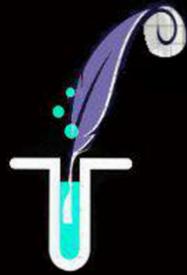


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PATHWAYS

FORMULATING THE FUTURE





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“Teachers”- They are the silent warriors who make the world a better place, one child at a time. They are essentially the link between knowledge and education. To the young and old alike the Teacher-Student relationship has always been that of understanding each other’s requirements and coming to proviso with each other’s expectations. This edition is a dedication to the wonderful teachers who form an integral part of our life.

Our September edition is quite a nostalgic one as we caught up with the retired faculty members of A.C. Tech. They shared with us their memories and experiences from back in the day, opinions on today's generation and enlightened us with their kind words of wisdom. A must read for all you young budding engineers.

As you read you will come across some of the greatest minds of the Chemical Engineering world, who apart from being eccentric curators of various innovations have also imparted their knowledge to students to carry on their zeal to create and innovate further.

Our regular sections Jokes, Train of Thought, Word Search and ACT Dairies are included to lighten the mood and also unleash the inner “CHEF” in you by trying out our recipe in the Chem Kitchen section. Our ACT Alumni continue to be involved and share with us their experiences in the Alumni Corner & contribute articles on their Graduate School Experience. They continue to be our Pillars of Support.

We also have a special piece on “AURORA” 2016 highlighting the teacher's day celebrations- a kind gesture by our students.

We hope you enjoy this very special edition of Pathways. Feel free to us your suggestions on pathwaysteam16@gmail.com

access our magazine on www.pathways.mnmserve.com and do send HAPPY READING !

SANJANA R

MESSAGE FROM THE HEAD OF DEPARTMENT



The most wonderful part of being a teacher is to think that many years down the line, there will be someone, somewhere out there, thinking about how lucky they were to be taught by a particular teacher. It is this feeling that I hope to experience as I sure feel this way about my professors.

This year's Teachers' Day was unique in many different ways, thanks to the many forgotten elements that were enforced this year. Aurora 2016 was a roaring success and this was made possible by the various groups of people who were a vital part of it, faculty and students who were instrumental in pointing out various aspects of the day and a very special mention to our retired professors, 13 to be accurate, who made it a point to return back to our campus and grace the occasion. Them being back

transported me to my college days, a feeling of being young and the excitement that comes along with it- "A good trip down memory lane" is how I'd put it.

This year I made it a point that food that day, was served on a plantain leaf, a tradition that has long been forgotten and neglected and every person who managed to not waste any food on the leaf was rewarded, rather handsomely too. This again, was a simple lesson, on two things, to uphold our traditional values and to not waste food.

I was full of gratitude when I spoke about each professor who was present that day. They are people who have taught me more than just class room lessons but "Life Lessons" which I uphold to this very day. To recount a few incidents of two different professors, one professor who never used to miss a class or a day to work, which taught me about humility, punctuality, perseverance and sincerity. The other incident though, was something really amusing to me; it's about two professors who taught me the meaning of true friendship. They used to be half and half in whatever they did. Be it from lessons, classes to splitting food in the canteen, they used to be an epitome of an example on how real friendship worked. These are the things which have helped me succeed in life, all throughout the years.

Students should not only use one day a year, Teachers' Day to establish connections with the teachers. There are several other platforms through which a student can get to know his/her teachers better, acknowledge their presence and vice versa. The amount of learning and take backs in a teacher-student relationship is magnificent and it is an opportunity that should very dearly not be given a miss. With a content of starting off something beautiful and sustainable, we start off another academic year with our guiding lights, our teachers and wonderful students.

To Teachers everywhere- it is truly a day to celebrate.

DR. N. NAGENDRA GANDHI
HEAD OF THE DEPARTMENT
DEPARTMENT OF CHEMICAL ENGINEERING



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THE MAN WHO MADE A.C. TECH HAPPEN



DR G.S.LADDHA

Professor Dr. G.S.Laddha, the former director of our Alagappa College of technology, is a renowned Chemical Engineer. He is very well known for his book '**Transport phenomena in liquid extraction**'. Born on August 26,1922 in Rajasthan, he contributed several research works in the field of chemical engineering. He attained his B.Sc. at Laxmi-Narayana University in Nagpur in 1944 and obtained his MS (1947) and Ph.D. (1949) in that discipline from Purdue University in the US.

On a lecture visit to Madras, Prof. Laddha was persuaded in January 1950 to accept the position of Reader by the University of Madras at the A C College of Technology, by the then Vice Chancellor Dr. A Lakshmanaswami Mudaliar. By 1957, he was a Professor and Campus Director, and in the years that followed, he helped the college become one of the premier institutions in the country. Prof. Laddha was the director of AC Tech for more than 30 years. His research in Crystal growth led to the establishment of Crystal growth Centre in Anna University. He contributed for the establishment of several chemical industries in India. He played a major role in the progress review committee of IIT Madras which constituted the President of India. He took part in the formation of 'Indian Institute of Chemical Engineers' and served as its president. In the 1980s he established the Chennai Regional Centre of IICHE. He also served as a director of Chemplast Sanmar Limited.

On 1st September 1995, Anna University conferred on Prof. Laddha the degree of Honorary D.Sc.. He was the first recipient of the Ambrose Congreve award and the honour of Chemical Engineering. In 2001 he was presented with the Dr. Burjor P. Godrej lifetime achievement award at the Indian Chemical Engineering Congress. The Indian Institute of Chemical Engineers has instituted an award in his name "Prof G S Laddha Chemcon Distinguished speaker award". The Alagappa College of Technology awards renowned academicians with an award "Professor G.S. Laddha Distinguished Professorship award". The Rajasthan Ratna is awarded to people who have served for more than 25 years in social service, education or medical services. The award was conferred on Dr. G.S. Laddha for his work in the field of Chemical Engineering (2005). He was honoured by the governor of Tamil Nadu for his contributions to Chemical Engineering. Dr. G.S. Laddha's pioneering contributions and achievements are always leading us to a better future.

- V.Reeshma Sona (2nd Year Chemical Engineering)



BIOCOMPATIBILITY

We live in a society that strives to attain perfection with ease. Be it in living a life with no pain or living to a ripe old age by any means possible. Over the past few decades, ingenious advances in nearly every aspect of modern medicine have led to attaining perfection through these miracles. This feat has been achieved through biocompatible materials developed by the chemical engineering community. These discoveries have helped extend and enhance our quality of life, improve disease diagnosis, treatment, and ease sufferings.

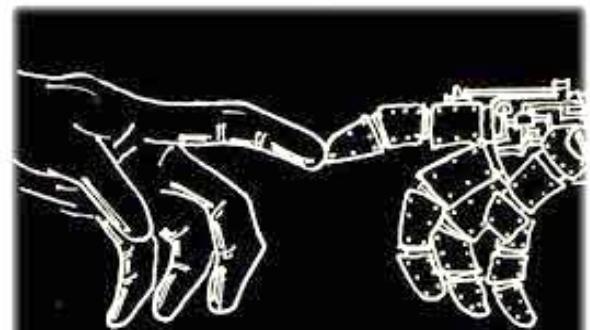
Developing such materials is not an easy thing to do at all. They not only have to come up with **devices or drugs that can successfully meet the patient's needs, but ensure the materials used** are accepted by the bodies and can resist damage, degradation and are non-toxic. Longevity is another important criterion that must be met as almost every device has the ability to perform perfectly in the first year or so. But as time goes by it has been noted some devices stop functioning properly and develop infections that can be lethal to the patient. For that reason, chemical engineers have to be careful in the way they design biocompatible materials as it requires precise perfection.

Among diverse biocompatible materials developed for use today, those used *in vivo*, or inside the body, include the following:

- Vascular grafts used to repair or reinforce existing veins and arteries (fabricated from specialized polyester, they are lightweight yet strong)
- Stents used to facilitate drainage and reinforce weak arterial tissue (they are fabricated from specialized stainless-steel alloys that are both strong and lightweight)
- Spinal, cardiovascular, and ophthalmic implant devices made from various specialized polymers, ceramics, and metals
- Creation of artificial knees, hips, arms and even entire legs (fabricated from combinations of biocompatible polymers and surgical titanium, they are rugged yet still highly flexible)

It is said a doctor may help save the life of a single patient whereas an engineer can save thousands of lives with his innovative discoveries through technology. Proving this point, along with many other advancements, chemical engineers have helped the medical field to help those that need the most help, and to help their patients live a better, healthier life. These pioneering innovative breakthroughs are truly miracles of modern medicine.

It is said a doctor may help save the life of a single patient whereas an engineer can save thousands of lives with his innovative discoveries through technology.



-Jebin (2nd Year Chemical Engineering)

These four uses of biocompatible materials have made things that seem impossible in the past to be a reality now. They have given those who once thought they would never walk or run again a second chance, and have helped them regain their quality of life and have their prospect for longevity increased.

DR. P Vivekanandhan

Disciplines taught:

Computer Science, ECE, Mechanical, Civil Engineering, Architecture, Numerical and Advanced Numerical Methods.

1) Advice to students of today?

Students must uphold honesty and sincerity. Moreover, they should not let corruption to find a way into their lives, in whichever way possible. This is the only way they can be the agents of a better society for the coming generations. Nowadays, corruption is widespread, like a contagious disease. Students must also empower and uplift one another and should always make it a point to visit other countries for better learning and job opportunities. The exposure gotten through those experiences are unimaginable.

Honesty, sincerity, no corruption, society into the up, very difficult. Corruption is wide spread. Help each other, explore other countries, and if students like the lifestyle of a particular country they can even consider settling themselves in other countries.

2) One incident that you'd always remember?

A good 20 years ago, there was a student from a rural background who did not want to continue the course despite a good cut off score, at AC Tech, only due to the fact that his parents were not able to make ends meet and pay his semester fees. I paid his fees and made sure he completed his degree here at Anna University. I later, let that incident pass off from my memory. 2 years ago, in an alumni meet, the same boy addressed in front of a huge crowd and thanked me. He said, 'My life today is because of that one timely help you did for me many years back, thank you Sir!'

DR.M.R.V. KRISHNAN

Director, Curriculum Development,
Professor of Chemical Engineering,
Adjunct professor of Biotechnology.

Years of service: **1979 to 2001**

**1)What do you think has changed in the college over the years?**

"The quality of education has clearly improved, attributing to better infrastructure, foundation of new laboratories and students mentality on the whole "

2)What do you consider as your favourite subject to teach?

"Without a doubt, it would be Design Drawing - my students never used to miss my classes, I also used to handle Fluid Mechanics as well as Mechanical Operations"

3)What do you consider to be the proudest moments of your career?

"There are a lot of good memories that I have made and few of them in particular are:

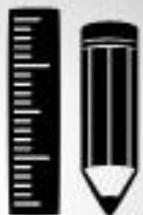
Establishing 4 new Departments including, **Sugar Technology, Polymer Technology at MIT, Department of Biotechnology, Department of Petroleum Refining and Petrochemicals.**

1. Having DR.G.S. LADDHA as my guide, whom I consider the best teacher I have ever had.
2. Being DR.A.P.J. ABDUL KALAM'S best friend and neighbour
3. Having DR.M. SWAMINATHAN as a good friend and most importantly Teaching a lot of great students over the years.

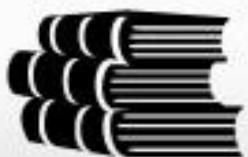
4)What would be your Message to the current generation of students?

"I would suggest them to inculcate the spirit of research and in addition to the prescribed textbooks. I would also recommend them to read journals and bulletins for they offer additional knowledge and results in concordance with modern science. I clearly want them to understand the importance of their Motherland for it is their responsibility and duty to do so. Study of foreign language is also something that I would like to stress upon"

"BEFORE I CONCLUDE, I KINDLY REQUEST ALL STUDENTS TO TAKE CARE OF THE NATION, FOR IT IS THEIR PRIME DUTY"



MY EXPERIENCE AT A GRADUATE SCHOOL



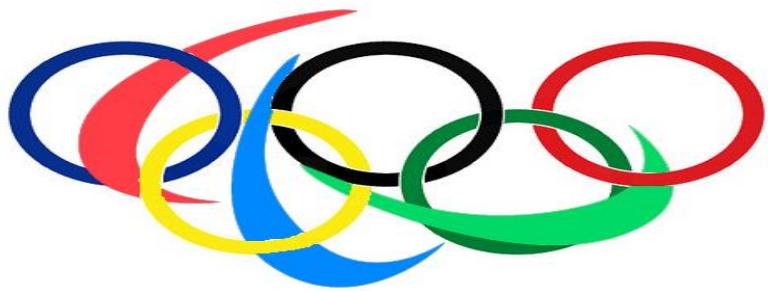
Throughout the four years of engineering and probably towards the end of the course, one question always loomed large on me- Job or Grad School? One on hand there was the option to start earning early in life and on the other hand to expand my knowledge base. I chose the latter and decided to diversify and pursue a MBA degree. After spending months attending coaching classes for CAT and somehow managing to score a decent percentile and scraping through an interview, I found myself at the Indian Institute of Management Indore.

Situated on top of a hillock, just outside the city of Indore, the campus voted as one of India's most beautiful campus, is truly a marvelous sight. Lush greenery, winding roads, state of the art infrastructure, all contribute to make it a truly amazing place to learn. B-Schools in general are thought to be very formal and strict but that's not the case. Some degree of these elements do exist but there's also a whole other side to it. You get to learn independence, time management and what not. Preparing cases after cases for numerous subjects, pre reading for the coming classes, staying up nights together to complete group assignments, etc. is all very different but fun at the same time. Multitasking is something you learn very quickly and become a master at within weeks once you join a B-school and I can safely assume that it's the same in every grad school. You're exposed to a whole new way of learning and living here. One develops holistically by learning the ability to manage tons of academic workload with everyday social life.



Grad school is a whole new chapter of your life. It's exciting, fast paced and highly competitive. Be prepared for a roller coaster ride with repeated ups and downs but with an evergreen thrill. It may seem like a lot of work but once you're there, you will have the time of your life and believe me- It's totally worth it!

-Anubhav Kedia (Alumni Chemical Engineering Batch 2012-2016)



PARALYMPICS

"Talent is ubiquitous"

The Paralympic Games is a major international multi-sport event involving athletes with a range of disabilities, including impaired muscle (e.g. paraplegia and quadriplegia, muscular dystrophy, post-polio syndrome, spina bifida), impaired passive range of movement, limb deficiency (e.g. amputation or dysmelia), leg length difference, short stature, hypertension, ataxia, athetosis, vision impairment and intellectual impairment. There are Winter and Summer Paralympic Games, which since the 1988 Summer Games in Seoul, South Korea, are held almost immediately following the respective Olympic Games. All Paralympic Games are governed by the International Paralympic Committee (IPC).



The Paralympics has grown from a small gathering of British World War II veterans in 1948 to become one of the largest international sporting events by the early 21st century. Paralympians strive for equal treatment with non-disabled Olympic athletes, but there is a large funding gap between Olympic and Paralympic athletes. The Paralympic Games are organized in parallel with the Olympic Games, while the IOC recognized Special Olympics World Games include athletes with intellectual disabilities, and the Deaflympics include deaf athletes.

Given the wide variety of disabilities that Paralympic athletes have, there are several categories in which the athletes compete. The allowable disabilities are broken down into ten eligible impairments as stated above. These categories are further broken down into classifications, which vary from sport to sport. The classification system has led to cheating and controversies revolving around athletes who over-stated their disabilities, in addition to the use of performance-enhancing drugs have risen up.



The PC is the global governing body of the Paralympic Movement. It comprises 176 National Paralympic Committees (NPC) and four disability-specific international sports federations. The president of the IPC is Philip Craven, a former Paralympian from Great Britain. In his capacity as head of the IPC, Craven is also a member of the International Olympic Committee. The IPC's international headquarters are in Bonn, Germany. The IPC is responsible for organizing the Summer and Winter Paralympic Games. It also serves as the International Federation for nine sports (Paralympic athletics, Paralympics swimming, Paralympic shooting, Paralympic powerlifting, Para-alpine skiing, Paralympic biathlon, Paralympic cross-country skiing, ice sledge hockey and Wheelchair Dance Sport). This requires the IPC to supervise and coordinate the World Championships and other competitions for each of the nine sports it regulates. IPC membership also includes National Paralympic Committees and international sporting federations. International Federations are independent sport federations recognized by the IPC as the sole representative of a Paralympic Sport.



International Federations responsibilities include technical jurisdiction and guidance over the competition and training venues of their respective sports during the Paralympic Games. The IPC also recognizes media partners, certifies officials, judges, and is responsible for enforcing the bylaws of the Paralympic Charter. The IPC has a cooperative relationship with the International Olympic Committee (IOC). Delegates of the IPC are also members of the IOC and participate in IOC committees and commissions. The two governing bodies remain distinct, with separate Games, despite the close working relationship.

The purpose of the Paralympics is to eliminate the distinction and encourage all people to participate and make sure they are recognized for their efforts. It gives people a chance to work for themselves and represent the disability they possess and it sure is very admirable.



-Abhinav Damodaran(4th Year Chemical Engineering)

catalyst



As mentioned in the earlier edition a new place, new people, new way of life are all an extremely daunting experience. It takes more than just courage to get through it, we need support in all forms. That is how we get through life and this "Transition" is no exception. Even after the transition (the transition from school to college life), when you find yourself stranded somewhere in the middle of your struggle, a guide will be there to help you find the destination. But you will have to trust the guide, in order to cross the barrier ahead. Right from your childhood, other than your parents, teachers have a very large role to play in your life. They help you achieve your dreams by being the compass for your journey. Whether you use the compass or not, lies in your hands.

All the professors and lecturers in the college are there only to guide you through your course so that, you will be able to come out in flying colors. When you find yourself mentally down, approach a teacher and speak to them, they will encourage you face the difficulty and help you come out of it. Most of the students, nowadays, don't approach their teachers for help, as they presume the teacher to be strict. First of all, remember that a teacher will be different in a class and in person. You will never come to know about a teacher unless you approach them and speak.

Teachers prepare students to face challenges. They share their knowledge and expertise with students and enable them to become resourceful people. They help students grow from a dependent stage to the independent stage and then to the interdependent stage.

This is the second phase of the transition you will be experiencing in your college life, where teachers will play a crucial role. In a more Chemical Sense, "**Teachers are the Catalyst to your College life. They will help you learn faster, boost your confidence and help you attain the activation energy to cross the barrier**". They will never give up on your talents, even if you give up.

The influence a good teacher has on a student can never be erased. Not all teachers can make that mark. Again, it depends on how to perceive the teacher's words. Remember, teachers are learners too. They learn from what they see and gain experience with each and every batch they teach. So, their actions are a consequence to your actions. **A catalyst cannot poison the reaction unless some product formed from the reaction disables the catalyst and changes its nature.**

I convey my Teachers' day wishes to all the faculties of the department. I am forever indebted to the campus that changed my life.

"Teachers who love teaching, teach children to love learning"

– Robert Meehan

Dr.N. Sathyamoorthy



Disciplines taught:

Chemical process calculations, Mechanical operations, Heat transfer and Mass transfer

1) Do you think that ACT has changed from the time when you were here?

Definitely there were many changes from when he was a student and a teacher here. Back then, the labs were not as equipped as they are currently. And on the whole, there are positive tremendous changes in ACTech.

2) Do you think that there is scope for chemical engineering as a field in the near future?

He believes that out of all the industries, chemical engineering has the maximum scope. Most of the products that we use are linked to this field. Starting from the manufacturing to the waste disposal is all a part of a chemical process.

3) Do you have any advice for our generation?

First and foremost I strongly believe that knowledge should not be confined to a classroom. One should not restrict the knowledge they acquire in class from the faculty. One should use that as a basis to obtain more information on any particular topic taken in class. And this can only be achieved by frequently reading in libraries and solving numerous problems in order to become an expert. The subjects we study right now are the foundation to become a successful chemical engineer and hence it is very important to be strong in them.

Dr. Padmanabhan (M.E, Ph.D.)



Subjects Handled:

Engineering Mechanics, Managerial Economics, Industrial Psychology, Theory of machines, Engineering Graphics

1) How do you think things have changed in AC Tech from past to present?

"AC Tech has definitely changed a lot. I have had very few occasional visits, so I don't know what exactly but there have been a lot of changes. But each time I come here, I feel more and more vernal that I feel I am doing my B.Tech again "

2) What has been your proudest moment as a teacher?

"I have felt very proud at every moment of my teaching career. I have always loved teaching and I have always been very proud and happy as a teacher. I always wanted to continue and inspire the young minds of today."

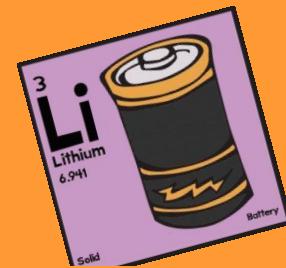
3) What message do you wish to give the students of today's generation?

"'Out of the box thinking' is very important for the growth of a student. Well, of course there will be changes in a student with time, i.e., from the UG level to the PG level and then to research and so on; but thinking in a different way is important for a better understanding. Also you must learn how to define various things. For example, 'knowledge' can be defined as 'progressive discovery of our own ignorance' and 'patriotism' can be defined as 'glorified tribalism'.

And always remember to respect your parents and teachers as they are the most important guides for you in life."

CHEMICAL ENGINEERING IN FIREWORKS

People everywhere enjoy the fantastic explosions and the brilliant light displays of fireworks. However, these spectacles are much more than just a form of entertainment. Each firework launched into the sky is a precisely formed assembly of chemicals and fuel, carefully calibrated to produce a particular effect – a red chrysanthemum spray accompanied by a powerful explosion, or a blue strobe, for example. Fireworks generate three very noticeable forms of energy: a tremendous release of sound, bright light, and heat. The tremendous booms heard at ground level are the result of the rapid release of energy into the air, causing the air to expand faster than the speed of sound. This produces a shock wave, a sonic boom. The colors are produced by heating metal salts, such as calcium chloride or sodium nitrate, that emit characteristic colors. The atoms of each element absorb energy and release it as light of specific colors. The energy absorbed by an atom rearranges its electrons from their lowest-energy state, called the ground state, up to a higher-energy state, called an excited state. The excess energy of the excited state is emitted as light, as the electrons descend to lower-energy states, and ultimately, the ground state. The amount of energy emitted is characteristic of the element, and the amount of energy determines the color of the light emitted. For example, when sodium nitrate is heated, the electrons of the sodium atoms absorb heat energy and become excited. This high-energy excited state does not last for long, and the excited electrons of the sodium atom quickly release their energy, about 200 kJ/mol, which is the energy of yellow light. The amount of energy released, which varies from element to element, is characterized by a particular wavelength of light. Higher energies correspond to shorter wavelength light, whose characteristic colors are located in the violet/blue region of the visible spectrum. Lower energies correspond to longer wavelength light, at the orange/red end of the spectrum.



RED: This light is produced by strontium salts, lithium salts, Lithium carbonate-red, Strontium carbonate - bright red and it has a wavelength of 652 nm.

ORANGE: This light is produced by Calcium salts, Calcium chloride and these have a wavelength of 628 nm.

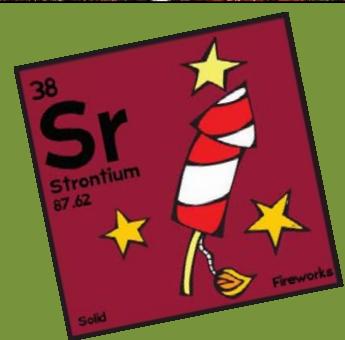
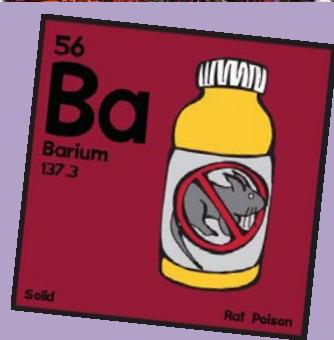
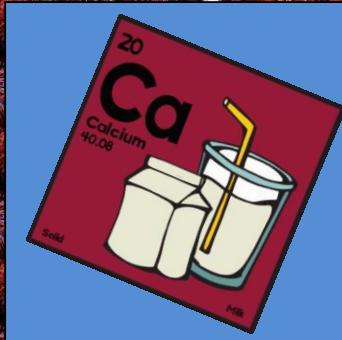
YELLOW: This light is produced by Sodium salts, Sodium chloride and these have a wavelength between 610-621 nm.

GREEN: This light is produced by Barium compounds such as Barium chloride and this light has a wavelength of 589 nm.

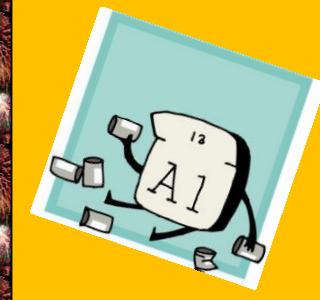
BLUE: This light is produced by Copper compounds and Chlorine produced Copper(I) chloride and it has a wavelength of 505-535 nm.

PURPLE: This light is produced by mixture of Strontium(red) and Copper(blue) compounds and it has a wavelength of 420-460 nm.

SILVER: This light is produced by burning Aluminium, Titanium or Magnesium. The sights and sounds of each explosion are the result of several chemical reactions – oxidations and reductions taking place within the firework as it ascends into the sky. Oxidizers produce the oxygen gas required to burn the mixture of reducing agents and to excite the atoms of the light-emitting compounds. Various oxidizers are used in both the black powder and the stars. The most commonly used oxidizers are nitrates, chlorates, and perchlorates. The reducing agents, sulfur and carbon, combine with the oxygen from the oxidizers to produce the energy required for the explosion.



The most commonly used amongst those mentioned are nitrates, the major component of black powder. Nitrates are composed of nitrate ions (NO_3^-) with metal ions. The most common oxidizer is potassium nitrate, which decomposes to potassium oxide, nitrogen gas, and oxygen gas. When reacting, nitrates release two of their three oxygen atoms. Because the oxidation does not result in the release of all available oxygen, the reaction is not as vigorous as that of other oxidizers and is more controlled. This is why nitrates are used as the major component of black powder. In fireworks their main purpose is to provide the initial thrust to power the package into the sky and to ignite each bundle of stars. Nitrates are usually not used in star explosions because reactions of nitrates do not produce a temperature high enough to energize many of the more colorful metal salts. These chlorates are less stable mechanically than nitrates, and therefore more dangerous to handle. This instability results from the fact that although the chlorine atom has the potential to bond with four oxygen atoms, in chlorates it bonds with only three, leaving the chlorine atom unsaturated and reactive. The complete release of its oxygen atoms makes chlorate a better oxidizing agent than nitrate. The oxidation by chlorates produces a much faster detonation – an explosion.



In recent years, fewer fireworks manufacturers are using chlorates. Instead, perchlorates are now more commonly used because of their increased stability and oxygen release. Perchlorates contain the perchlorate ion (ClO_4^-), in which each chlorine atom is bonded to four oxygen atoms. The chlorine is bonded to its maximum number of oxygen atoms, and so perchlorates are more stable than chlorates. Perchlorates are not only more stable, but more oxygen-rich than chlorates. They, like chlorates, produce more vigorous reactions than nitrates. The oxygen released by nitrates, chlorates, and perchlorates in the star compartments immediately combines with the reducing agents to produce hot, rapidly expanding gasses. The most common reducing agents are sulfur and carbon (charcoal) – standard components of black powder – which react with oxygen to produce sulfur dioxide and carbon dioxide respectively. The reactions that produce these gases also release a great deal of heat energy, which are hot and expand rapidly. This adds to the explosive force of the reaction. Chemists continue to explore ways to make new pyrotechnic compounds and mixtures that are environmentally friendly.



THE CHEMICAL ENGINEER BEHIND RAMAN EFFECT



Every one of us most positively knows about Sir C. V. Raman, who was known for his discovery of 'Raman Scattering Effect' which earned him a Nobel Laureate. However, we are oblivious to the little-known fact that a Chemical Engineer played a key role in ensuring this astounding discovery. Dr. P. Krishnamurthy was the co-founder, along with Sir C. V. Raman, of TCM company. His crucial findings aided in the latter to make a groundbreaking discovery that led to his fame and grand accolades.

In the study of scattering effect, Krishnamurthy traced a remarkable dependence of the intensity of the spectral lines, observed in scattering on the chemical bond, and followed the transition from the homo-polar to the hetero-polar type of chemical combination. Krishnamurthy's observation, that the para-magnetism of crystals apparently influences the observed intensity of the displaced lines, is one of the most remarkable ones ever made in this new field of research

Despite his great value and significance, Dr. P. Krishnamurthy's personal life details are known till a bare minimum. He completed his degree in Chemical Engineering and later went on to become a scientist and industrialist in India. His close association with another great mind, Sir C. V. Raman, led to the birth of a company.

Krishnamurthy and Raman started the Travancore Chemical & Manufacturing Company in 1943, with Raman as the Chairman and Krishnamurthy as the Managing Director. They established 4 factories across South India and the company was listed on the Bombay Stock Exchange. For over 5 decades, the company was a leader in the manufacture of potassium chlorate, sodium chlorate and other chemicals.

It was Sir C.V. Raman who initiated the inception of TCM in Kerala. He goaded Krishnamurthy to start the production of copper sulphate in Kerala. Electricity was the main raw material required for the production of TCM's chemicals, and Kochi, with abundant power resources, was chosen as the ideal place for the production of TCM chemicals. Power was then a cheap commodity.

In 1929, Krishnamurthy was the co-author of a paper, along with Sir C. V. Raman titled 'A New X-Ray Effect', published in Nature. Having won the trust of Sir C. V. Raman, Dr. P. Krishnamurthy went on to write the biography of Raman – 'Sir C.V. Raman: a short biographical sketch'. He also wrote the book 'Studies in X-ray Diffraction' in 1930. In 1930, Raman referred to the immense contributions made by Dr. P. Krishnamurthy in the Nobel lecture.

- Pooja Zen (2nd year, Chemical Engineering)

Chemical of the month

Sodium Fluoride

Properties

Appearance	Colourless crystalline solid
Density	2.78g/cm ³
Molecular Weight	41.988172 g/mol
Boiling point	1704 Degree Celsius
Melting Point	993 Degree Celsius
pH value	7.4



Sodium Fluoride (NaF) is a colourless, odourless, salty tasting crystalline solid which readily dissolves in water to give Na^+ and F^- ions. The formula for this ionic compound is NaF . It is octahedral in shape while its crystal structure is cubic. It is available in the form of dry powder or large pellet crystals. Sodium fluoride is formed by neutralizing hydrofluoric acid with sodium hydroxide and then drying to form crystals.

It is highly soluble in water but is insoluble in alcohol. When it is heated till decomposition, it decomposes and emits fumes of disodium oxide and hydrogen fluoride. It is inflammable and is easily corroded by aluminium.

Sodium fluoride is used as a metal cleaning agent and surface cleaner and for pH adjustment in industrial textile processing. It is also used as an insecticide, enzyme inhibitor and as a wood preservative.

Sodium fluoride is used extensively in the medical industry. It is used to treat osteoporosis and otospongiosis (rare bone diseases) in adults. It is available in multivitamin preparations as oral supplements for infants and children. It is used as an anthelmintic (medicine) against round worms (*Ascaris*) and stomach worm (*Hyostrongylus*) in pigs.

When sodium fluoride is added to toothpaste it increases the strength of the teeth by the formation of fluorapatite (a natural occurring component of tooth enamel) and it can limit the ability of oral bacteria to produce enamel eroding acids.

Fluoride works by binding to the tooth enamel, which is primarily made up of hydroxyapatite, a crystal composed of calcium, phosphorous, hydrogen and oxygen. By replacing the hydroxyl molecule on hydroxyapatite, fluoride makes the teeth more resistant to acid attack. The requisite/allowed amount of fluoride in the toothpaste is between 0.22% (1000ppm) and 0.312% (1450ppm) usually in the form of sodium fluoride or Sodium monofluorophosphate(MFP). Over dosage of fluoride or rise of fluoride levels can lead to dental decay or fluorosis.

It is a highly toxic chemical which on contact can irritate the skin and eyes. Breathing even small doses of it can irritate the nose, lungs, and throat. When sodium fluoride comes in contact with water, it results in the formation of hydrofluoric acid which is highly corrosive in nature. Inhalation of large amounts of this can lead to nausea, vomiting and loss of appetite. Exposure to large quantities can lead to deposition of fluoride in the bones and teeth, a condition called fluorosis. So great care is required while handling this chemical. Currently scientists are researching for possible ways to use the chemical in a safe and efficient way.

Many reports have been published throughout the world about fluoride and its harmful effects. After many years, the scientific conclusion is that fluoride toothpaste and correctly fluoridated water, salt and milk are of great benefit to dental health. They help to reduce decay, and cause no harmful side effects to general health. Studies have also gone ahead to show no evidence that fluorine added water causes harmful side effects.

- Srikanth V Srinivas (Second year, Chemical engg)



It is no secret that the placement rates, the number of companies visiting our campus and the number of students getting recruited are decreasing exponentially year after year. Those of you who are going to attend placements this year, you better kick start your preparations now, if you haven't already.

The books you can use for the placements preparations are preferably R.S. AGARWAL (for the aps) and O.P. GUPTA (for basics).

We should be very lucky to have DUAL PLACEMENT this year which has been approved by CUIC (Centre for University Industry Collaboration) so that people who are not able to get placed in the core can get selected in the BULK RECRUITMENT.

So now, you will find more information about the companies that come for placement in the following:

CHEMICAL ENGG CORE COMPANIES **(in order of arrival in 2015-2016)**

- ZIFO TECHNOLOGIES – PHARMA & DRUG DEVELOPMENT
- WABAG – WATER TREATMENT
- HYUNDAI
- SRF
- COROMANDEL
- STERLITE (VEDANTA)
- BPCL
- RELIANCE
- SANMAR
- RAMNATH
- SHASUN PHARMA
- KWALITY MILK FOODS LTD.

IT BULK

- IBM
- ACCENTURE
- TCS
- CTS
- INFOSYS

To grab this very good opportunity, you will have to know the DO's and DONT's in the interview. And they are

DO'S

- Arrive 10 minutes early. Being late to an interview is never excusable.
- Clarify your doubts before hand. Answer the interviewer's questions as specifically as possible. Relate your skills and background to the position requirements throughout the interview.
- Specify your qualifications. Focus on accomplishments that are most pertinent to the job.
- Anticipate tough questions. Prepare to turn perceived weaknesses into strengths.
- Ask questions. An interview should be a mutual exchange of information, not a one-sided conversation.
- Listen. Concentrate not only on the interviewer's words, but also on the tone of voice and body language. Once you understand how the interviewer thinks, pattern your answers accordingly and you will be able to establish a better rapport.
- Dress appropriately. Make your first impression a professional one.
- Be professional. Smile, make eye contact and maintain good posture. These are simple but important things that are easy to forget during an interview.

DON'TS

- Don't answer questions with vague replies. Ask the interviewer and clarify the question.
- Don't interrupt the interviewer. If you don't listen, the interviewer won't either.
- Don't be overly familiar, even if the interviewer is.
- Don't ramble. Overlong answers may make you sound apologetic or indecisive.
- Don't lie. Answer questions truthfully.
- Don't express resentment. Avoid derogatory remarks about present or former employers.
- Don't wear heavy perfume or cologne. The interviewer may not share your tastes.
- Out of all the rounds, Group discussion has a very important role where you can actually portray your talents. The topic can be based on anything like sports, society, politics, environment etc.

In GD, the most important things that will be noted by the company are,

- 1.Your body language.
- 2.The way you carry yourself.
- 3.The way you sit throughout the GD.
- 4.The way you put your points in a proper time without interrupting when someone else is speaking.

I think these are the most important notes you have to know before you sit for the placements. And I wish you ALL THE BEST.



AURORA 2016

On 9th September 2016, A.C.Tech saw the Department of Chemical Engineering celebrate the 2016 edition of 'Aurora'. Aurora is a teachers' day event that is conducted by the third year students in association with the Consortium of Chemical Technologists. The term 'Aurora', which in physics means a lightening phenomenon, also refers to the aurora lights of the northern and southern hemispheres. The event is named as such to symbolize the importance of teachers in our life - as they are the ones who enlighten us with their knowledge and illuminate the path to a successful future.

The event was held in Raman Auditorium. The guest list included the faculty members from Department of Chemical Engineering and Applied science. Notable faculty members from the English and Mathematics departments who are associated with A.C.Tech were also invited. Apart from these, 13 eminent retired professors from the Department of Chemical engineering were also invited. The event started at 9 AM.

The informal events consisted of two sessions - indoor and outdoor. The indoor events were held till 11:30 AM. Some of the events that were held included chemconnections and finding the said words in the newspaper. The teachers were divided into groups for these games and they seemed to have a wonderful time. With cheerful laughter along with competitiveness that sprang up when each group tried to outdo the others, the fun quotient of the event was raised. In between the events, Ms. Supraja Krishnan of 3rd year sang a beautiful song to grace the occasion further. After the conclusion of the indoor events the teachers were provided with refreshments.

After that, it was time for the official inauguration. The eminent people invited made way into the auditorium. Hon'ble Dean Dr. S. Sivenesan and The Head of the Department, Dr. N. Nagendra Gandhi along with the dignitaries took their seats on the stage. The hosts of the event were Mr. Mukesh Ranganathan and Ms. S.H. Raashida Farhath. The inauguration started with the 'tamil thai vaazhthu' followed by a brief introduction about aurora given by Ms. Sucharitha Sridharan. This was followed by the dignitaries lighting the lamp to mark the inauguration. After this a classical dance was performed by Ms. Sangeetha and Ms. Vidarshana. Up next the HOD gave the welcome address. Being a student of the same campus, he shared many memories of his college days which made entire auditorium break into laughter at the hilarious instances. Following this our hon'ble Dean gave the presidential speech and stressed on the importance of teachers in our lives. Mr. D. Viswanathan, retired professor and ex-VC of Anna University gave a motivational speech for the audience gathered and stressed on the responsibilities which everyone who is a part of this prestigious college should have. This was followed by the momento distribution ceremony where each of the faculty members were presented with the same by the Dean and HOD.

The event came to an end with the vote of thanks, given Mr. Sabarish Ramamoorthy. The inauguration was followed by lunch provided to all the teaching staffs in the Chemical engineering meeting room and fluid mechanics lab.

The final session of the day was the outdoor events. First up was breaking the pot. The teachers had a tough time in this game and ultimately Mr. Pathalamuthu's skills led him to his victory. Next was the musical chair for the female faculty. Dr. Lima remained the undisputed champion in this game although Dr. Brinda Lakshmi gave her tough competition in the final round. Then came the tug-of-war. This was a competition between the students and the faculty. In the women's match, the girls tried hard but our female faculty had the last laugh as they won with a score of 2-1. However, in the men's match, the boys won after facing a stiff competition from the male faculty members led by Mr. Pragatheeswaran, who unfortunately slipped in the end. Else, he would've single handedly won it. All this was followed by a lemon race. The final event of the day was the badminton finals which saw our dean and other senior faculty members taking part and playing a pretty competitive game. The outdoor events came to an end at 4.30 PM after which refreshments were provided.

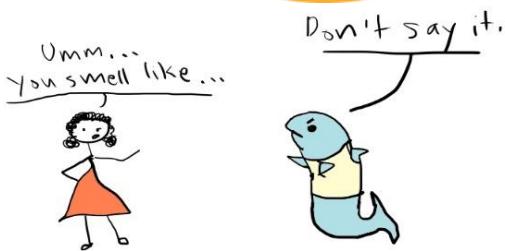
Overall, the day was an eventful one. And it also proved itself to be a great opportunity for the students and staff members to get closer - from all the selfie sessions to cheering during the events, it truly was a good opportunity. It was also a successful event at the end of the day, thanks to the tireless work of the student coordinators and CCT staff Co-coordinators Dr. Gomathi Priya and Mr. Vetriselvan being backed by the ever so helpful H.O.D who made sure everything was in place and done very efficiently. We sincerely do hope that the teachers enjoyed the day as much as we did.



-Arpan Datta (3rd Year Chemical Engineering)



SCIENCE



Why do fish have a strong smell?

Fishes smell because of a natural process of decay. Bacterial enzymes attack the flesh of the fish. This triggers an oxidation reduction reaction. The muscle of a fish contains a substance called trimethylamine oxide (TMAO). Which is broken down by decomposition. The result is trimethylamine and diethyl amine. The mixing of these two amines results in that characteristic fishy smell.

Though natural gases are odourless, why do we detect an odour when LPG leaks?

Human noses can easily detect sulphur compounds that belong to the thiol class. Other compounds like ethanethiol and propanethiol are added to increase the amount of smell that these gases give. These compounds are called warning agents, because they help warn you of a gas leak. Any gas supplier mixes odourless natural gas in LPG with strong smelling pungent gases to help you detect a leak easily. A gas like hydrogen sulphide which smells like rotten eggs is added to natural gas. With that strong pungent smell, you can easily know if there is a leak.



Why does baking soda extinguish fire?

A fire needs three elements to burn. Fuel, an oxidizing agent and heat. A fire will stop burning if any of these is no longer present. When baking soda (sodium bicarbonate) is heated to a high temperature, the chemical properties of this salt make it produce carbon dioxide and remove oxygen. This then totally reduces the amount of oxygen in the surrounding atmosphere and puts the fire out.

Why are ice cubes cloudy on the insides?

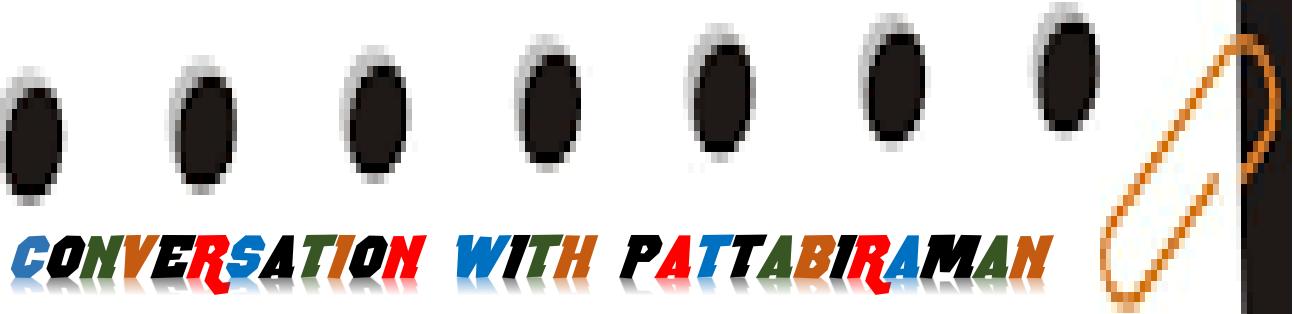
Water consists of several gases and minerals like calcium and magnesium salts that are naturally dissolved in it. When water begins to freeze, pure water freezes quicker than impure water. Thus, the minerals and gases remain in solution state as pure water turns solid. The rest of the liquid slowly freezes from outside to inside. This leads to layers of increasing concentration of impurities towards the centre. This concentration of gases results in light being refracted through the piece of ice causing it to look cloudy.



What makes stain remover remove stains?

Stain removers work purely on simple chemistry. Water has a property known as surface tension. Due to surface tension, when a drop of water falls onto your kitchen counter it does not spread quickly. Instead, it roughly stays in the shape of a drop. Detergents however, are surfactants, substances that lower the surface tension of water. These surfactants surround the stain molecule and make it easier for water to remove it from the fabric, allowing it to get washed away.

-Jebin (2nd Year Chemical Engineering)



IN CONVERSATION WITH PATTABIRAMAN

AC Tech has been home to students from all walks of life ever since it was established in the 1940s. This edition, Pathways brings to you an exclusive interview with one of AC Tech's most cherished alumni, Mr. Pattabiraman (1964-1969).

M.A. Ramaiah Kumar (MARK) with Mr. Pattabiraman (1964-1969) B.Tech Textile Eng (1969-1971)
M.Tech Textile Engg.

MARK: Hello sir, Please do share with us on how you entered A.C. Tech.

Pattabiraman: I finished my SSLC and PUC with good marks and I got a recommendation from a textile mill in Coimbatore but my admission into A.C. Tech wasn't through the usual way. I had to attend an interview with the HOD of Textile Engineering. Back in the day Dr. Krishnamurthy and I had to pass the interview to get admitted into the college. The same was also done in the Chemical Engineering department by Dr. G.S. Laddha.

MARK: How was your time in A.C. Tech, sir?

Pattabiraman: It was pretty smooth-sailing and when I look back I laugh at myself and wonder if this was me. We also used to have a tradition of initiating the freshmen into our A.C.Tech. I never participated that much in ragging and getting ragged due to the fact that I was a day scholar and not hostellers. During my time, we also had a magazine called "The Campus Rigmarelle" which can be considered as a predecessor of the magazine "Pathways" but our magazine was disbanded just after 1 year of its establishment.

MARK: What were the differences between the A.C. Tech during your time and the A.C. Tech of now?

Pattabiraman: I do not know much about the A.C. Tech of now but during my time, all branches were compiled into a classroom during the first 4 semesters and later on, the Chemical Engineering students and Leather Engineering students were grouped together for the next 4 semesters and everyone went their separate ways from the following semesters onwards due to the fact that each department had different core subjects.

MARK: During your time, we have heard about the compulsory learning of a foreign language other than English. How was it, sir?

Pattabiraman: Well, we in the textile department had to learn German because the textbooks were in German, so we had a subject called Technical Deutsch for our first two years and a lady from the Max Müller Bhavan would drive over to A.C. Tech to teach us German. Similarly, Chemical Engineering students had the option of learning either French or German during the first 2 years as majority of their textbooks were either in French or German.

MARK: Which of the teaching staff during your time had left a deep impact on you?

Pattabiraman: Apart from the HOD Dr. Krishnamurthy sir, the one that left a deep inspiration within me would be Dr. T. Manikavasagam Pillai who was in charge of Engineering Mathematics for the whole of A.C. Tech. He was a very brilliant person and his books and notes were crisp and to the point.

MARK: What message would you like to give for the current students of A.C. Tech?

Pattabiraman: After I had finished my B.Tech and M.Tech in A.C. Tech I worked in Binny & Co for five years after which I did my UPSE exams and worked as a Civil Servant for 10 years. After that, I worked as Head of Exports in Ashok Leyland and I have visited many places due to that and right now, I am a Professor of International Business Studies. So what I mean to say is that the current students of A.C.Tech must not channel all their efforts into one path in life as you would tend to lose out on learning other skillsets and you must have many backup plans in case your gamble backfires on you.

CHEMICAL ENGINEERING GENIUS

Rakesh Agarwal is a National Medal of Technology and an Innovation Laureate as well as the Winthrop E. Stone Distinguished Professor of chemical engineering at Purdue University. Previously, he was employed for more than two decades with Air Products and Chemicals, Inc., where he was elected to the highest technical position in the company, an Air Product Fellow, before moving to Purdue in 2004. His technical contributions towards improving the energy efficiency of separation plants producing industrial gases such as O₂ and N₂ from air, and in the general area of gas liquefaction and separation, has led to 116 US patents and 500 international patents along with several peer-reviewed publications. In recognition of his technical accomplishments during his more than two decades at Air Products and Chemicals, Inc., he was announced as the recipient of National Medal of Technology and Innovation for 2011, by the White House. His efforts have also been recognized by previously received awards including, J & E Hall Gold Medal from the Institute of Refrigeration (UK) Presidential Citation for Outstanding Achievement from the University of Delaware, Industrial Research Institute (IRI) Achievement Award and from the AIChE: the Gerhold, Excellence in Industrial Gases Technology, Institute Lecture, Chemical Engineering Practice, and Fuels and Petrochemicals Division awards. In 2002, he was elected as a member of the US National Academy of Engineering. At Purdue, his current research initiatives are in the area of renewable energy, including developing low-cost methods for synthesizing solar cells based on Nanotechnology, efficient conversion of biomass to liquid fuel for transportation and maximizing liquid fuel from a given quantity of biomass. He is also engaged in an 'energy systems analysis initiative' to explore the role of biofuels compared principal investigator in the National Science Foundation sponsored Solar Economy IGERT involving researchers at Purdue University, University of Delaware, University of Texas El Paso, and HZB. In addition, he continues to engage in research pertaining to improving the energy efficiency of separation processes, with the focus on energy efficient distillation configurations for multi component separations as well as membrane based separation processes. He received a B. Tech. from the Indian Institute of Technology Kanpur, India in 1975; an M.Ch.E. from the University of Delaware in 1977, and an Sc.D. in chemical engineering from the Massachusetts Institute of Technology (MIT), 1980. In 2013 he became an elected member of the American Academy of Arts and Sciences. He is truly an inspiration to us all.



-Gayathri k (2nd Year Chemical Engineering)

Dr. Jammunathan
Teaching Career (1968-2001)



Subjects taught:

Physical Chemistry, Organic Chemistry, Technical Analysis lab and visiting faculty for biotechnology

1) What do you think has not changed in AC Tech since then and is the same now?

A: The interest and involvement of the students as well as their habits is only increasing and has never gone down. The students are highly decent and very courteous. It is really happy to see all of this and it makes me very proud.

2) how was your experience as a professor in Ac Tech?

A: I cherish each and every moment I spent teaching in this college. We had a very coordinated staff and we had an amazing leader, Dr. Laddha. He had a very nice understanding and relationship with each and every member of the staff. There was no bossism or arrogance whatsoever. The students were very regular and attendance was never a matter of concern. The understanding and adjustability between the students and teachers was always overwhelming. It was a very affectionate atmosphere. We worked for the cause of education in the Chemical Department.

3) What message would you like to give to the students of this generation?

A: Maintain the same decency and decorum this department has seen. 'Love the Institution' and everything will be inherent.

Dr. P Gnanasundaram



1) What are the major changes you feel have taken place in AC Tech?

A: Back in the day the level of attachment and bonding was a lot, but today everybody is so consumed with their own work and life has become very mechanical.

2) What do you feel is the one thing that hasn't changed in AC Tech?

A: the atmosphere is still the same, very much vibrant and full of zest because of the enthusiastic students coming here to study.

3) What is your proudest moment being a professor?

A: There are several moments that have filled me with pride and satisfaction. I do not want to pick one.

4) What message would you like to give to the students of the current generation?

A: More attachment is required for everything, the subject, the people and everything.

AC Tech DIARIES

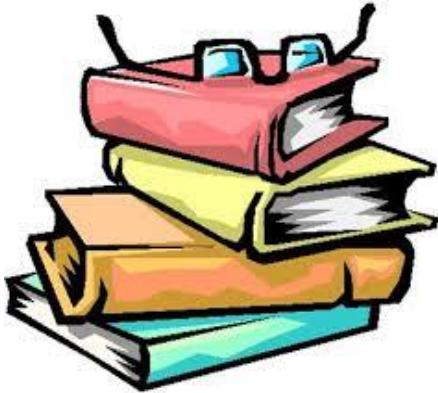


I think I speak for most of the students here when I say that all of us step into college with big dreams. These dreams can be anything - from getting one's dream job to simply having a really fun college life. From what I have learned till now after two years in ACT is that college life is what you make out of the regular and monotonous days. It all depends on how you handle the situations that you are in (although this can apply to life in general as such). The first semester is the hardest in terms of settling in and getting used to the new environment. For most of us, it is probably the first time being away from home which can be a downer at times. But after a while, if you're staying in a hostel especially, it eventually becomes home. And surprisingly, your actual home might become a foreign place when you go back after a while.

Being blessed with a campus like ours is also a huge bonus. All the times spent sitting in the parking lot or the Wi-Fi hut, chattering away about all the things under the sky will forever be remembered. Although it might seem like these are small things - like somehow making it to class by 8:30 AM, waiting in line in the canteen to get a plate of ghee roast and so many more countless little things. Also, there are so many cultural events throughout the entire academic year.

Starting with Fresher's day to Sampradha followed by Aurora in the odd semesters plus the biggest ones Kalakriti and Chemfluence in the even semesters. These are the times when the whole campus is filled with people huddling around the food stalls and you have music playing which really heightens the already existing happy mood. In between all this, every once in a while, you have the very depressing assessment period. And we have not one but three - kidding! All play and no work made Jack a dull boy, remember? I guess you need to have a bit of both the worlds. Although no one would downright object not having exams. Right?

Anyway, assessments are just like a small heads up to prepare you for the actual big thing waiting at the end of each semester. Now let me tell you about the end semesters - this period is when you will be hit by a sudden urge to do every other thing except studying. Two years and four end semesters later, this still happens to me. Also this is the regret period for the ones who only then realize that their teachers were right about the whole 'Last minute studying will not work here'. But I guess, some things will never change - you will definitely find numerous study groups trying to get an entire textbook into their heads in a span of two days or even lesser. But even these days, although tiring - will again get added to the huge bundle of memories.



Also, college is where one is really exposed to so many things. You learn to do chores that our parents used to cover for us. This is when you will be filled with a genuine sense of gratitude towards them for bringing you up. Although we will always be dependent on them, you learn to carry some responsibilities on your own shoulder. You also meet so many new people with different personalities ~ some you may be compatible with, others not as well. But ultimately you learn to accept people the way they are in order to not create disharmony.

Generally at the end of the first year, everyone has to attend their respective camps ~ depending upon which group they are a part of (NSO, YRC, NSS or NCC). This maybe be for a week or ten days. Being in NSO, I can say for sure that this period was the first time in a long time (Since 12th grade to be precise) when I woke up at 5:30 AM for ten consecutive days. This was really hard as most of the time everyone ended up sleeping late after endless talks and games in the night. Even though all we wanted to do was go back home during the camp, once it actually got over, life became a bit still after all the activity. Apart from this, in the second or third year you get to experience your first national industrial visit. Having just come back from mine, I can say for sure that this is the time when you get closer to your friends. From the train rides to the sleepless nights spent in hotel rooms talking to everyone, each and every moment is precious.

But then again college life is not all milk and roses. You also need to make many decisions that will directly influence your future. Remember when everyone told us this one line ~ "Try to study hard in twelfth. After this you can do whatever you want in college". I guess this was just a pep talk to encourage us to study well at that point. Because only in college you decide what you want to study further or which stream you would probably want to work in. This as such is hard but after this comes the harder part where you have to really work towards achieving your goal.





IICHE : INDIAN INSTITUTE OF CHEMICAL ENGINEERS

Every organisation is unique to itself in various ways; IICHE is one such organisation that identifies a chemical engineer comprehensively in India. Under the tutelage of Dr. N. Nagendra Gandhi who is the chairman of IICHE, the organisation has flourished opening new avenues to both students and professionals alike.

Chemical engineering related members from all around India are interlinked through IICHE. It is a medium of communication for professors, students, graduates and scholars. It is also a platform to seek job opportunities and an arena to learn and understand the latest chemical engineering developments across the world.

CHEMCON a National level conference is an annual congregation of chemical engineers. The Annual Session, popularly known as the Indian Chemical Engineering Congress (CHEMCON), is the most important event in the calendar year. All renowned chemical engineers from India gather to share their experience and thoughts on innovations and developments across the field. CHEMCON features a host of events, which include memorial lectures, plenary lectures, seminars, symposia, panel discussion, exhibitions, and such. To the Indian chemical engineering fraternity in the country and abroad, CHEMCON offers the most attractive platform, ensuring intensive interface with the best of brains – national and international – in chemical engineering and its allied fields.

Alagappa College of Technology (A.C. Tech) is very proud to host CHEMCON after 25 years. All the student chapters in Chennai will together gain access to improved library facilities and laboratories being a part of IICHE giving them access to greater resources which will make it easier to pursue their goals.

The previous CHEMCON: CHEMCON 2012 which was held in Dr. Ambedkar National Institute of Technology (NIT) Jalandhar was themed “Sustainable Technologies for Energy and Environment in Process Industries”. It focused on topics such as Green Technology, Nuclear and Thermal Power, Novel Separation Techniques, New and

Renewable Energy, Hydrocarbon and other fossil fuels, Energy and Environmental Policy issues, Modelling, Simulation and Scale-up, Nanotechnology and many more.

This year's CHEMCON is themed "Chemical Engineering – Emerging Dimensions and Challenges Ahead". Three memorial lectures, namely Dr H L Roy Memorial Lecture (the Founder President), Prof N R Kamath Memorial Lecture (a distinguished professor associated with the University - Institute of Chemical Technology, Mumbai, and IIT, Mumbai), and C K Murthy Memorial Lecture (an accomplished chemical engineer who passed away prematurely) set the tune of every CHEMCON. These lectures are delivered by the elitists of academia, top research establishments and the corporate world in the national and international circuit and they are a veritable treasure trove of knowledge.

CHEMCON is often held in collaboration with premier chemical engineering bodies of nations such USA, UK, Australia, Canada along with many others who send large delegations, hold joint symposia/seminars and take part in meaningful dialogue. Lectures by CHEMCON's Distinguished Speakers and international symposia are the other noteworthy events, where one gets access and exposure to the latest happenings in the ever-expanding domain of chemical engineering.

A "JOB MELA" which is to be held during CHEMCON is the main attraction this year, wherein reputed companies in and out of India are invited to offer job opportunities, particularly to the final year graduates from all chemical engineering institutes in India.

For more details, please visit www.chemcon2016.com

CHEMCON is the only platform for students which allow them to incorporate their fields of interest with co-curriculum activities.

Being a member of IICChE is an added advantage for students pursuing higher studies as it reflects on their professional courses for resumes and an asset during visa interviews.

If you're a member of IICChE, utilise the resources that it provides to all its members. Gain access to its archives and understand chemical engineering in a broad aspect. If you're not a member of IICChE, I suggest you take up membership immediately and be a part of CHEMCON 2016.

ASPIRE TO BE THE CHANGE

-Dr. Kunthala Jayaraman



Whom do I consider a mentor? A mentor to me, is an individual whose life and achievements are an inspiration to future generations.

My mentor is Dr. Kunthala Jayaraman, a former adviser to the chancellor of Vellore Institute of Technology (VITU) and the founder of the Centre for Biotechnology (CBT), Anna University, Chennai.

Dr Jayaraman was a fellow of the Indian National Academy of Engineering (FNAE) and received her Post Doctor Fellowship from Indiana University, USA. Having started her research in the year 1965, she received grant for her various works in the field of biotechnology such as molecular pathogenesis, biochemistry, bioinformatics etc. She was an active member of various committees such as the Swiss Academy of Engineering Services, International Jury of Helena Rubenstein Award for Women in Science, International Scientific Advisory Board of UNESCO, 86th Session of the Indian Science Congress and Fellow of the Tamil Nadu Academy of Sciences.

Dr. Jayaraman has written a number of books and lab manuals in Biotechnology for both school level and college students. She had undertaken a wide variety of International Sponsored Research Programs including Indo-Swiss Bilateral Programme, Indo (UGC) – U.K. (ALIS) Exchange Programme, Scherring Plough Research Centre and WHO-Filarial Genome project.

Dr Jayaraman was a pioneer of Biotechnology. Her works and contribution to the field of Biotechnology will forever be remembered. The Herculean efforts she took to make people recognize Biotechnology as a subject which can alter the day to day activities of people and establish a Centre just for the study of Biotechnology is truly awe inspiring. Her valuable inputs, technical suggestions, the love for the subject and kindness has been well documented by her students. As a result of her hard work and perseverance, many biotech firms such as the HLL Biotech and TICEL BIO Park have bloomed and flourished over the past few years.

Even after her death in the year 2008 at the age of 67, Biotechnology continues to be the top choice for students while choosing UG courses. In light of her achievements and contributions to the field of biotechnology, the Government of India has instituted an award (The Kunthala Jayaraman Endowment award) for students who excel in the field of biotechnology.

Why am I inspired by her? She pioneered a subject that did not have much recognition to turn it into one of the major fields in science and technology in India today. Her efforts have inspired students to study the subject and improve research and investments in that area. She has shown that passion, perseverance and dedication can help achieve wonders. I hope to emulate her efforts in some way in my life.

- Srikar V Srinivas (2nd Year Chemical Engineering)

IN-PLANT

TRAINING

In-plant Training provides an industrial exposure to the students. A lot of reputed companies provide in-plant training opportunities to students. The major difference between in-plant training and internship is that internships require you to apply all the theoretical knowledge you gained while studying whereas In-plant Training has the added advantage of letting you get hands on experience. I had the privilege to attend a 5-day program at Cetex Petrochemicals in Manali.

Cetex Petrochemicals is one of the primary manufacturers of Methyl Ethyl Ketone(MEK) and Secondary Butyl Alcohol(SBA) in the country. It was established in the year 1989. The company uses German technology in the manufacturing of their products. It gets its feedstock from the pipeline drawn from the neighboring Chennai Petroleum Corporation Ltd. (CPCL). Recently Cetex Petro have started development of fine chemicals like specialized pharma intermediates, aroma chemical as well as essential chemicals. Cetex Petro is also planning to enter into the business of chemical additives, energy chemicals, lube additives, water treatment chemicals and marine chemicals. It has also entered into a joint venture for the marketing of its products with industry leaders like Petro-Canada.

It is the largest producer of Methyl Ethyl Ketone (MEK) and Secondary Butyl Alcohol (SBA). Cetex Petro has achieved market leadership in India for the high quality of its products and services. Cetex Petro enjoys 60% of market share in India. It is the only manufacturer of MEK to be ISO 9001-2000, ISO 14001 and OSHAs 18001 quality standards compliant.



Cetex Petrochemicals Ltd

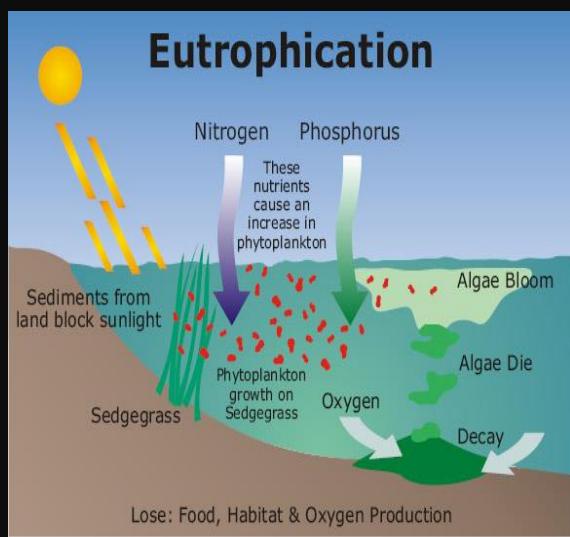
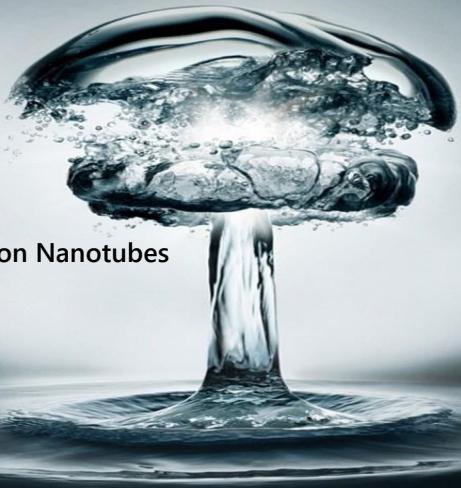
The program started off with an introductory speech by the former Executive Director of Cetex, Dr. R. Sundaramurthy who also happened to be our mentor for the days to follow in the program. Firstly, we were asked to study the manufacturing of MEK and SBA to get ourselves familiarized with the various processes that are involved in the manufacturing. The morning sessions were more relaxed where we were given general instructions and a lot of reading material to get through. I also had the opportunity to meet with students of other colleges and interacting with them helped me learn more about Chemical engineering. In the Afternoon, we all went for a visit to the site where our mentor explained in detailed all the process involved in manufacturing. By the end of the program, I felt I had a whole new perspective on Chemical Engineering and the way I see it now is very different from the start of my course. I am thankful to Dr. R. Sundaramurthy and Cetex for giving me this opportunity. I urge all you readers to also try and make sure you do an in-plant training to experience what I did.

-Supraja Krishnan (3rd year Chemical Engineering)



PREVENTION OF EUTROPHICATION

~ A Method of Removal of Phosphate from Wastewater Using Iron Nanotubes



Effects of Algae Bloom



Algal Bloom at Rio Olympics

"Water, water everywhere but not a drop to drink."

Water covers three-fourth of the earth's surface yet there is an acute shortage of water. With withered trees and barren grounds, people across the globe are facing a serious problem. Thus it has become very vital for us to tackle the water pollution and its effects. One such effect is eutrophication. Excessive nutrients like nitrogen and phosphorous are the main cause of eutrophication. Although nitrogen to some extent is important, excess amounts of it can be removed by certain methods. But phosphorous on the other hand, is difficult to remove. Though researches were conducted for a better portion of the last century for removing phosphorous from water, the mechanisms devised by scientists however could not be made cost effective.

There had been many studies on how to efficiently utilize, retract and reuse water by removing phosphate from sewage sludge and wastewaters. However, the results of these studies have shown certain limitations. Filtration and sedimentation technology used sieves to remove phosphate, but due to low removal efficiency, its usefulness was limited. Biological methods to remove phosphate employed phosphate-solubilising fungi or activating microorganisms to adsorb phosphate and convert it to fertilizer. However, the efficiencies of these technologies were sensitive to the environment of the fungi or microorganisms which made it difficult to remove phosphate from the waste water. However on the advent of this century, researchers from the chemical engineering field devised a cost effective method by which phosphorous could be removed from sewage water by using nanotubes.

METHOD OF REMOVAL OF PHOSPHATE FROM WASTEWATER USING IRON NANOTUBES

Preparation and characterization of iron oxide nanotubes (INTs):

Iron oxide nanotubes (INTs) were prepared using Fe foil (5 cm × 4 cm, purity 99%, thickness 0.5 mm). The characteristics of INT formation were investigated according to electrolyte components and concentration, reaction temperature and time, and voltage.

Cleaning of the Fe foil:

To degrease the surface of the iron foil, it was cleaned with ethanol and deionized water after reaction with hydrofluoric solution. This procedure is called etching.

Anodization:

Fe foil was used as an anode and copper (Cu) foil (99.9%) as a cathode in the anodization device. For the electrolyte, we used a solution of either Na_2SO_4 or ethylene glycol. The anodization was conducted at 40 V or 60 V with a DC power supply. The anodization time was either 60 min or 90 min. The temperature of the anodizing device was maintained between 15 and 20 °C using a circulator. The working volume of the reactor was 1 L.

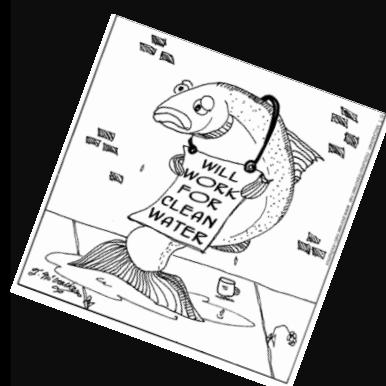
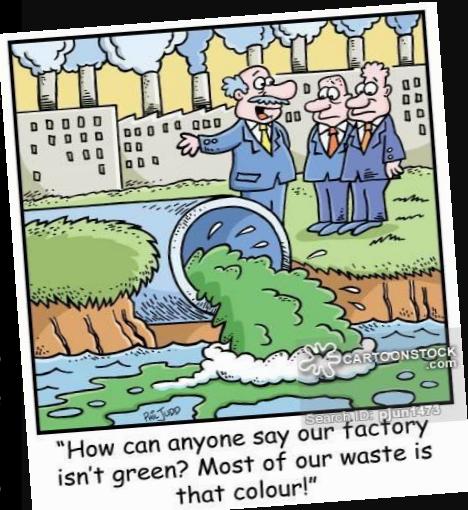
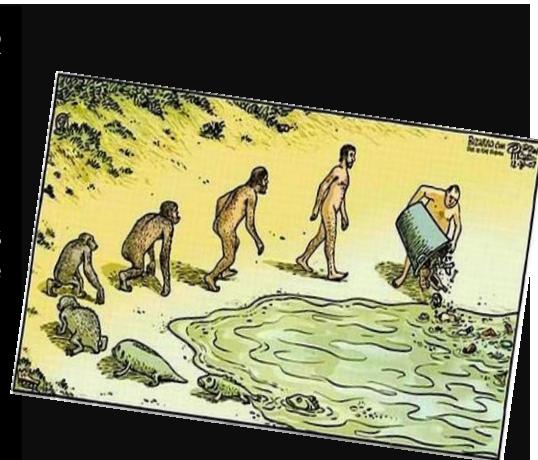
Prevention of oxidation and annealing:

After the anodized Fe foil was washed again with ethanol and deionized water, it was dried using nitrogen gas in order to prevent oxidation of the Fe foil. Then, heat treatment (annealing) was conducted for 60 min at 500 °C using an electric furnace.

Characterization of INTs:

The shape of the fabricated INTs was determined using a field emission scanning electron microscope. The INTs retains 95% adsorption efficiency through three cycles of consecutive phosphate adsorption and desorption, demonstrating their high potential for reuse. In addition, the INTs shows nearly 90% desorption efficiency. The INTs adsorbed 43.3% of the phosphorus in raw livestock wastewater.

The phosphorous recovered from this method was high which could be used in other phosphorous based industries like fertilisers, dyes and paints industries. Thus this method proved to be economical as the cost involved was minimal with an additional source of income through the phosphorous obtained.





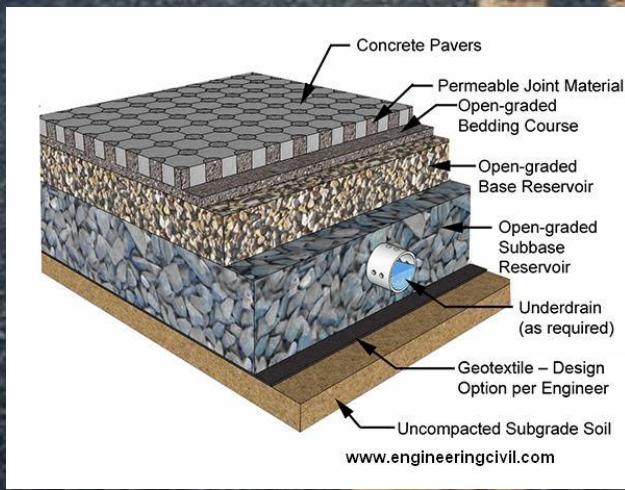
MAGICAL ROADS

December rains in Chennai last year was hard to forget because of the damage it caused us. Waterlogged roads everywhere which eventually made Chennai an island. Transport and communications were lost. The problem is not with rains but the roads and the drainage system. We need to prevent all that water from accumulating on the surface of our roads and footpaths. So, "Tarmac", a UK based building materials and solutions company has invented Topmix Permeable, a new type of fast-draining concrete that can absorb up to 4000 liters of water in the first 60 seconds and an average of 600 liters per minute, per meter square.

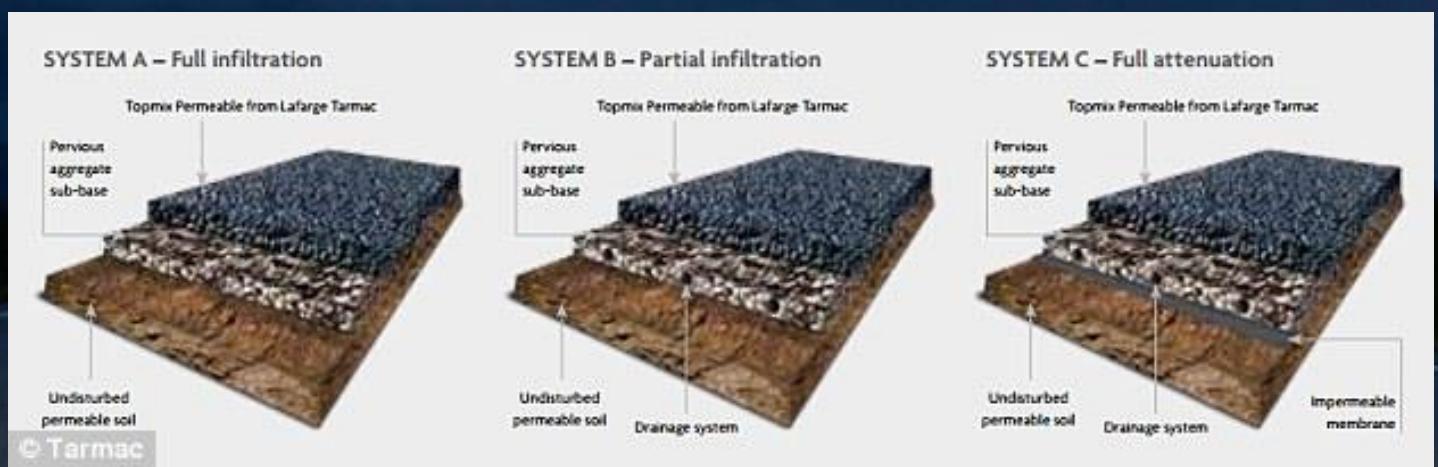
Here's how it works

Rather than using sand-based concrete, Tarmac uses something called no-fines concrete. It's made up of tiny pieces of crushed granite packed together. The pieces are packed loosely enough to allow water to pass through. The Topmix system is made up of 3-5 layers: Permeable concrete layer, loose aggregate as drainage layer, Permeable soil, Pipe system and Impenetrable layer. These 5 layers are arranged into 3 different systems:

This superabsorbent could help reduce flood damage by absorbing water and even reduce risk of water shortages by redirecting rainwater into natural aquifers. In times of extremely heavy rain, the pavement acts as a reservoir, its under-layer holding on to water and releasing it slowly at a pace the ground can handle. The system can also help filter contaminants, such as motor oil out of water- the multiple layers of porous stones essentially acts as a giant filter.



Normal concrete can absorb only 300 mm of water per hour but this 'thirsty' concrete can absorb 36000 mm per hour. Also it has 35% void space which is very high. It will be cooler than regular concrete because water stored within the system evaporates creating a cooling effect reducing surface temperatures.



But Topmix Permeable cannot withstand heavy traffic since it is highly porous. If that water stored happens to freeze, the entire system would be destroyed, so the concrete can only be used in places where temperatures are never likely to dip that low. This system requires high maintenance than the regular one.

Surfaces such as asphalt absorb much less water than dirt, and heavy rain can quickly overwhelm cities' storm-water drainage systems. Its production is confined to UK as of now. As the world continues to urbanize and the amount of the Earth covered in impervious surfaces increases, flooding is likely to become more of an issue.

Puddles will become a thing of the past with this magical road. Areas that are prone to floods when the heavy rains come could have a solution to all their problems with this "MAGICAL CONCRETE".

-V.Reeshma Sona(2nd Year Chemical Engineering)



Dr. P. Kaliaraj



"I joined Anna University in the year 1986 as a reader in Biotechnology and proceeded to become the Director for Centre of Biotechnology. Later, I was appointed as the Dean of AC Tech and as well as the Dean of SAP. I later retired as the Vice Chancellor of Anna University. I taught Immunological Sciences for the students of Biotechnology. Adding on, I have been part of major infrastructural initiations around the AC Tech campus when I served my term as the Dean."

1)What do you think are the things that have changed and things that have remained constant in A C Tech ?

More than changes around the campus, I've been impressed by the major infrastructural developments around the campus that were initiated during my term and have been successfully completed by the present Dean, Dr S. Sivanesan. Apart from this, the quality of students and teachers have always been the same, the best. Both the categories are self-made and sustainable, on their own. Improvement cannot be measured by the number of buildings, only through the amount of new equipment that we have employed for use in our laboratories and the dedicated teachers that we have recruited.

2)Message to the underway chemical engineers

Learning is a continuous process, thus students will have to modernise themselves along with the guidance of a skilled faculty who have been exposed to a variety of fields.

I started off my career in this college as a junior lecturer in the year 1972, I retired in the year 2004. As a junior lecturer moved on as a lecturer and descriptive portions in the Fluid Mechanics discipline.

Dr. V. Mohan



1)What do you think has not changed in AC Tech since then and remains the same till date?

First and foremost, AC Tech enjoys a lot of academic freedom, both for the students and the faculty and this has been maintained all throughout the years which is a matter of elation to me because freedom brings out the creativity in you.

2)Message to the underway chemical engineers

Irrespective of the field you choose, learn your fundamentals well, from your teachers. Students above 18 should not place ultimate dependency on their teachers. A teacher is only your guiding light who helps you out with your doubts and queries and nothing more. It is every student's responsibility to learn on your own and be independent in today's competitive World, be it in the matters of academics or jobs.

Dr. S. Kumaraswamy



1) What is your message to the current generation Sir?

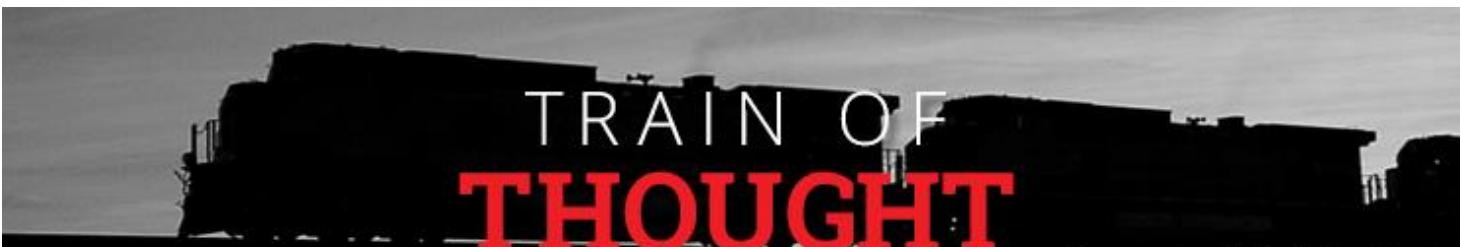
I very strongly believe that honesty plays a very vital part of all our lives and it has to be enforced. Students should start a party called the "Honesty Party", who try and enforce things to be done in the right way. If we have a group of 50 people 10 years down the line it can make a huge difference. Admissions should be granted base on merit rather than on the caste system that we follow, things should be done right.

Parents are ROLE-MODELS for children. Children follow exactly as they see especially during their formative years, so their actions count for a lot while bringing up a child.

2) What is the Proudest Moment you felt while being a professor?

I feel when the student understands and excels and comes out with flying colours, I as a Professor have achieved my goal and it makes me feel extremely proud. One particular instant I would like to mention is of a student named A. Thiyagarajan who I taught Linear Algebra while at IIT- He was a brilliant chap, extremely smart and talented. I used to prepare very well for that class because he would otherwise correct me. It is because of such students we as Professors want to improve ourselves and make us very happy to teach.

I would also like to add that as an Alumni it is your duty to make sure that the students that follow get good job opportunities as well as try and fund the department to get better infrastructure as well as equipment. Once you graduate it's not that you are no longer a part of the institution, be a part of it and contribute as much as you can.



TRAIN OF THOUGHT

The Invicta

Not even once did he flinch nor ponder his decision while typing out the heavily encrypted message to his contact, Jarvis. The cruelty and revolting acts done by Invicta in the name of science and truth had made Ezra despise the whole organisation. The secrecy of the organisation has ensured that it could operate in the shadows, resulting in MI6 having only a page of information about them. Though nothing about the recent dealings or motives were disclosed by Cadmus, the information he learnt is still vital and could possibly be useful in bringing out Invicta into the limelight. After sending the message, Ezra stood by the mirror and stared at his own eyes. Though his looks might give out the vibes of twenty-two-year-old youth brimming with energy, the eyes that stare back seem out of place. He took out his shirt and stared at the burnt mark on his left shoulder, his fingers grazed across it before changing into more comfortable wear for the night. A sudden knock on his room door brought him back to reality.

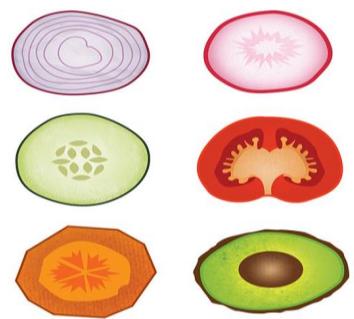
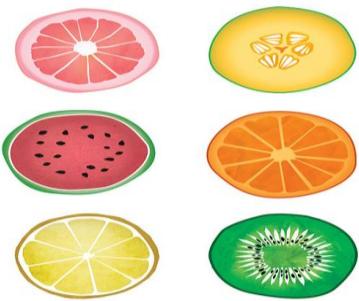
"Master Ezra, dinner is ready. Master Cadmus will not be able to eat with you as he is caught up with other priorities. But his daughter will be there as your company." The Butler politely told him once the door was opened. With a brief nod, he acknowledged the message before proceeding to follow Butler down the stairwell and into the dining hall.

'Eight-digit pay slip sure does have its benefits,' thought Ezra as he was greeted with a scrumptious meal. The dining table was filled with the finest of all delicacies that made his previous lifestyle seem insignificant comparatively. Calling the whole set up as luxurious seemed like an understatement. Once his parents died in a tragic accident, he was taken under the wings of his uncle who sent him off to the prestigious Calvary High School. Never did he realise till today that the course he was put through was especially tailor-made to transform him into a perfect Companion, then a Master. The breeding ground of Invicta potentials spared no expenses in providing the best in academics and in sports. Valedictorian of his final year, school Head Boy, swimming team captain, cross country athlete and Robotics club president – Ezra was one of the finest students to ever grace the school. Carefree, popular and charismatic, he was eager to take University life with a storm. Against the wishes of his uncle, he dismissed the idea of continuing in Calvary University and went on to join Arcadia University. That decision led to his picture perfect world be popped like a needle on a balloon. MI6 opened his eyes and now the loyalty to his blood and caretaker is not even in consideration.

"Seems like the Pisces loves to dream," mocked Dora Cadmus, his twenty years old cousin. Ezra realised that he had spaced out and turned to face her who happened to be another fine product of Calvary High School, and is best known for her intellectual abilities and snarky remarks. She has grown into a beautiful young lady while he was away at university. His close confidante and friend, but being wise he hasn't shared the details of his involvement with MI6 or the topic of discussion he had with her father today to her. "Seems like someone is mesmerised by me?" Dora joked before letting out a laugh. Not wanting to satisfy her with a reply, Ezra rolled his eyes and started eating his meal.

After the meal, he spent some quality time with his cousin before retreating back into his room. Ensuring that the room was locked, he checked to see Jarvis' reply to his message. 'Watch Out. Stay Safe. Stay Alive.' The usual acknowledgement reply stared back from the bright light of the laptop, but the last line showed the emotions of his contact for the first time. Little did he know his contact was compromised.

Pathways' 'Train of Thought' section is a corner that will let your imagination run wild as we bring you a vivid story that will continue through every edition. So take a peek and let it transport you to another world, and you have the power to alter the course of the story! The following editions will feature a continuation of the story written by you! So send in your entries to pathwaysteam16@gmail.com



This Month's Recipe

Steamed Modak

MY CHEMICAL KITCHEN

Basis: 12 to 15 modaks

Process: Batch

Process Time: 1 hr 10 min

Input Streams:

For the outer modak covering:

- 100 gm rice flour
- 75 ml water
- $\frac{1}{4}$ spatula oil or ghee
- 0.1 gm of salt

For the inner sweet filling:

- 0.1 gm of nutmeg powder
- $\frac{1}{2}$ spatula poppy seeds
- $\frac{1}{2}$ spatula ghee or oil
- $\frac{1}{2}$ spatula rice flour (optional)

Equipment Required

- Mixed Flow Reactor (3)
- Grinder
- Agitator
- Beating hammers
- Roller
- Casting mould
- Feed hoppers

Making the sweet filling for steamed modak:

- Heat the ghee in the reactor 1. Add poppy seeds, cardamom powder and nutmeg powder from their respective feed hoppers. Sauté for a minute and the mixture is stirred.
- Ground fresh coconut and pulverized jaggery is then added.
- Mix well and cook this coconut-jaggery mixture on a low flame. The jaggery will melt first.
- Agitate this mixture till the moisture from the jaggery begins to dry. Stop heating. Don't dry it for long as the jaggery then hardens. Keep this coconut-jaggery mixture aside. On cooling the mixture will thicken more.
- Depending on the moisture content a bit of rice flour is added to this mixture. This is an optional step as the rice flour helps to absorb moisture.
- Keep the reactor aside to cool.

Making the outer cover of the steamed modak:

- Add water, oil and salt to reactor 2 which is heated to about 100 °C.
- While lowering the temperature of the reactor rice flour is added with continuous agitation to mix it thoroughly with water.
- Stop heating and cover it with a lid for 4 to 5 minutes.
- Now the mixture is beaten with hammers and gathered together to form dough. If the dough looks dense or hard or dry some quantity of warm water is sprayed. Then the product is casted into spherical balls which should be smooth and without cracks.
- These balls are then passed through rollers

Assembling and shaping modaks:

- Water is added to the third reactor and heated till steam is obtained.
- To the rolled balls mixture from reactor one is added and is folded into modak manually.
- Ghee is applied onto the hands and the edges of the dough is pressed in such a manner that a wavy pattern is obtained on its boundary.
- All the crests on its boundary are brought closer to the center and joined by protruding it outwards. Shape and taper the top of the modak with your fingers.
- Place all the modaks in the reactor and close the system and steam for 10 to 15 minutes at a low temperature.

WORD SEARCH

Z	E	L	T	O	T	S	I	R	A
A	I	B	M	A	X	W	E	L	L
W	N	P	W	F	H	N	H	H	D
Q	S	A	Z	S	O	S	C	A	H
E	T	S	Y	T	E	V	R	H	G
R	E	T	W	H	L	W	L	N	F
T	I	E	G	E	I	R	U	C	D
Y	N	U	F	N	L	K	Z	N	M
U	O	R	D	H	A	L	S	E	T
I	P	A	S	J	G	X	C	V	B

HINTS:

- 1) He explained the laws of motion
- 2) He developed vaccine for Rabies, Anthrax and explained the process of Pasteurization
- 3) He successfully proved that earth revolve around the sun
- 4) She discovered radiation and helped to apply it in the field of x-ray
- 5) He won the Noble prize for his discovery of photoelectric effect
- 6) He developed theory of evolution
- 7) He played a key role in the development of modern electricity
- 8) He is a Greek scientist who made many novel discoveries in natural sciences
- 9) He is a German chemist who discovered nuclear fission
- 10) He made research in electricity and kinetics and laid the foundation for quantum physics

Send us your answers at pathwaysteam16@gmail.com. The winner will be announced in the next edition.



DEAD POETS SOCIETY

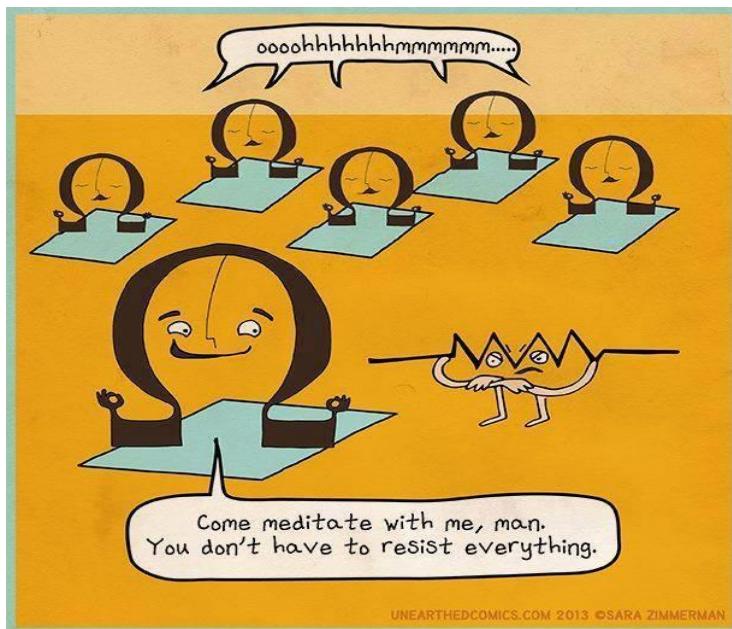
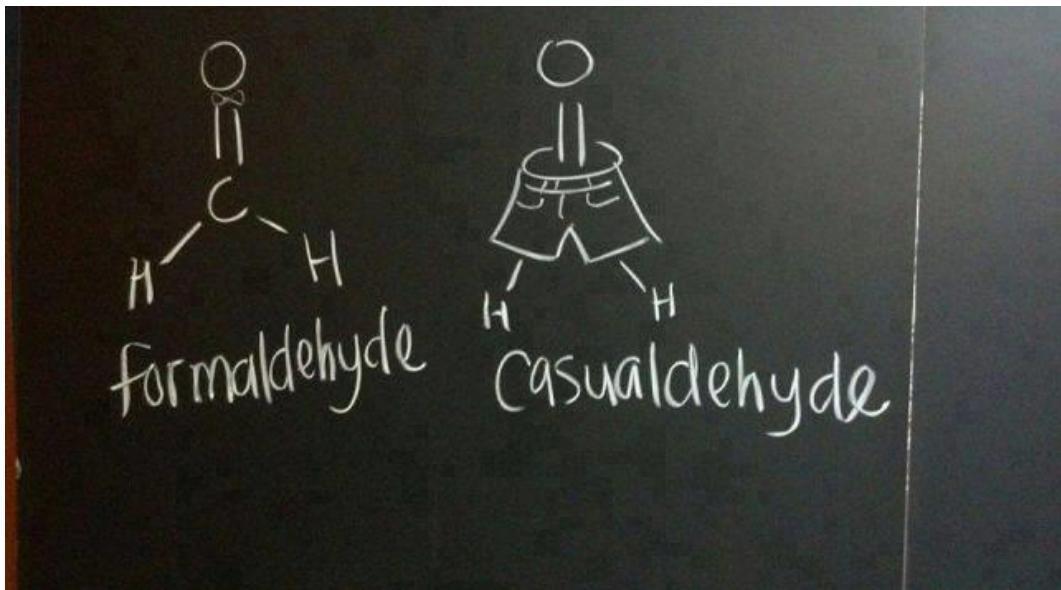
Dead poets society is a 1989 classic directed by Peter Weir that went on to receive several accolades in the next few years - the most notable one being the Academy award for Best original screenplay. The film holds an 85% approval rating and average rating of 7.2/10 on Rotten Tomatoes based on 54 reviews, meaning it earned mostly favorable reviews. Coming to the plot, it basically highlights how one person can influence the lives of so many others. This is done by an unorthodox English teacher John Keating in an all boys' prep boarding school - Welton Academy. It closely follows the lives of a group of young boys and their struggles in life - ranging from making study plans and wooing a girl to bigger issues such as difference in opinion between parents and their wards. Although the storyline is not extraordinary, the brilliant portrayal of the characters (especially the English teacher by Robin Williams) deserves a huge round of applause. A good movie is one that leaves the viewers' pondering over it long after it gets over -Dead poets society does just that.

The most appreciable quality about the professor is probably the unique way in which he handles his students. For instance, in one such class he asks his students to tear out the pages as he thinks that learning poetry involves more of interaction and self-interpretation than the conventional way of studying from the textbook provided to all the students. In another case, he takes class while standing on top of his table just so that he can tell his students to always look at things from a different perspective. Other than Prof John Keating, the movie focuses on the budding friendship between a very shy, newly admitted Todd Anderson (played by Ethan Hawke) and an already existing student Neil Perry who is forced by his dad to study medicine although he wants to get into the acting business. The strained relationship between the latter and his father is also highlighted. Simultaneously, we get to see Todd Anderson emerge from his shell to socialize with the other guys.

During his time in the same school, Professor John Keating forms a group called the dead poets society. Upon acquiring this piece of information, Neil restarts the group which would later consist of him and his friends who then sneak out of the campus in the dead of the night into a cave, where they would discuss poems and their own interpretations. However, once the school authorities come to know about this, they do not take it well. From this moment onwards, it is basically a struggle to not get expelled and fired for the students and the Professor respectively.

Overall, I would say it is a great movie and is a must watch as it leaves the viewers inspired.

WHY SO SERIOUS?

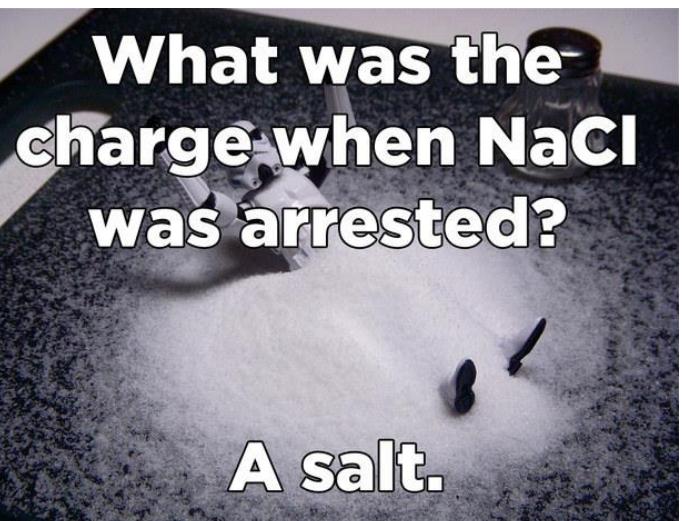
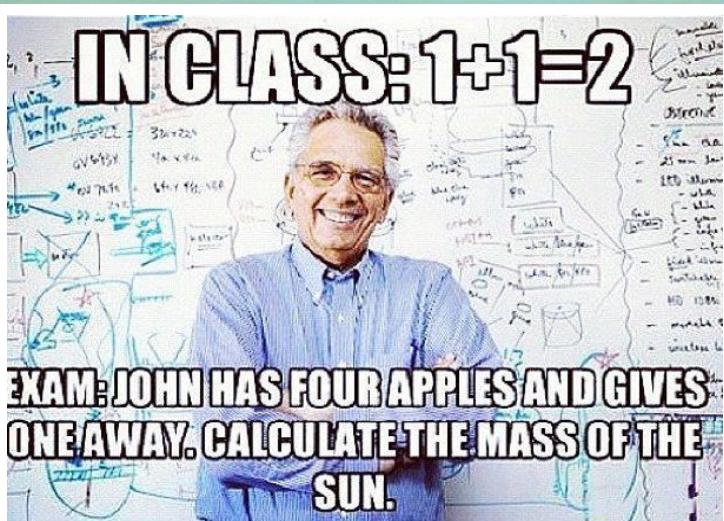


A CHEMISTRY LAB
IS LIKE A BIG PARTY



SOME DROP ACID
OTHERS DROP THE BASE

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SENIOR EDITORS AND DESIGNERS

-4TH YEARS



PRIYADARSHANI



SOURABH



SANJANA



DURGA



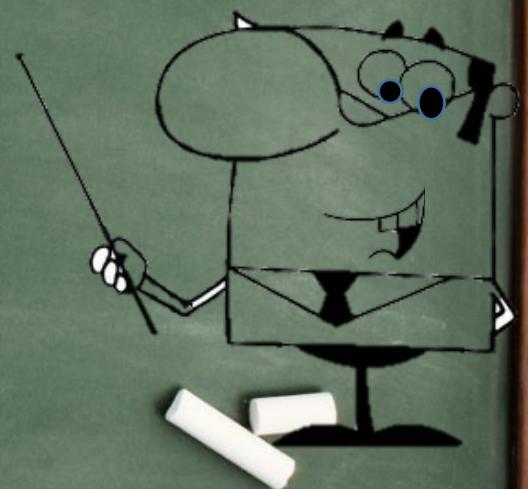
ABHINAV



ASHWIN



MAHISHA



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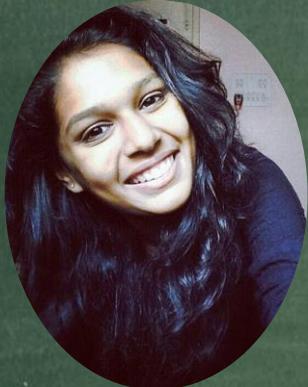
-3rd YEARS



MARK



LAKSHNA



SUPRAJA



SEHAJ



NEEL



ARPAN



SUCHARITA



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-2nd YEARS



SRIKAR



REESHMA



JEBBIN

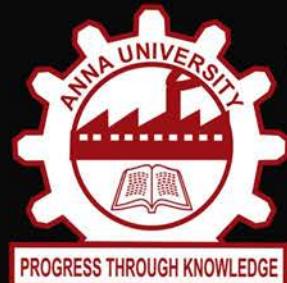


GAYATRI





For your patience
and caring, kind
words and sharing,
I just want to say.
“Thank You !”



CONSORTIUM OF CHEMICAL TECHNOLOGISTS
DEPARTMENT OF CHEMICAL ENGINEERING
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