developments and discoveries in the subject. I wish the department the very best.

Saluting the Father of Indian Chemistry Industry

"The World is the biggest classroom and life the biggest teacher. It teaches us to live a dignified life, organize, resist and march on."

Dr. Manabendra Nath Bhaattacharjee
Head, Department of Chemistry,
Shillong College, Shillong

The above statement is simply the precursor of what shall be enumerated in the following lines. To talk about chemistry and chemicals, and giving a statement as above may appear ridiculous and out of context. But it is truly applicable when we talk about the life history and activities of the celebrated Indian Chemist, Acharya Prafulla Chandra Roy – often regarded as Father of Indian Chemical Industry. Many of us, as a student of chemistry, either do not know him or never care to take lessons from history of development of Chemical research and chemical industry in India. The present article is an attempt to take care about what we carelessly avoid to study.

Acharya P. C. Ray, often called as the Father of Indian Chemistry, was born on August 2, 1861 in Raruli, Khulna District, now in Bangladesh. His research covered a wide range of problems related to food adulteration, especially the purity of ghee and mustard oil; search for the elements missing in the Periodic table. Ray had special interest in mercury because of its importance in Ayurvedic medicines. The discovery of mercurous nitrate opened a new chapter in his life. Ray wanted to prepare water soluble mercurous nitrate; but to his surprise, the action of dilute nitric acid with excess mercury resulted in the formation of a yellow crystalline deposit, a compound then known to be unstable. This result was published in 1896 in the Journal of Asiatic Society of Bengal, for which he received congratulatory letters from many eminent chemists including Bertheltdt, Roscol and Victor Meyer. Ray developed a new method for the synthesis of Ammonium Nitrite via double displacement between ammonium chloride and silver nitrite. He presented this result before a scientific audience in London, which included William Ramsay. Nature immediately hailed (1912) the successful preparation of this compound in tangible form. The details were published in the Journal of Chemical Society. Ray wrote more than 100 papers, some in collaboration with his students, on mercury salts and related compounds. He founded the Bengal Chemical and Pharmaceutical Works (1892) Bengal Pottery Works,

Calcutta Soap Works and other factories, in the face of obstruction of the British.

His life style was so prudent that he gave away most of his savings and pension to propagation of chemistry and to poor students. The University established the 'Acharya P.C. Ray Museum' to house his personal belongings, collection of books and many of Shakespeare's plays with his personal noting. Prafulla Chandra died on June 16, 1944 in his room in the college. The Royal Society of Chemistry, UK has honoured the life and work of Acharya Prafulla Chandra Ray, father of Indian Chemistry, with the first-ever Chemical Landmark Plaque outside Europe. RSC's chief executive Robert Parker made the announcement on Sep 29, 2011 at the launch of a report 'Developing Talent in the Chemical Sciences'. P C Ray was the first Indian to gain a doctorate in chemistry and was a prodigious publisher of scientific research. Widely considered as the father of Indian Chemistry, his work was, though belatedly, honoured with a Chemical Landmark Plaque in Kolkata. "This is just a small selection of his achievements and I am delighted to announce this award -- our first outside Europe -- to such an eminent scientist," RSC's chief executive Robert Parker said while making the announcement on Sep 29, 2011 at the launch of a report 'Developing Talent in the Chemical Sciences'. The Indian chemical industry has evolved a lot over the past decade. Today, India has a significant presence in the production of basic organic and inorganic chemicals, pesticides, paints, dyestuffs and intermediates, petrochemicals, fine and specialty chemicals, cosmetics and toiletry product segments. There are challenges involved in running a chemical industry and integrating the engineering skills with the knowledge of chemistry. That is the task we should be prepared to undertake and to the progress and development of the nation through optimal utilisation of our knowledge. We have the example of great genius of Acharya P. C. Ray to emulate and the highly developed modern technology to be acquired and executed.

Health and Environmental impact of Paints

Dr D.L.Buam

Paints are products manufactured from a wide range of organic and inorganic materials. Paint is a pigmented coating material, in liquid or in paste or powder form, it forms an opaque film having protective, decorative or specific technical properties when applied to the surface after which it dries up to a solid, adherent and protective coating. Paint is a simple mixture of ingredients including pigments, a binder and a diluent or thinner but these can contain components which can have adverse impact on the environment due to the following :

- Release of solvents, heavy metals and other toxic substances used in their manufacture
- Release of solvents, heavy metals and other toxic substances during the life of a paint
- Coating and in its removal and disposal

The volatile organic compounds (VOCs) are Aromatic hydrocarbons which are mixed in paint solvents, these volatile organic compounds evaporate during use and are the main contributors to adversely affect the environment. When released into the atmosphere, VOCs react with nitrogen oxide to form ozone, one of the main components of air pollution, particularly smog in summer. VOCs also have impact on the human health as they cause damage to the human nervous system, blood, and kidneys, when exposed over a long period of time. Not only the VOCs but there are other elements that also affect and these are some metals and elements that are used in paints which include the following :

- **Mercury:** Mercury was added as biocide but exposure to these metals either through respiration or direct contact results in long-term health effects, increasing with accumulated exposure.
- **Lead:** Lead was added in the paint as it provided paint drying, and corrosion resistance. Lead can affect almost every organ and system in human body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the immune system and the effects are the same whether it is breathed or swallowed.
- **Arsenic:** It is used in paints as a preservative. It is known that inorganic arsenic is a human poison but organic arsenic is less harmful. Arsenic damages many tissues including nerves, stomach and intestines, and skin. Breathing high levels can give you a sore throat and irritated lungs.

- **Cadmium:** Cadmium is another heavy metal, which has a severe effect on the human health. Breathing high levels of cadmium severely damages the lungs and can cause death. Eating food or drinking water with very high levels severely irritates the stomach, leading to vomiting and diarrhoea.
- **Hexavalent Chromium:** It is used in pigments in paints. These Cr(VI) compounds have been found to be carcinogenic in humans and hence their addition to the paint preparation is prohibited by most of the ecolabelling programs.
- **Antimony:** Antimony is used in paint as pigment. Exposure to antimony at high levels can result in a variety of adverse health effects.
- **Aromatic Hydrocarbons** Volatile aromatic hydrocarbons are used as solvents in paints. These aromatic hydrocarbons have severe effects on the human body and the environment and have a severe effect on the reproductive system and hence their use is prohibited
- **Halogenated Hydrocarbons :** Halogenated hydro-carbons are known to be ozone-depleting substances and are toxic to human health. Hence they are not to be used as a solvent in water-based paints.
- **Preservatives :** Formaldehyde was used in paint as the biocide to prevent degradation of the paint. Formaldehyde is a colourless, strong-smelling gas. It has severe effects on the human health, and as it is a carcinogenic substance it is not used much in paint.
- **Packaging materials :** The packaging material also contributes to the environmental pollution as the packaging material contains plastic material. To reduce the environmental pollution recyclable material is used by most industries.

The spraying of a paint can be worse as VOCs in the form of aerosols can readily spread in the air and harmful to the one who does the spraying, these can even get adsorbed or absorbed into the body. There is a need to educate those who are involved in paint work so as to enable them to take precautions while they are engaged in such jobs. In conclusion, the important suggestions are to use paints with low VOCs which include Latex (water based), recycled latex (water based), acrylic, and milk paint and so in order to check low VOC paint read label if paint consists of < 50g/l of VOC and for paints with zero VOC read label if paint consists of < 5g/l VOC.

Global Warming and its Effects

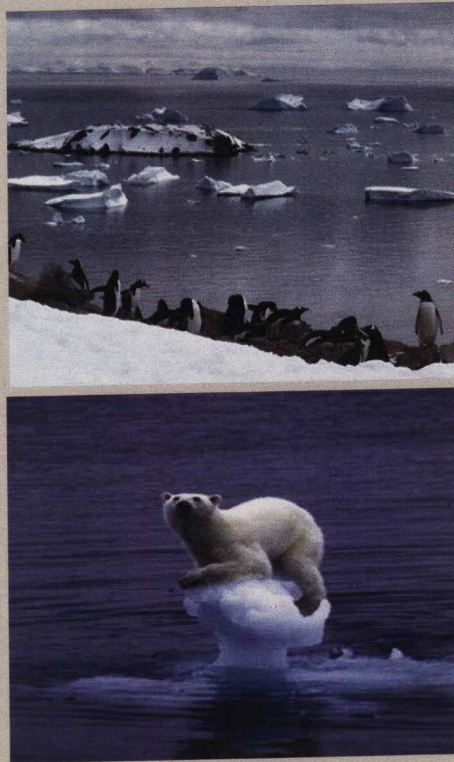
Ms L. Pathaw

The planet is warming, from North Pole to South Pole, and everywhere in between. Globally, the mercury is already up more than 1 degree Fahrenheit (0.8 degree Celsius), and even more in sensitive polar regions. And the effects of rising temperatures aren't waiting for some far-flung future. They're happening right now. Signs are appearing all over, and some of them are surprising. The heat is not only melting glaciers and sea ice, it's also shifting precipitation patterns and setting animals on the move.

Some impacts from increasing temperatures are already happening.

- Ice is melting worldwide, especially at the Earth's poles. This includes mountain glaciers, ice sheets covering West Antarctica and Greenland, and Arctic sea ice.
- Researcher Bill Fraser has tracked the decline of the Adélie penguins on Antarctica, where their numbers have fallen from 32,000 breeding pairs to 11,000 in 30 years.
- Sea level rise became faster over the last century.
- Some butterflies, foxes, and alpine plants have moved farther north or to higher, cooler areas.
- Precipitation (rain and snowfall) has increased across the globe, on average.

Antarctica has lost so much ice that it has caused a shift in Earth's gravity, according to a new study. The European Space Agency (ESA)'s GOCE satellite has shown that the ice lost from West Antarctica over the last few



Ice melting due to Global warming

years has left its signature. "The loss of ice from west Antarctica between 2009 and 2012 caused a dip in the gravity field over the region," ESA said in a statement. The strength of gravity at Earth's surface varies subtly from place to place owing to factors such as the planet's rotation and the position of mountains and ocean trenches. Changes in the mass of large ice sheets can also cause small local variations in gravity, ESA said.

Pacific walrus that can't find sea ice for resting in Arctic waters are coming ashore in record numbers on a beach in northwest Alaska. An estimated 35,000 walrus were photographed on Saturday about 5 miles (8 kilometers) north of Point Lay, according to the National Oceanic and Atmospheric Administration. As

temperatures warm in summer, the edge of the sea ice recedes north. Females and their young ride the edge of the sea ice into the Chukchi Sea, the body of water north of the Bering Strait. Walrus in large numbers were first spotted on the US side of the Chukchi Sea in 2007. They returned in 2009, and in 2011, scientists estimated 30,000 walrus appeared along a half-mile stretch (1 kilometer) of beach near Point Lay. Young animals are vulnerable to stampedes when a group gathers nearly shoulder-to-shoulder on a beach. Stampedes can be triggered by a polar bear, human hunter or low-flying airplane. The carcasses of more than 130 mostly young walrus were counted after a stampede in September 2009 at Alaska's Icy Cape. The World Wildlife Fund said walrus have also been gathering in large groups on the Russian side of the Chukchi Sea. "It's another remarkable sign of the dramatic environmental conditions changing as the result of sea ice loss," said Margaret Williams, managing director of the group's Arctic program, by phone from Washington, D.C. "The walrus are telling us what the polar bears have told us and what many indigenous people have told us in the high Arctic, and that is that the Arctic environment is changing extremely rapidly and it is time for the rest of the world to take notice and also to take action to address the root causes of climate change.



DIETHYLSTILBESTROL (DES)

Dr. C. Masharing

What is Diethylstilbestrol?

Diethylstilbestrol with a molecular formula $C_{18}H_{20}O_2$ is a synthetic nonsteroidal estrogen which was first synthesized in the early 1938 by Leon Golberg at the Perrins Laboratory at the University of Oxford. A report of this work was published in higher impact Journal i.e Nature on 5th February 1938.

Why is DES used in food production?

DES was one of the first synthetic estrogens made and used commercially in the US to fatten chickens. DES was also used as a drug in human medicine. Certain hormones can make young animals gain weight faster. They help reduce the waiting time and the amount of feed eaten by an animal before slaughter in meat industries. In dairy cows, hormones can be used to increase milk production. Thus, hormones can increase the profitability of the meat and dairy industries. Synthetic estrogens started being used to increase the size of cattle and chickens in the early 1950s.

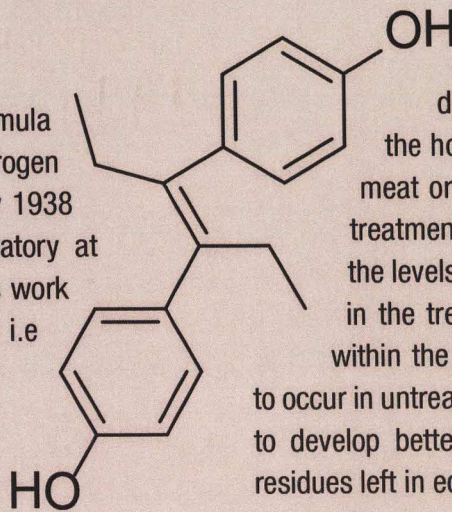
How DES is introduced into the animals?

Steroid hormones are usually released into the animal from a pellet (ear implant) that is put under the skin of the ear. The ears of the animals are thrown away at slaughter. Improper use of pellet implants in other parts of the animal can result in higher levels of hormone residues to remain in the edible meat. Federal regulations prohibit their use in this manner. Melengestrol acetate is also available in a form that can be added to animal feed.

Dairy cattle may be injected under the skin with rbGH. This hormone is available in packages of single dose injections to reduce chances of accidental overdose.

Does DES remain in the milk or meat of treated animals?

The levels of naturally produced hormones vary from animal to animal, and a range in these levels is known to be normal. Because it is not possible to differentiate between the hormones produced naturally by the animal



and those used to treat the animal, it is difficult to determine exactly how much of the hormone used for treatment remains in the meat or the milk. Studies indicate that if correct treatment and slaughter procedures are followed, the levels of these hormones may be slightly higher in the treated animal's meat or milk, but are still within the normal range of natural variation known to occur in untreated animals. Scientists are currently trying to develop better methods to measure steroid hormone residues left in edible meat from a treated animal.

What is the Side effect of DES?

From about 1940 to 1971, DES was given to pregnant women in the mistaken belief it would reduce the risk of pregnancy complications and losses. DES was shown to cause clear cell carcinoma, a rare vaginal tumor in girls and women who had been exposed to this drug in utero. The United States Food and Drug Administration subsequently withdrew DES from use in pregnant women. Follow-up studies have indicated that DES also has the potential to cause a variety of significant adverse medical complications during the lifetimes of those exposed. The United States National Cancer Institute recommends women born to mothers who took DES undergo special medical exams on a regular basis to screen for complications as a result of the drug. Individuals who were exposed to DES during their mothers' pregnancies are commonly referred to as "DES daughters" and "DES sons". Women exposed to DES are at an increased risk for clear cell adenocarcinoma (CCA) of the vagina and cervix, reproductive tract structural differences, pregnancy complication, and infertility. Although DES daughters appear to be at high risk for clear cell cancer in their teens and early 20s, cases have been reported in DES Daughters in their 30s and 40s. Men exposed to DES before birth (in the womb), known as DES son, are at an increased risk for non-cancerous epididymal cysts. Steroid hormones in food were suspected to cause early puberty in girls in some reports.

COAL MINING

Mebanrilang Rymbai
B.Sc Ist

The goal of coal mining is to obtain coal and sometimes other resources from the ground. Coal is valued for its energy content and has been widely used to generate electricity. Steel, cement and many other industries use coal as a fuel for extraction of iron from iron ore, for cement production, for running engine, etc. There are different kinds of coal each with a different carbon concentration: Anthracite, Bituminous, Subbituminous coal and Ignite. Coal mining has a huge impact on the environment. It causes water and air pollution, greenhouse effect and many diseases on the labourer and it also affect the wildlife direct or indirectly. Coal and coal waste products releases approximately 20 toxic- chemicals, including arsenic, lead, mercury, nickel, vanadium, beryllium, cadmium, barium, chromium, copper, molybdenum, zinc, selenium and radium which are dangerous if released into the environment. During combustion, the reaction between the coal and the air produces oxides of carbon, including CO₂ (an important greenhouse gas), SO₂ and various oxides of nitrogen (NO_x). Hydrides and nitrides of carbon and sulfur are also produced during the combustion of coal in air. These includes hydrogen cyanide (HCN), sulfur nitrate (SNO₃) and other toxic substances. SO₂ and NO₂ react in the atmosphere to form fine particles and ground-level ozone and are transported long distances, making it difficult to achieve healthy levels of pollution control. Release of SO₂ also contributes to the widespread acidification of ecosystem. Coal remains the world's most abundant fossil fuel and along with petroleum and natural gas, it will continue to provide most of the world's energy. But all three are finite resources and society should consume them wisely, not wastefully in order to extend their lifetimes and reduce their harmful emissions. The conservation of fossil fuels and the development of alternative energies, such as solar and wind power are pathways to a global society's cleaner energy future.



MOLE DAY

Wanshanlang Kharmawphlang
3rd B.Sc

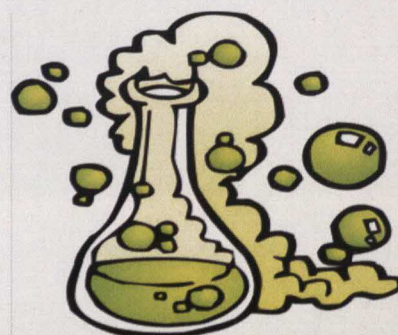
October 23rd (or 10/23) from 6:02 am to 6:02 pm is a mole day. No it's not a day for freckles or spies or cute little burrowing mammals. Rather it is the day to celebrate the chemical unit of the mole. It was first celebrated in the year 1991.

Mole day is an unofficial holiday celebrated among chemistry students, chemists and chemistry enthusiasts on 23rd October between 6:02 am to 6:02 pm making the date 6:02 10/23 in the American style of writing dates. This time and date are derived from Avogadro's number which is approximately 6.02×10^{23} defining the number of a particle in one mole of substance in SI unit.

So with that out of the way here are funny facts about the mole and mole day

- The mole is attributed to 18th century Italian scientist Amedeo Avogadro, whose full name is Lorenzo Romano Amedeo Carlo Avogadro di Queregna e di Cerreto. Man, that's a long name but it somehow fits the long number that now bears his name (6.02×10^{23} or 602000000000000000000000).
- Did you know that the mole day has annual themes. Here they are for examples:

- | | |
|----------------------------|------------------------------|
| 1991- The mole the merrier | 1998- Ride the molercoaster |
| 1992- Go for the mole | 1999- It's a mole world |
| 1993- Mole out the barrel | 2000- Celebrate the molenium |
| 1994- An ace in the mole | 2011- Molar eclipse |
| 1995- Moledi gras | 2012- Animole kingdom |
| 1996- Molemorial day | 2013- Fabulous mole project |
| 1997- We dig chemistry | 2014- Mole O'ween |



Signs you are a CHEMISTRY MAJOR

Biscora Umdor
3rd B.Sc

If you are chemistry major, you know you're special. Yet, can people tell you are chemistry major before you tell them? Yes! Here are the signs that set you apart from other students.

1. You get annoyed when someone tells you they don't want chemicals in their food (shampoo, cleaners, etc) because you know everything is a chemical.
2. The dark circles under your eyes from lack of sleep are from pulling all-nighters to write labs and work problems rather than from partying.
3. You often smell like a signature scent from the lab that no one mistake for designer perfume.
4. You not only know what are Avogadro's number is, but can state it with 5 significant figures.
5. You own a lab coat, wear it even when it isn't necessary, and like the interesting way its smells.
6. Despite the lab coat, most of your pants have holes in them from acid burns. There's a good chance you have some scars from chemical burns, too.
7. Cupboards contain lab glassware in addition to the usual kitchen utensils.
8. When someone refers to a mole, you think of the unit, not the burrowing mammals.
9. When asked if organic, you consider whether it contain carbon and hydrogen, not whether it was grown without pesticides.
10. You can pronounce the name of every ingredients on product packaging, know its purposed, and may be able to draw its structure.
11. You have multiple copies of the periodic tables, although you could state the name of at least the first 20 element in order and possibly their atomic weights. The periodic table may be the wallpaper on your phone and computer.
12. You rarely get to wear sandals or flip flops. When you do wear them you're conscious spilling liquid on your feet.
13. If you need vision correction, you wear glasses, because you can't wear contact in the lab. You may even own a pair of prescription safety glasses.
14. No matter how well thing are going, you can always find some type of error

CHEMISTRY OF HUMAN BODY

Pooja Newar
B.Sc 1st

Chemistry has importance in every part of life. Even the body of human being is full of chemical composition and reactions.

Human body is made up of just four elements:-Oxygen, Carbon, Hydrogen and Nitrogen with a lot of that in the form of water. The remaining four percent is a sparse sampling of the periodic table of elements. Some of the more prominent representatives are called macro nutrients, whereas those appearing only at the level of parts per million or less are referred to as micronutrients. These nutrients perform various functions including the building of bones, cell structures, regulating the body's pH, carrying charge and driving chemical reactions. And there are several other elements such as Silicon, Boron, Nickel, Vanadium and Lead that may play a biological role but are not classified as essential. Here are some percentages of the chemical elements present in the human body.

Oxygen(65%) and Hydrogen (10%) found in water

Carbon (18%)

Nitrogen (3%)

Calcium(1.5%)

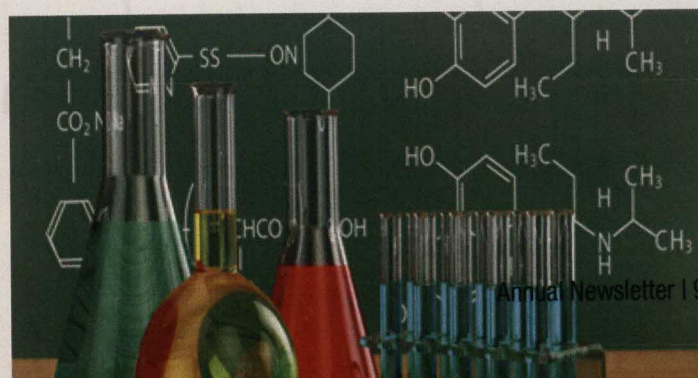
Phosphorus (1%)

Potassium (0.25%)

Sodium (0.15%)

Chlorine (0.15%)

Many reactions occur in the human body including Ionic bond reactions, Covalent bond reactions, H-bond reactions. Even while taking breathe in or out reactions use to take place. The chemical reactions of metabolism occur over and over again.



Skin care using NATURE'S BEST.

Marbester Mawkhiew
B.Sc 3rd

Tulsi leaves are used in the treatment of pimples. Take a few Tulsi leaves, mint and a tablespoon of yoghurt. Grind it into a paste and apply it gently on the pimples. Wash it off after 15 minutes to get a glowing skin.

Curd is good for oily skin. It can be used as it is or along with sandalwood powder. Also used with wheat husk and a few drops of lime juice. Cucumber helps to get rid of dark circles and puffiness around the eyes. Mix cucumber juice with an equal quantity of milk, and make it cold in the refrigerator. Soak cotton pads in it and keep them on your eyes for 10 minutes.

Honey is a natural moisturizer. By applying honey daily you can give a natural glow to a dry and dull face. Mix honey with a few drops of lemon juice, apply on the face and wash it off after 20 minutes. It can give brightness to a dry skin. Lime juice is a kind of natural bleach, but it should not be used directly on the face. Always mix it with gram flour or milk cream or honey for dry skin and sandalwood powder or yoghurt for oily skin.

Milk cream is the best of all the creams available for dry skin. Apply gram flour mixed with one teaspoon of milk cream and one teaspoon of honey every day. It can be applied on both face and body. Frequent application of this pack will make your skin smooth and shining. Dry the neem leaves and crush them into powder in the mixer. Take one teaspoon of this powder mix it with white part of an egg and apply it on the pimples. Allow it to remain till fully dry. Rub it in the upward direction and wash it off. After only two applications the pimples disappear. Take half a cup of crushed papaya and one teaspoon each of water, melon juice, lime juice and honey. Mix it well and apply it to bring a natural brightness to your skin. It also brings about natural colour and warmth to your dark arms, feet, knees and elbows.

Rose water is good for all skin types. It can also be used with gram flour or rice powder. Mix rose water, glycerine and lemon juice in the proportion of 1:1: 1/2 respectively. This mixture makes a strong body lotion for dry / normal skin and can be applied anytime. Turmeric is an excellent germ killer. A pinch of turmeric may be added to all the face packs.

CHEMISTRY OF COFFEE

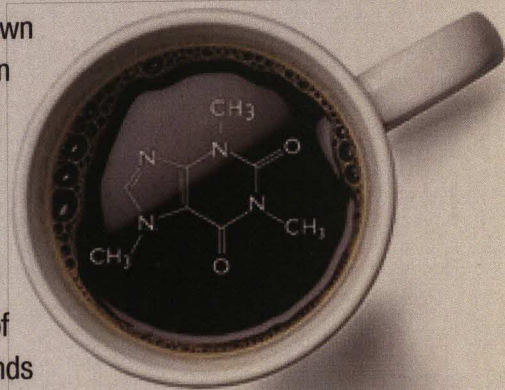
Mary Wankmen Khongwar
B.Sc 1st

Everyday millions of people around the world begin their day religiously with a morning cup of coffee. Though today we easily identify coffee in its beverage form, it was not always this way in the beginning.

Coffee drinking is simply a delivery medium for a potent alkaloid we have identified as caffeine or 1,3,7-trimethylxanthine. Caffeine is typically associated with coffee, its production within the plant kingdom spans across numerous other plant species. For humans caffeine is very unique. Thus far we are the only living forms on Earth that readily seek caffeine for both its stimulatory and psychological effects. For all other life forms, caffeine is a potent toxin capable of sterilization, phytotoxicity and antifungal properties.

Another less known alkaloid that shadows in the light of caffeine is that of Trigonelline. Its concentration is slightly less than that of caffeine, it plays a significant role in the development of important flavor compounds during roasting. But unlike that of caffeine, which survives the roasting process, trigonelline is decomposed leading to the formation of Carbon dioxide, water and the development of a large class of aromatic compounds called pyridines. These heterocyclic compounds play an important role in flavour and are responsible for producing the sweet/caramel/earthy-like aromas commonly found in coffee. Another important by-product produced during decomposition of trigonelline is nicotinic acid, or vitamin B3 – more commonly known as niacin. Depending on roasting conditions niacin can increase up to ten times its initial concentration, providing anywhere between 1mg of niacin per cup for Americano type coffees and roughly two to three times this concentration in espresso type beverages.

In the end, "It looks like drinking a cup of coffee may not only keep the doctor away, but the dentist as well"



NEUTRON ACTIVATION ANALYSIS

Lawandashisha Warjri
B.Sc 3rd

In chemistry, neutron activation analysis (NAA) is a nuclear process used for determining the concentrations of elements in a vast amount of materials. NAA allows discrete sampling of elements as it disregards the chemical form of a sample, and focuses solely on its nucleus. The method is based on neutron activation and therefore requires a source of neutrons. The sample is bombarded with neutrons, causing the elements to form radioactive isotopes. The radioactive emissions and radioactive decay paths for each element are well known. Using this information, it is possible to study spectra of the emissions of the radioactive sample, and determine the concentrations of the elements within it. A particular advantage of this technique is that it does not destroy the sample, and thus has been used for analysis of works of art and historical artefacts. NAA can also be used to determine the activity of a radioactive sample.

Analytical capabilities

NAA can detect up to 74 elements depending upon the experimental procedure, with minimum detection limits ranging from 0.1 to 1×10^6 ng g⁻¹ depending on element under investigation. Heavier elements have larger nuclei, therefore they have a larger neutron capture cross-section and are more likely to be activated. Some nuclei can capture a number of neutrons and remain relatively stable, not undergoing transmutation or decay for many months or even years.

Estimated Detection limits for INAA using decay gamma rays (assuming irradiation in a reactor neutron flux of 1×10^{13} n cm⁻² s⁻¹)

Sensitivity (picograms)	Elements
1	Dy, Eu
1–10	In, Lu, Mn
10–100	Au, Ho, Ir, Re, Sm, W
100–1000	Ag, Ar, As, Br, Cl, Co, Cs, Cu, Er, Ga, Hf, I, La, Sb, Sc, Se, Ta, Tb, Th, Tm, U, V, Yb
1000–104	Al, Ba, Cd, Ce, Cr, Hg, Kr, Gd, Ge, Mo, Na, Nd, Ni, Os, Pd, Rb, Rh, Ru, Sr, Te, Zn, Zr
104–105	Bi, Ca, K, Mg, P, Pt, Si, Sn, Ti, Tl, Xe, Y
105–106	F, Fe, Nb, Ne
107	Pb, S

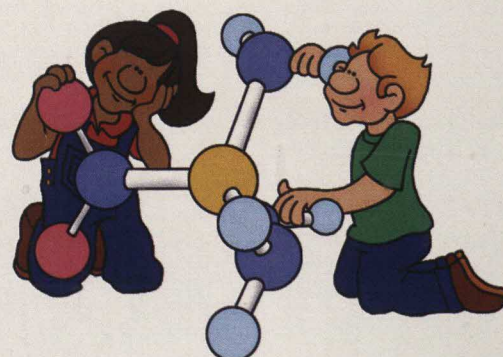
NAA can perform non-destructive analyses on solids, liquids, suspensions, slurries, and gases with no or minimal preparation. Due to the penetrating nature of incident neutrons and resultant gamma rays, the technique provides a true bulk analysis. As different radioisotopes have different half-lives, counting can be delayed to allow interfering species to decay eliminating interference. There are two noteworthy drawbacks to the use of NAA; even though the technique is essentially non-destructive, the irradiated sample will remain radioactive for many years after the initial analysis, requiring handling and disposal protocols for low-level to medium-level radioactive material; also, the number of suitable activation nuclear reactors is declining; with a lack of irradiation facilities, the technique has declined in popularity and become more expensive.

POLYESTER CLOTHES 'STINK' MORE THAN COTTON POST WORKOUT

Teiborlang Kurbah
2nd B.Sc

A new study has found that polyester clothes reek badly than cotton ones after people do rigorous exercise, since they contain bacteria that causes the stench to grow more. In the study, the investigators collected T-shirts from 26 healthy individuals following an intensive, hour-long bicycle spinning session, and incubated the T shirt for 28 hours before having them inspected by a trained odor panel.

The researchers also investigated the taxonomy of the bacteria on the T shirts and in the axillaries. These bacteria are mainly the culprit bacteria known as micrococci. They are known for their enzymatic potential to transform long chain fatty acids, hormones and amino acids into smaller, volatile compounds which have typical malodour. Staphylococci, which inhibit both axillary skin and adjacent textiles, create a normal, non malodorous body odor.



Did you know?

FOOD FACTS

TeiborlangKurbah
2nd BSc

Brinjal has a compound called nasunin which blocks the formation of blood vessels that feed malignant tumors.

Garlic consumption may also support a healthy immune system by increasing the activity of white blood cells and T-helper cells.

Cranberries boost HDL "good" cholesterol levels. It also help in reducing Alzheimer's risk and alleviate infection of the prostate gland. 2) Cucumber has 95% water content which causes the inside of a cucumber to measure up to 20 degrees cooler than the outside temperature.

Cauliflower suppresses breast cancer cell growth and promotes cancer cell death. It contains vitamin C, vitamin K, folate and vitamin B6.

Coconuts also provide an excellent source of manganese and fiber as well as a good source of copper, iron and selenium.

Pineapple contains bromelain which acts as a "clean up agent," digesting dead cells to help skin injuries heal faster.

Green cabbage provides high levels of glucosinolates which inhibits tumor growth and stimulates body's own natural enzyme systems.

Beans are naturally low in fat and high in fiber, protein, folate, and essential nutrients. It reduces diabetes and cancer risk.

Blueberry bonus: Like their little red cousin, the cranberry, blueberries contain compounds that may help ward off urinary tract infections.

Red bell peppers are loaded with beta-cryptoxanthin, a vitamin-A carotenoid, which may reduce the risk of lung cancer.

Beets are good source of folic acid, manganese and potassium. It regulates blood pressure, as well as beta-carotene for supporting eyesight.

Apples are a top source of quercetin which may reduce the risk of Alzheimer's disease as well as lung and prostate cancers.

Bananas are excellent source of vitamin B6 and a good source of potassium, fiber and vitamin C - nutrients that help promote heart health.



Eat Fruits for Healthy Heart

Teiborlang Kurbah
2nd B.Sc

Daily Fruit consumption cuts the overall risk of death by 32 percent and cardio-vascular diseases (CVDs) by up to 40 percent, study shows. Researchers found that compared to people who never ate fruit, those who ate fruit daily cut their CVD risk 25-40 percent around 15 percent for heart ischemic disease (IHD), around 25 percent for ischemic stroke and 40 percent for hemorrhagic stroke. The findings came from a seven year follow up study of nearly 5,000,00

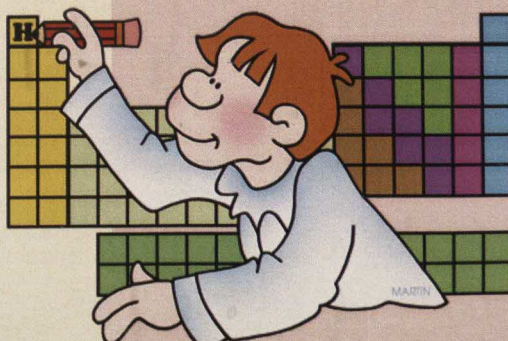
people living in ten different areas of china. The more fruit you eat the more your CVD risk goes down. It suggests that eating more fruit is beneficial compared to less or no fruit, said lead researcher DrHuaidong Du Oxford University. The researchers also found that people who consumed fruit more often had significantly lower blood pressure (BP). "Patients with CVD and hypertension should also be encouraged to consume more fresh fruit".

Riddles and Jokes

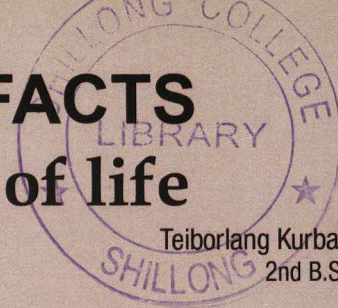
Wanshanlang Kharmawphlang
3rd B.Sc

Every Chemist deserves a break. So put down that beaker, take off your lab coat, your safety glasses and enjoy a few Chemistry jokes and riddles.

- Don't trust atoms, they make up everything
- A proton and neutron are walking down the street the proton says "Wait, I dropped an electron"
- The neutron says "Are you sure?"
- he proton replies "Yes I'm positive".
- The optimist sees the glass half filled
- The pessimist sees the glass half empty
- But!! The chemists see the glasses completely full. Half with liquid and half with gases.
- A neutron walked into a bar. He asked the bartender "How much for a beer?". The bartender offers him a warm smile and says "For you! No charge".
- Did you know that oxygen went for a second date with potassium: How did it go?
- It went OK2.
- Why do chemists like Nitrates so much?
- Because it is cheaper than day rates.
- I asked the guy sitting next to me if he had any sodium hybobromite?
- He said NaBrO.
- What is the show cesium and iodine love watching together?
- CSI.
- If H₂O is the formula for water, what is the formula of Ice?
- H₂O cubed.
- What did a bartender say oxygen, hydrogen, sulphur, sodium and phosphorus walked into his bar?
- OHSNaP
- What do you called a tooth in a glass of water?
- 1 molar solution.
- When one physicist asks another, what's new?
- Cover lambda.
- What element is derived from a Norse god?
- Thorium.



FUN FACTS Laws of life



- Laws of Mechanical repair:
- After your hand becomes coated with grease, your nose will begin to itch.
- Law of the Telephone:
- When you dial the wrong number, you never get an engaged one.
- Law of Alibi:
- If you tell the boss, you were late for work because you had a flat tyre, the next morning you will have a flat tyre.
- Variation law:
- If you chance queues, the one you have will start move faster than the one you are in now.
- Law of close encounters:
- The probability of meeting someone you know will increase when you are with someone you don't want to be seen with.
- Law of the result:
- When you try to prove to someone that machine won't work, it will.
- Law of coffee:
- As soon as you sit down to a cup of hot coffee, your boss will ask you to do something, which will last until the coffee is cold.

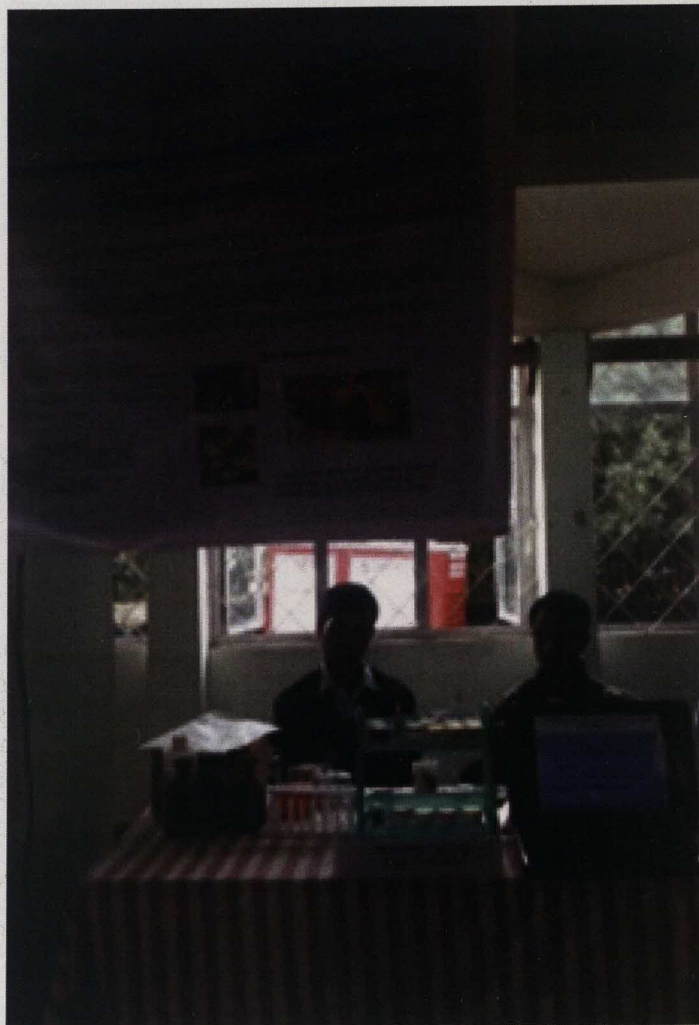


ACCOMPLISHMENTS OF THE DEPARTMENT

3rd Chemistry Honours Students, Govindstar Lyngdoh Nongbri and Nicolas Myllem participated in the Inter College Science Exhibition organized by the Science Club, Synod College on the 24th September 2015. The program was organized as a part of the Golden Jubilee Celebration of the college. The Chemistry Honours students of the college took part in the exhibition on the topic "Impact of Food, adulterants on Human Health where a demonstration/ display of some food adulterants like brick powder, urea, starch, aluminium were shown to be present in some food commodities like turmeric, chilli powder, milk etc. The students actively participated in the exhibition and were given a certificate of participation. The department of chemistry appreciates the participation as this is the first time for the students to join in the inter college science exhibition.

Accchievements:

- Shri Udit Narayan Hazarika secured 5th position in the B. Sc 3rd Year (Hons) Final examination conducted by NEHU in 2015
- Smt. Barisha Wahlang, part-time teacher, Dept of Chemistry Shillong College was awarded PhD degree on the 5th February 2015 on the topic " Studies on synthetic applications of electron deficient and heteroatom substituted olefins with special reference to olefin metathesis" under the guidance of Prof G.Bez
- Smt Badaker M .Laloo , regular teacher, Dept of Chemistry Shillong College was awarded PhD degree on the 29th July 2015 on the topic "SeO₂-promoted synthesis of α - substituted and α,α di-substituted aromatic ketones and related compounds" under the joint supervision of Prof. B. Myrboh and Dr. R.L. Nongkhlaw
- Smt Larica Pathaw, regular teacher, Dept of Chemistry Shillong College has completed the course work for PhD degree and was awarded 'O' grade.

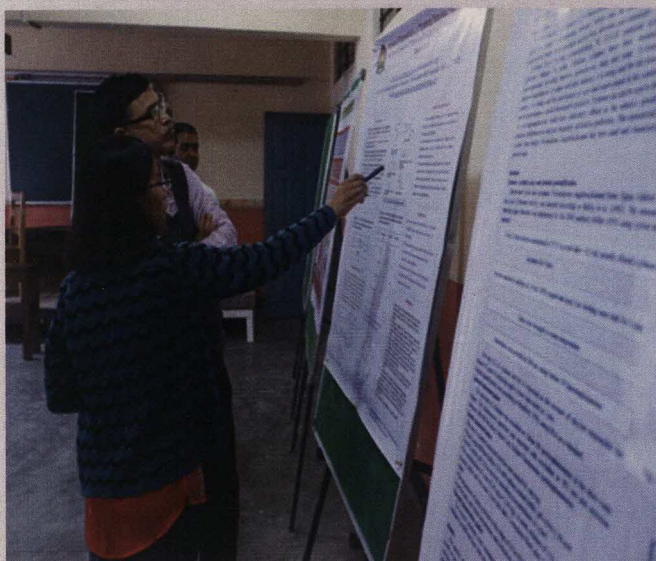




Visit To Magic Cement Plant, Umiam.



Students presenting a special item during the Departmental National Seminar on Exploring Recent Advances in Chemistry in Service of mankind, 2015



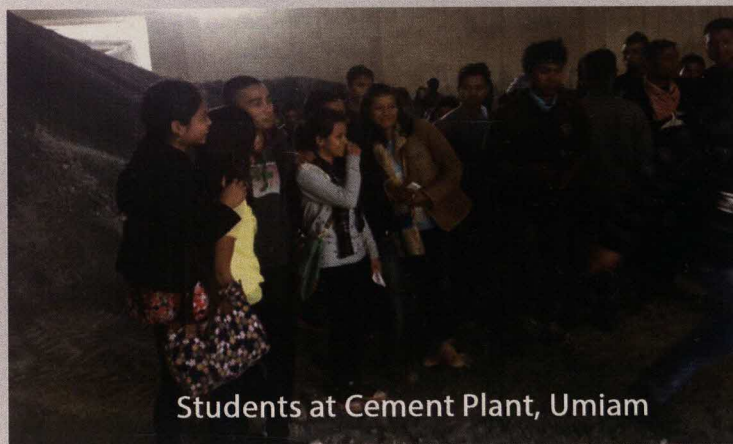
Poster Presentation during National Seminar on Exploring Recent Advances in Chemistry in Service of mankind, 2015



Former HOD Lt. T.J Kharbhiih congratulates the Jubilarian Dr. M. N. Bhattacharjee



Dr D. L Buam felicitating chairperson Dr. B. Bhattacharjee during the Departmental National Seminar on Exploring Recent Advances in Chemistry in Service of mankind, 2015



Students at Cement Plant, Umiam

