

Delhi Public School Bangalore East







Message From Sri. K. Rahman Khan

Former Member of Parliament (Rajya Sabha) Chairman - KKCET Pro Vice-Chairman – DPS Bangalore/Mysore



It gives me immense pleasure to share my views with you through this platform. Delhi Public School Bangalore East is a prestigious institution of stellar education. It envisions a future wherein our students can implement the skills they have honed in their fruitful years of schooling. The study of Science is the key to understanding, as well as changing the universe. Science is the path that will allow the youth to invent a brighter tomorrow. Here at DPSBE, we instill skills such as self-confidence, strive to determination and courage in the next generation so they can transform the world into a more scientifically developed and better place to live in.

I would like to extent my best wishes to the Principal, Vice- Principal, teaching and non- teaching staff, students and the editorial team of this magazine. God Bless!



Message From Mr. Maqsood Ali Khan

Secretary – KKCET Member Board of Management DPS Bangalore/Mysore



"Creativity is seeing what others see and thinking what no one else ever thought." - Albert Einstein.

Knowledge is power and an indispensable tool to cultivate the mindset required to thrive in this fastpaced competitive society. Delhi Public School Bangalore East provides a multitude of opportunities for its students to start at an early age and help them foster connections. This would lead to a brand-new spectrum of connectivity and could certainly change the face of modern science as we know it. This magazine is a medium that allows students to exhibit their innovative ideas and copious skills. Further, it acts as a catalyst that inspires generations to come and set a standard for all aspiring scientists. My best wishes to the Principal, Vice Principal, faculty members, students and the editorial team of Scientia!



Message From Mr. Mansoor Ali Khan

Member Board of Management DPS Bangalore & Mysore Treasurer KKECT



"Science and Everyday life cannot and should not be separated"- Rosalind Franklin

Science is an integral part of our daily life and it runs through the same thread of time and technology. This magazine tackles the curious and ever-exploring minds of young geniuses who dream of being the next Marie Curie, Albert Einstein or C.V Raman. I congratulate the Editorial team and the student writers who have put in arduous efforts through several drafts, which has resulted in an extremely insightful magazine. My good wishes to the Principal, Vice-Principal, faculty members and students!



Message From The Principal



Dr Manila Carvalho

"We are all connected to each other-biologically, to the earth- chemically, to the rest of the universeatomically." – Neil deGrasse Tyson

Science is in our blood. It courses through our veins and encompasses every aspect of our lives. Our school is a galaxy, which consists of the brightest stars - its students, who possess immense creativity, ambition and enthusiasm. Modern science has advanced expeditiously in the past two decades. However, there is a plethora of unanswered questions, enigmatic problems, unexplored paradoxes we have yet to venture into.

It is said that creativity is a bottomless chasm. Today's youth have been fortunate enough to live in a world filled with resources, such as the latest technology, quality education, and several other opportunities; which is a prerequisite to combat the vast scope of the Science stream.

It is ever growing and it mandates aspirants brimming with boldness to question the status quo and change the world. This magazine is a small initiative, taken up by our school which will enable the students to channel their boundless creative skills, and make substantial contributions in the various fields of science and benefit humanity greatly.

My heartiest congratulations to the team who have made this e-edition of 'Scientia' a massive success!



Message From The Vice-Principal



Mrs. Priti Ssoota

"Nothing in life is to be feared, it is only to be understood. Now is the time to to understand more, so that we may fear less" -Marie Curie

Delhi Public School is incredibly proud and exhilarated to announce the second edition of "Scientia", which aims at highlighting the significance of study of science as well as the progress made in the past couple of years. Scientia started out as an idea to stimulate an interest in the field as well as to influence brand new innovations that could act as an incentive for young aspiring researchers and inventors in the modern world. The idea ultimately metamorphosed into a tangible e-publication that will, without a doubt, ignite a passion for Science.

A sincere note of gratitude to the Management and the Principal for their constant encouragement and support that enabled us to bring 'Scientia' to fruition.

Congratulations to the faculty and the editorial team!! Happy Reading!!



Message From Science Department



Mrs. S Aparna Raju Head of Department of Physics

Good communication ensures that scientific progress benefits society.

We present to you the second edition of SCIENTIA through which we will be taking you to the world of scientific developments, advancement in technology, science in art, entertainment and a lot more.

We are also elated to showcase the achievers at Delhi Public School Bangalore East in the stream of science at various scientific programs and competitive examinations.



Message From Science Department



Mrs. Anjali Kumar Head of Department of Biology

I'm glad to pen this note for 'Scientia' the wonderful publication from the Department of Science. I congratulate the students and faculty alike for their commendable efforts in bringing out this innovative content. Team work makes the dream work.

My heartfelt thanks to the honourable "Management" " Principal "and "Vice Principal " for this marvelous platform to encourage students to research, gain and share scientific knowledge.



Message From Science Department



Mrs. Shweta Gupta Head of Department of Chemistry

"Individual curiosity, often working without practical ends in minds has always been a driving force for innovation " The world of science would have never progressed till this point without the knowledge of Chemistry. It is the branch of science concerned with the substances of which matter is composed, the investigation of their properties and reactions, and the use of such reactions to form new substances. It deals with the smallest units of matter that make up everything in this universe. This reminds us that the human body and the stars are made up of the same fundamentals. Research is a vital necessity to discover the truth of our origins as well as to shape the future. For this, we require a diligent and zealous work ethic, and this is exactly what we aim to imbibe in our students through these courses.

This magazine opens the door to a world filled with wonderful opportunities and enticing questions that will help engross and engage these extraordinary young minds. My hearty congratulations to the entire team who has worked assiduously on this magazine!



Message From Editoral Team

DAs we embark on another thrilling edition of Scientia, we are delighted to welcome you to a journey through the wonders of science that promise to captivate your intellect and fuel your curiosity.

In this issue, we have curated a diverse array of articles that delve into the frontiers of scientific exploration, from cutting-edge research breakthroughs to thought-provoking analyses of the profound impact science has on our world.

From the mysteries of the cosmos to the intricacies of the microscopic realm, we strive to illuminate the interconnectedness of all scientific disciplines. Our goal is to ignite a passion for discovery and encourage a sense of wonder that transcends the boundaries of any one field.

We invite you to immerse yourself in the pages of Scienta and join us in celebrating the extraordinary achievements and ongoing quests that define the scientific landscape.

Thank you for your continued support, and we hope this edition of Scientia sparks your curiosity and fuels your passion for the incredible world of science.

Happy reading!

Saigeeth D - 120 Aditi C - 120 Yutika G - 12H Anika G - 11Q Mayur S - 11R



DIMENSIONS

Enter the boundless expanse of physics, where the fabric of reality unfolds across Dimensions, our captivating exploration into the wonders of the cosmos. In this section, we navigate the intricate layers of space, time, and alternate realities, unraveling the mysteries that stretch beyond our conventional perceptions. 'Dimensions' is more than a title; it is an invitation to transcend the limits of the known and venture into the uncharted territories of theoretical physics.

Each article within this section is a gateway to understanding the vastness of the universe and the interplay of forces that define our existence. Join us on this intellectual odyssey as we peel back the layers of reality and venture into the rich tapestry of Dimensions, where the marvels of the universe reveal themselves in ways both profound and extraordinary.

(A) - Galera

编词合称

contents

- 1. Chaos: The nature of nature (article)
- 2. Ramjets and Scramjets
- 3. Space Exploration & Us on Mars (Poster)
- 4. Valtteri Bottas (story)
- 5. Research on Magnetic Monopoles
- 6. Youngest Prof
- 7. Temporal Redemption (story)
- 8. The Lucky Thousand Year old (story)
- 9. Cartoons
- 10. DIY diamagnetism
- 11. DIY Newton's Cradle
- 12. Crossword Puzzle

CHAOS: THE NATURE OF NATURE

by Jayant Nagpal
of class 12 G

BREAKING NEWS: CROCODILE FIGHT IN THE NILE CAUSES HURRICANE IN NORTH PACIFIC OCEAN

Sounds absurd, right? How can two things of incomparable magnitude in completely different parts of the earth ever be related? I'm not saying this is true, but sometimes, nature has its own way of being weirdly unpredictable.

Take the example of today's weather. In today's world – where we have trillions of bytes of data available – no one, not even the world's best data scientists, will be able to predict the weather correctly for the following 15 days. The reason why isn't just complexity – scientists regularly tackle complex problems with ease – it's something much more fundamental.



The most beautiful thing about chaotic systems is that they're found more often than not in nature. The branches of trees, just like the bronchi in our lungs, extend out randomly.

Weather is what scientists refer to as a dynamic system that is extremely sensitive to initial conditions. This means that even the slightest change in the initial condition (even to the magnitude of 10-20) can cause a huge change in the outcome, given time. This makes the weather a chaotic system, one whose behaviour appears to be random, owing to great sensitivity to small changes in conditions.



If the perfectionist part of you still has trouble digesting this, you're not alone. Einstein, along with other Physicists, advocated that the universe was deterministic (i.e. events are completely determined by previously existing causes; every event has a perfectly logical reasoning behind it). However, this idea took a hit in the mid-20th century when mathematician Edward Lorenz was studying a simple model of the Earth's weather on an early computer. When he stopped and restarted his simulation, he ended up with wildly different results, which shouldn't be a thing. He was putting in the same inputs, and he was solving the problem on a computer, and computers are good at doing the same thing over and over again. What Lorenz essentially discovered was chaos. He referred to it as the Butterfly Effect.

	50	-7.183000	-11.345000	18.224000	-13.864000	-3.694000	41.232000	12.213000	17.178000
	25	0.211000	-12.249000	24.120000	5.727000	14.312000	30.260000	2.965000	0.136000
>>>	50	1.677274	-1.982322	13.497450	-0.798984	-5.560391	17.228423	-1.546169	1.388104
	25	0.210937	-12.249408	24.120034	5.728927	14.312447	30.269715	2.965322	0.136018

What he found was a surprising sensitivity to the initial conditions. One tiny rounding error, no more than 1 part in a million, would lead to a completely different behaviour of the weather in his model.

I'm going to leave you with food for thought: In 1814, a French Scholar Pierre-Simon Laplace published an idea that developed into a thought experiment: if some creature knew everything's position and motion at one moment, then the laws of physics would give it complete knowledge of the future. He quoted, "If this intellect were vast enough to submit the data to analysis... then the future, just like the past, would be present before its eyes."

Will such an entity ever exist? And if it does, will its existence be the landmark in science when logic takes over the universe?

RAMJETS AND SCRAMJETS

How they work: Ramjets use the power of supersonic air intake to generate thrust without an onboard oxidizer, making them simpler in design than rockets.

Key applications:

Ramjets have been used in target drones, cruise missiles, and some supersonic military aircraft, like the American SR 71 and X7.

Limitations:

They are not suitable for flying at low speeds or for launch from a standstill.

René Lorin (24 March 1877 – 16 January 1933) was a French aerospace engineer and inventor of the ramjet. In 1908 Lorin patented, FR390256, the first subsonic ramjet design.



How Do Ramjets Work?

Inlet: The ramjet has an inlet at its front designed to slow down and compress the incoming air as the engine moves through the atmosphere.

Compression: As the air enters the inlet, it is compressed due to the narrowing of the engine's internal passages.

This compression is vital for efficient combustion, as it increases the air temperature and pressure before it reaches the combustion chamber.

Combustion: After compression, fuel is injected into the compressed air in the combustion chamber. The high temperature and pressure of the air promote rapid and continuous combustion of the fuel, which

releases a large amount of energy in the form of hot exhaust gases.



Expansion and Thrust: The hot exhaust gases expand through the nozzle at the rear of the engine, producing a high-speed jet of exhaust.

Self-Sustaining: Unlike turbojet engines, ramjets do not have any rotating compressor blades.

Instead, they rely on the forward motion of the aircraft to compress air. As a result, ramjets are most effective at high speeds (typically above Mach 2)

Working Principle of Scramjets -

What Makes Them Different:

Scramjets work on a similar principle as ramjets, but the don't have turbine blades or a rotating compressor.

Operating range :

Scramjets operate only at very high speeds and altitude, typically above Mach 5.

Fuel source :

Scramjets require hydrogen as the fuel source and use atmospheric oxygen to combust the hydrogen.

Advantages Of Scramjets Over Ramjets-1) Higher speed and efficiency : Scramjets offer higher speed, better fuel efficiency, and a shorter time to reach orbit than ramjets.

2) Reduced weight :

Scramjets don't carry heavy oxidizers, like ramjets, making them lightweight and ideal for space missions.

3) Cost-effective :

Scramjets offer a cost-effective means for putting small payloads in space.

The realm of scramjet technology is an exclusive one, with only a handful of nations having successfully developed and tested this advanced technology. The nations that have made significant strides in scramjet technology include Russia, the United States, China, and India.



Current Research and Future Prospects

Continuing research on scramjets holds the potential to revolutionize

space travel and transportation, from highspeed commercial flights to space tourism.

Experimental full-scale testing

Several countries are developing and testing the technology. Boeing X-51's test flight in 2013 and FalconHTV-2's launch in 2011 brought promise to the technology.

Spaceplanes

Scramjets offer an excellent pathway for the development of reusable space planes, such as the Skylon from the UK.

Challenges In Designing And Testing Scramjets

1) Heat management :

Scramjets generate high temperatures, which is challenging to control. 2) Complexity :

The complex interactions between the components of a scramjet engine require precise design and testing methodology.

3) High speed testing :
Scramjets reach high speeds,
which requires special testing
equipment.

Potential

Scramjets could revolutionize spacetravel, vastly reducing traveland transportationtimes to spacedestinations.

Conclusion And Summary

While both ramjets and scramjets are used for supersonic air travel and space exploration, scramjets hold a significant advantage in terms of efficiency and speed due to their lighter weight, hydrogen fuel source, and lack of air intake restrictions.

 by Ashwardhan Agrawal and Arnav Misra of class 11



BARENT SIGNATION OF CONTROL OF C



THE STORY OF VALTERRI BOTTAS

-By N Madhav Krishnan And Rishi Nair of12K

This story is about Valtteri Bottas, an astrophysicist established and engineer who, among his many achievements, shares the honor of being one of the twelve of his kind to have stepped foot on the moon. This story is also about how this established gentleman is considered as a genius turned lunatic by most people around the globe. This story is written is written from the point of view of the few open minded enough not to discard him as crazy, but the confirmation or denial of the validity of said events is left to my reader.

June 17th, 1991 was meant to be a joyous day for Valtteri Bottas for two reasons: one, his mission to the unexplored side of the moon was a huge success and NASA's Voyager 11 had returned home safely to the applause of millions around the world, and two, his wife and his one year old daughter who he had left when she was just a few months were waiting for him on the tarmac. But Bottas for some reason wasn't happy, in fact he had dodged all the reporters, his wife, his daughter and locked himself in a room asking to be left alone. The world wasn't happy with this at all. They expected their space hero to address them and inspire them as he was meant to having accomplished such a feat.



But days passed and the reporters forgot, weeks passed and the world forgot, soon it was only his family who were weeping over his unusual behaviour.

27 days after Bottas had landed, he emerged out of his solitude and demanded to see the Head of NASA, he demanded the Lieutenant General be called, he wished to hold a meeting with the President for he claimed to know something no one else did. Being a man of his stature, the meetings were called but every single time he was asked to explain what he wanted to convey, he would start scribbling circles, each one different from the other but none made any sense. Bottas refused to elaborate on the circles, he didn't say what they stood for, he didn't say where he found them, he didn't even talk about his journey on the Voyager 11.

With very little credibility left and even fewer answers provided, Bottas' claims were soon dismissed as trauma he had suffered in his trip to the moon. Doctors were called, psychologists were consulted, but all they could all say was that the journey had taken a toll on his sanity and nothing else. Valtteri Bottas was found dead on 30th July, 1991 which the autopsy accredited as a heart attack to a perfectly fit man in his late 30's. Bottas was buried in his backyard and his scribblings mysteriously disappeared and his family apparently refused to provide a statement on the whole matter. On 31st July, 1991 the gardener at the Bottas family house made a call to the police saying there were peculiar glowing circles on the ground where Bottas was buried. Nothing was reported further on the matter and no official incident was filed. The Bottas family house simply got a new gardener.





DO MAGNETIC MONOPOLES EXIST?

-by Narean of class 11L

What are Magnetic Monopoles?

Magnetic monopole, is a hypothetical particle with a magnetic charge, a property analogous to an electric charge. As implied by its name, the magnetic monopole consists of a single pole, particle with either a "north" or "south" magnetic charge as opposed to the dipole, which is comprised of two magnetic poles. As yet there is no evidence for the existence of magnetic monopoles, but they are interesting theoretically.

Hypothesis

Finding these magnetic monopole particles (if they exist) would confirm there are laws of nature beyond the Standard Model of physics.



Question/Problem

Do magnetic monopoles exist? Can we find them by using giant atom smashers and collide particles such as protons and neutrons?



MoEDAL-the Monopole and Exotics Detector at the Large Hadron Collider

It searches directly for the magnetic monopole, it also searches for other exotic particles that would indicate new physics beyond the Standard Model, such as dyons, Q-balls, black- hole remnants, multiply charged particles and massive singly charged particles. So far, it's never found any monopoles, but that might be because previous MoEDAL experiments looked for monopoles created in collisions between particles like protons and neutrons. However, "we there is a different mechanism for producing monopoles, not based on collisions of elementary particles," said Arttu Rajantie, a professor of theoretical physics at Imperial College London and a co-author of the study.



Schwinder Mechanism

mechanism confidently Schwinger lets scientists calculate how many monopoles of a givennmass and magnetic charge would be produced by a magnetic field of known strength.lf monopoles exist, the mechanism would create them as pairs of particles with opposite poles - one with a "north" magnetic field and the other with a "south" magnetic field, but moving in directions otherwise completely opposite and independent of each other.

The mechanism is named after the American Nobel Prize-winning physicist Julian Schwinger, who in 1951 theorized that strong electric fields would produce electrically charged particles in the same way. While the experiments once again didn't find any monopoles, the calculations have enabled the team to narrow down their search by ruling out the possibility that monopoles have very low mass or less than a certain magnetic charge.



Conclusion

The study's lead author, University of Alabama particle physicist Igor Ostrovskiy, said magnetic monopoles feature in several theories that seek to go beyond the Standard Model of particle physics, which describes three of the four known fundamental forces and all of the known elementary particles (currently there are 31, including the Higgs boson). "There are strong reasons to believe that the Standard Model of physics is not the whole story," he said in an email. Combined with other evidence, there's "a good indication that monopoles may exist and be worth searching for." Thanks to the predictions of the Schwinger mechanism, the scientists have now ruled out the possibility that monopoles are lighter than about 75 times the mass of a proton, with fewer than three base units of magnetic charge. Their next step will be to repeat the experiments, after modifying the MoEDAL instrument to detect heavier magnetic monopoles with greater magnetic charges. The MoEDAL search highlights a difference in terminology between particle physicists and condensed matter physicists. Researchers in the United States, Switzerland and Finland said in 2019 they had imaged monopoles that emerged under specific conditions in a low- temperature magnetic material called a "spin ice" at the Lawrence Berkeley National Laboratory in Berkeley, California. While the MoEDAL monopoles would create either a north or south magnetic field, the Berkeley monopoles do not, which means they're not the real thing. They're mathematical analogues of monopoles - virtual particles, also known as 'quasiparticles'. But since they behave just like particles with a magnetic charge, that can be useful for determining how real monopoles would behave.



PHYSICS IN ACTION

"Truth is ever to be found in the simplicity, and not in the multiplicity and confusion of things." -Isaac Newton



Delhi Public School Bangalore East was sensational with the energetic sessions of the youngest professor Soborno Issac Bari.

"Physics in Action", a series of sessions were conducted for students of grades 9, 10 & 12. Interesting topics as "Light has a Brain" & "Kinematics, Dynamics, Momentum & Energy" were discussed. Students enjoyed the popper activity. It was lots of fun and excitement for students & teachers with lot of selfies and pictures taken to capture the moments for everlasting memories. 19th November 2021 Delhi Public School Bangalore East



Department of Physics had hosted a very successful online session "An Evening of Physics", then the topic being "Gravity- from Newton to Einstein".





Looking forward to many more sessions.....



TEMPORAL REDEMPTION -By Girik Bhattacharjee of 12 K

In the year 2375, humanity had reached unprecedented technological heights. They had conquered diseases, eliminated poverty, and harnessed the power of the cosmos. But their greatest feat was the invention of the Temporal Nexus, a device capable of manipulating time itself.

Within this remarkable age, David Anderson emerged as a brilliant scientist dedicated to ensuring humanity's survival and prosperity. As a Temporal Engineer, his latest mission was to prevent a global nuclear catastrophe scheduled to devastate the planet in the year 2380.

David entered the Temporal Nexus chamber, a vast, futuristic space filled with swirling vortices of light. He adjusted his temporal suit, a sleek, silver jumpsuit designed to shield him from the rigors of time travel. With a deep breath, he activated the Nexus and was instantly transported to the year 2376.

His mission was to influence key world leaders' decisions, thwarting the escalating tensions that would lead to the impending nuclear conflict.

Months of studying historical records and meticulous preparation had led him to this crucial task. David's first stop was Washington, D.C., where he secured a meeting with President Elena Ramirez. In the Oval Office, as President Ramirez reviewed a report on nuclear arms negotiations, David subtly suggested a compromise that would satisfy both sides, effectively diffusing the impending crisis.

As the years passed, David continued to make calculated changes throughout history. Working discreetly behind the scenes, he whispered ideas into the ears of scientists, diplomats, and politicians, all aimed at preventing the catastrophic war. However, with each nudge, the timeline became increasingly unstable, and the consequences of his actions rippled through the fabric of reality.

By 2379, the world had transformed into a dystopian society. Although the nuclear war had been averted, the unintended consequences of David's interventions had created chaos. Governments crumbled, and societal order teetered on the edge of collapse. The very essence of time itself began to unravel.

Desperate to restore the timeline, David returned to the Temporal Nexus. He needed to find a way to undo the damage he had inadvertently caused. Yet, as he entered the chamber, he was confronted by a holographic projection of a wise, aged scientist.

"David," the projection said gravely, "you have tampered with the past in ways unforeseen. The timeline is on the verge of collapse, and it's all due to your actions."

David's heart sank. The importance of his work had always been clear, but now he saw the true cost of his interventions. He had unwittingly become the architect of humanity's downfall.

The holographic figure continued, "There's only one way to restore the timeline and prevent further destruction. You must sacrifice yourself to the Temporal Nexus. Your existence is the anomaly tearing the fabric of time. If you cease to exist, the timeline will stabilize." Tears welled up in David's eyes as he grasped the gravity of the situation. He had to make the ultimate sacrifice to save humanity. With a solemn nod, he finally stepped into the Temporal Nexus.

As the machine hummed to life, David's existence began to unravel. He watched as his memories, his identity, and his very being dissolved into the swirling vortex of time. It was a harrowing experience, but he knew it was the only way to set things right.

In the end, David Anderson ceased to exist, and the timeline was restored. The world that emerged was not the utopia he had hoped for, but it was a world where humanity had a chance to forge its own destiny, free from the unintended consequences of temporal meddling. Humanity has learned the profound lessons of manipulating time and the perils of tampering with the past. As they moved forward into an uncertain future in the year 2375, they did so with a deep sense of responsibility, forever mindful of past lessons and the price of meddling with time. The Temporal Nexus remained locked away, a reminder of the power they had harnessed and the sacrifices made to preserve the integrity of time.



THE LVCKY THOUSAND YEAR OLD

-By Haseeb Ahmed S of 12 K

'Why am I still alive, professor?' asked the wrinkled and crippled old man who sat in front of physics professor Ming. Ming was a heart patient in his early 70s and the old man was just a bag of skin on broken bones in a brown suit. One could say he was 1000 years old. "I'd assume a human being wouldn't want to die. In your case, I feel you've lived a satisfying and long life. Also, that is a question you must ask a doctor. Not a theoretical physicist," said Ming politely. "You're 70 and I feel you'll soon experience what I faced a hundred times." "And that is?"

The old man inhaled and said, "When everyone you've known in life starts dying like falling dominos."

Ming didn't expect to hear something so bizarre. He hushed his mild annoyance and asked firmly, "Why did you want to meet me, mister..." "Oh! My name? Yeah, I have forgotten my real name. I'm known by many names, my current name is Chao," the old man interrupted. Ming controlled a hundred questions that rose in him and said, "Mister Chao-".

"But you can call me 'Sir', Sir," Chao said

Ming sighs. Chao continues, "Is immortality possible, Sir?". Ming doesn't want Chao to stay any further so he unwillingly addresses his question very formally. "A theory says that every possible outcome exists in parallel universes and any one of the universes can be experienced. If every time a human meets death and has the slightest possibility to escape death there is a parallel universe with that outcome. So my answer is that if you are lucky, maybe you can be immortal. You can even live a thousand years."

Chao pulled out a six-gun from his suit and said as he took out the six bullets, "Now look professor, I'll load only one bullet and spin the cylinder and lock it." He did as he said. He placed the barrel in his mouth and, without even flinching, pulled the trigger 5 times.

"OH MY GOD!" Ming screamed. "See I'm still alive," said Chao and Ming wheezed, holding his chest.

Chao said, "Now." Chao pulled the trigger again and a blast was heard and sparks were seen. Ming's eyes popped out. Chao continued, "See! The one way I could have died, the bullet got jammed. What are the odds of THAT!?."

Ming sat motionless in his chair open mouthed. Ming died of a heart attack. Chao sighed in disappointment.



LABLAVGHS



-by Aditi Choudhury of class 12 O



Baibhab & Kumaran 12-0

—by Baibhab & Kumaran of class 12 K

REPort on the D14 Project

Aim: To prove the diamagnetic property of water.

Materials required:

- i) styrofoam blockii) a beaker of wateriii) a neodymium magnet
- iv) a piece of paper



Observation:

Through this experiment we are able to prove the diamagnetic behaviour of water using a magnet.

While conducting this experiment we find out that when the magnet is brought close to the surface of water then the water being diamagnetic generates its own magnetic field in the opposite direction which then repels the magnetic field of the magnet creating a depression on its surface due to which the floating piece of paper slides into the depression and appears as if it's following the magnet and also shows the magnetic character.

But in real life application, we all know that paper does not exhibit any magnetic character. This is also applicable to any other floating object made of any other material.

These depressions are also visible in the reflections of the water when left still.

Procedure:

Just get a basin of water and float a styrofoam block in it. Styrofoam is very light and so even the small repulsive force of a test tube of water will have a noticeable push on it. It can be experienced with a piece of paper as it's light. Push the test tube of water into the center of the block and simply hold a strong neodymium magnet as close as possible to the tube without touching it. It's a very small force, but eventually the block will start moving away from the magnet.

Pyrolytic graphite, also called pyrolytic carbon, exhibits the same effect and can even be made to levitate on top of a magnet. A single magnet is unstable since the graphite will like to fall off the side. But having four magnets and arranging them like in the video will create a "void" in the center that the graphite "falls" into and remains stably levitated.

> –By Sanjana of 11 O

newton's cradle

Materials required:

- Jumbo Craft Sticks[ice cream sticks]
- (6) Marbles
- String Glue
- Tape
- Pencil
- Hot Glue Gun/Glue

Procedure:

Step 1- Glue 4 craft sticks together at the corners to make a square. Repeat with 4 more crafts sticks. Let it dry. These will be the sides of the frame.

Step 2 - Cut the string into 6 equal pieces approximately 8cm long.

Step 3 - Hot glue a marble to the center of one of the pieces of string. Repeat to end up with 6 separate marbles, each glued to the center of a string.

Step 4 - Tape one end of the strings with the marbles attached along the craft sticks with $\frac{1}{2}$ cm gap.

Step 5 - Using hot glue, assemble the frame. Take the two sides and hot glue a craft stick

Step 6 - Using hot glue, assemble the frame. Take the two sides and hot glue a craft stick perpendicular to each corner. The final frame will be a cube.

Step 7 - Glue the craft stick with the taped string/marbles to one side of the frame.

Step 8 - Glue the second marked craft stick to the opposite side of the frame.

Step 9 - Tape the loose end of each string with a marble attached to the marked

craft stick. Pull on the strings gently to make sure the mables align. The marbles must line up both horizontally and when viewed from the top.

Pull one of the end marbles up and let go! Watch what happens!

—by Pratyusha Pal and Vaishnavi A. of class XI - R


CROSSWORD PVIILE



Across

5. A type of circuit where the current that flows through all the devices is the same

(13)

- 7. A circuit that allows two or more paths for the current to flow through (15)
- 8. A type of energy possessed by the body due to its motion (13)
- 9. Elementary particle with a negative charge (8)
- 10. Unit of Electric Current (6)
- 11. Material that allows electric current to pass through it (9)
- 12. Electrical device that resists the flow of current in a circuit (8)
- 14. Device used to measure voltage (9)

- 1. The device that measures current in a circuit (7)
- 2. The unit that measures energy (5)
- 3. A device that converts electrical energy to mechanical energy (5)
- 4. Unit of Power (4)
- 5. Imbalance between negative and positive charges (17)
- 6. Smallest unit of matter (4)
- 13. An elementary particle that is identical to the nucleus of the hydrogen atom (6)
- 15. Device that converts chemical energy to electric energy

Answers:



Across:	Down
5. Series Circuit	1. Ammeter
7. Parallel Circuit	2. Joule
8. Kinetic Energy	3. Motor
9. Electron	4. Watt
10. Ampere	5. Static Electricity
11. Conductor	6. Atom
12. Resistor	13. Proton
14. Voltmeter	15. Battery

ALCHEMY

Step into the enchanting world of chemistry, where transformation is the essence, and elements weave their alchemical spells. In the Alchemy section of our magazine, we unlock the secrets of matter and explore the mystical reactions that transmute the ordinary into the extraordinary.

Through captivating articles and illuminating features, we invite you to embark on a journey of discovery, where the periodic table becomes a grimoire, and the pursuit of knowledge transforms the mundane into the extraordinary. Welcome to Alchemy, where the allure of chemistry is distilled into the elixir of understanding.

CONTENTS

- 1. Is glass liquid or solid?
- 2. Belousov-Zhabotinsky reaction
- 3. Electrochemical cells: Powering our world
- 4. Chemistry of black & white photography
- 5. Food industry chemicals
- 6. Food adulteration a rising problem
- 7. Molecular gastronomy
- 8. Diamonds for cheap
- 9. Nanotechnology
- 10. The Dangers of Drinking Tap Water
- 11. What is Chemistry?
- 12. What are Nuclear Weapons?
- 13. Cartoon Chem
- 14. Crossword with Chem
- 15. Fact Corner

IS GLASS LIQVID OR SOLID?

Glass, dainty, and frail

Look through it, does it tell a tale? It's sometimes said that glass in very old buildings is thicker at the bottom than at the top because glass is a liquid, and so over several centuries it has flowed towards the bottom.

Glass is not a slow-moving liquid. It is called an amorphous solid because it lacks the ordered molecular structure of true solids, and yet its irregular structure is too rigid for it

to qualify as a liquid.

When most materials go through the transition between liquid and solid states, their

molecules instantly rearrange. In a liquid the molecules are moving around freely, then all at once– they are more or less locked into a tightly knit pattern.

But the transition from the glassblower's redhot liquid to the transparent solids we drink from and peer through doesn't work like that. As a liquid is cooled, its viscosity (fluid friction) normally increases; but increasing viscosity has a tendency to prevent crystallization. The viscosity rises rapidly and continuously, forming a thick syrup and eventually an amorphous(formless) solid. At this stage it's still hundreds of degrees above room temperature. It's then cooled until it transitions into the rigid amorphous solid that even shatters with grace.



The question "Is glass solid or liquid?" has no clear answer. It can be said that glass is its own state of matter, neither a liquid nor a solid. In any case, claims that glass panes in old windows have deformed due to glass flow have never been substantiated.The observed features are more easily explained as a result of the imperfect methods used to make glass window panes before the float glass process was invented.

by Megha Yadav of class 120

BELOVSOV-ZHABOTINSKY REACTION

A Belousov–Zhabotinsky (BZ) reaction are a family of oscillating chemical reactions. These reactions serve as an non-equilibrium example of thermodynamics, resulting the in establishment of a nonlinear chemical oscillator. In the early 1950s a Soviet biochemist, Boris P. Belousov, was trying to develop a simple chemical model of the oxidation of organic molecules in living cells. In the Krebs cycle organic acids are oxidized to CO2 and H2O and in aerobic organisms, oxygen is the agent, the reactions are oxidizing catalyzed by enzymes and electrontransport proteins, many of which rely on iron ions (Fe2+/Fe3+) to move electrons around. In his test tube version of metabolism, Belousov used citric acid (one of the intermediates of the Krebs cycle) as an organic substrate, bromate ions (BrO3-) as oxidizing agent, and cerium ions as catalyst. He expected the reaction to proceed monotonically to equilibrium, perhaps showing one visible sign of progress by changing from a colourless solution (cerium in the reduced state, Ce3+) to pale yellow (the oxidized state, Ce4+).

So we can imagine Belousov's surprise when his reaction mixture turned yellow then colourless, then yellow again and colourless, oscillating dozens of times between oxidized and reduced states. Most BZ reactions are homogeneous. During these reactions, transition-metal catalyze oxidation of various ions organic, reductants by bromic acid in acidic water solution. Various detailed kinetic models have been proposed to explain the oscillatory behaviour of the BZ reaction. The first and simplest is known as the FKN which involves 18 elementary steps and 21 chemical species but can be simplified considering the role of three key species: HBrO2 as exchange intermediate, Br- as control intermediate and Mox, i.e. the oxidized form of the catalyst, as regeneration intermediate.



Successively other models have been proposed to improve or fix some aspects of the FKN mechanism for example the radicalator model. In the BZ reaction three white solids are added to a colourless stirred solution. The solution turns orange and after about 75 seconds, colourless. The oscillation continues with an initial period of about 20 seconds at 20 oC and continues for approximately 10 minutes

The Reaction

 $3CH2(COOH)2(aq) + 4BrO3-(aq) \rightarrow 4Br-(aq) + 9CO2(g) + 6H2O(l)$

Some references claim that the red colour is due to molecular bromine which could be produced via the following two steps:

 $\begin{array}{r} \mbox{Br-(aq) + BrO3-(aq) + 2H+(aq) + 4 Mn(II) → HOBr(aq) + 4 Mn(III)(aq) + \\ 2H2O \\ \mbox{Br-(aq) + HOBr(aq) + H+(aq) → Br2(aq) + H2O(I)} \end{array}$

However, other detailed studies of the processes occurring give a variety of colourless bromate ions and bromic acid molecules as intermediates, rather than bromine itself, so it is therefore possible that the red color is due to something else, maybe the transient existence of Mn3+ions which are known to be red/purple in colour. When the ruthenium bipyridine complex is utilized as a metallic catalyst, the cyclic redox reaction is observed from the change in the color of the BZ solution [Ru(bpy)32+ (orange) ₹₹ Ru(bpy)33+ (light green) + e-] This cyclic redox reaction was also electrochemically monitored using metal electrodes such as Pt and Ag on the basis of the half-cell reaction Simultaneously, the concentration of protons, [H+], should periodically change in accordance with the BZ reaction. In fact, there are a few studies in which the change in pH caused by the BZ reaction was investigated using ion sensitive electrodes. It is interesting to note that before 1980, all chemical (not biological) oscillators were either discovered accidentally or were minor variants of the two accidentally discovered oscillators. Since that time, nearly three dozen new oscillating chemical reactions have been discovered. Most of these were found using a particular schematic. These discoveries generally involve halogen chemistry and are driven by the large oxidation potentials of species such as BrO-3, IO-3, CIO-2, O2, or H2O2. The wide range of oxidation states for halogens as well as their ability to participate in radical and nonradical reactions seem critical to the appearance of oscillations.



- example of the non-equilibrium thermodynamics
- resulting in the establishment of a nonlinear

chemical oscillator

- the change of colour during the reaction bases on the oxidation of ferroin
- consists of 80 chemical reactions
- 2 main types bubble x bubble free reaction

By Ashlesha singh Of 110

ELECtrochemical Cells: Powering ovr world

- By Baibhab Bhattacharjee

Electrochemical cells are like hidden energy wizards, secretly powering the devices and technologies we rely on every day. These cells have the amazing ability to turn chemical reactions into electricity, and they come in different forms, each with its own superpower.



VOLTIC CELLS-THE POWER POCKETS

Think of the AA battery – that's a typical Voltaic cell. It's like a tiny energy vault with two parts: an anode (the negative side) and a cathode (the positive side). These parts react with special chemicals to create a flow of electrons, which gives us the power to run things like remote controls, flashlights, and electric cars. These come in two variants, Button cells and Dry cells.

B FUEL CELLS - THE GREEN ENERGY TRANSFORMERS:

Imagine cars that only emit water vapor – fuel cells are making this a reality. They use hydrogen and oxygen to create electricity, releasing water as the only byproduct. Beyond ecofriendly cars, fuel cells are being explored for clean energy production and are even used in space exploration to power spacecraft.

LITHIUM ION BATTERIES-THE REUSABLE POWERHOUSE

When you need rechargeable magic, enter the lithium-ion battery. It is the energy core which

sits in your smartphone, laptop, and electric car. The heart of the beast comprises a graphite anode, a cathode made of lithium cobalt oxide, and an electrolyte in between. When you charge it, lithium ions shuffle around, storing energy, and when you use it, they float back, making your gadgets work. They are eco-friendly and super efficient.

FLOW BATTERIES -THE ENERGY DAMS:

When you need a lot of energy, the flow batteries can be called upon. They work like massive tanks of liquid electrolytes that flow through the cell, creating electricity. The slightly more impressive part about this is that you can increase their power by increasing the size of the tanks. They are perfect for storing renewable energy from wind or solar sources, and they play a vital role in providing power for entire neighborhoods.

For all those who want a quick glance and to compare between the few electrochemical cells define below:

Type of Cell	Examples of Usage	Output Power
Button Cell	Weighing Scales, Digital Watches	1.5 V
Dry Cells	Remotes, Wall Clocks	1.2 V to 1.5 V
Li-lon	Smartphones, EVs	3.2 V per cell
Fuel Cells	Large Data centres, Space crafts	300 W to 5kW
Flow Batteries	Hospitals, Office blocks	1 to 2.43 V per cell

So, whether it is the dry cells in remotes, or the Li-ion in smartphones and EVs or the green

energy advocates in fuel cells and flow batteries, it is these electrochemical cells which are

the invisible forces powering us into a greener and eco-friendly future.

CHEMISTRY OF BLACK \$ WHITE PHOTOGRAPHY



The modern day camera we use is a result of many years of development in the field of photography. Black and white photography was invented way before colour photography, Lets take a close look at how black and white photography works.

USE OF SILVER HALIDE CRYSTALS

Black & White photography involves the use of light-sensitive silver halide crystals that form an emulsion on plastic film with gelatine(originally glass plates were used). The energy from the light waves that enter the camera and hit the film causes a chemical reaction with the silver halide, which creates silver ions. The grains of silver halide creates an image by reacting to the different amount of light hitting different parts of the film and creating different quantities of silver ions. However, you can't see the image on the film until the film is developed because it's still light-sensitive and the image is not yet stable.

DEVELOPMENT OF THE PHOTOGRAPHIC FILM

Developing photographic film is another process where chemicals are used to turn the silver ions

into silver metal – more light produces more silver and a darker, opaque area on the film. Less light produces a more transparent area on the film. This process creates what we call a negative image(which might appear a little scary) – light parts of the image appear dark and dark parts appear light. Once the film is developed, the chemical processes must be stopped and fixed so that the silver halide crystals are removed and only the silver metal is left. Once developed, you can take the film out into the light and see the negative image.

CONVERSION OF NEGATIVE IMAGE TO POSITIVE IMAGE

So how do we create a positive image from the negative film? Another chemical process is used with light-sensitive paper, which also contains silver halide crystals held on the paper with a gelatinous emulsion - like the photographic film. A white light is shone through the negative film onto the paper, activating the silver halide to create more silver ions on the paper. You can't see the image on the paper until it is developed in a bath of chemicals that turn the silver ions into silver metal, which oxidises and shows up as dark areas on the paper. The process is then stopped and fixed ,just like the film. This is how we get a positive image on a photograph.

-by Aaryan Anu of class 11K



fun fact:The first photograph, taken by Joseph Nicéphore Niépce in 1826, was a black and white image of a view from his window



FOOD INDVSTRY CHEMICALS

The food industry is a complex landscape where science and technology meet the art of culinary creation. At its core, a myriad of chemicals play an indispensable role in enhancing flavors, extending shelf life, and ensuring food safety. Yet, the use of these chemicals has sparked debates and concerns, often centered on the balance between innovation, safety, and sustainability.

Chemicals like preservatives, flavor enhancers, and color additives play a crucial role in extending the shelf life and improving the taste and appearance of food. However, the use of certain chemicals, such as artificial sweeteners and high-fructose corn syrup, has raised health-related questions.

Preservatives and Shelf Life:

Preservatives are essential to maintaining food quality nd preventing spoilage. Chemicals like benzoates and sorbates inhibit the growth of harmful microorganisms, keeping food safe for consumption over an extended period.

Flavor Enhancers:

Food chemists develop flavor enhancers such as monosodium glutamate (MSG) to make food taste better. These compounds intensify and accentuate the natural flavors of ingredients, improving the overall sensory experience.



Color Additives:

Chemical colorants are employed to make food more visually appealing. They enhance the vibrant red of strawberries in jam or give soft drinks their characteristic hue. Nowadays many food companies are moving toward natural color alternatives.

Sweeteners and Sugar Substitutes: The food industry employs a variety of sweeteners, from natural sugars to artificial alternatives like aspartame and saccharin. In response to health concerns related to excessive sugar consumption, food manufacturers are exploring healthier sweetening options such as stevia and erythritol.

In conclusion, the role of chemicals in the food industry is complex and multifaceted. While they have undeniably revolutionized food production and distribution, concerns over their potential health and environmental impacts remain valid. As regulations tighten and consumer awareness grows, the future of food chemistry promises cleaner, safer, and more environmentally responsible food products that cater to the diverse and evolving tastes of consumers.



-by Anika Gupta of class 11Q

FOOD ADVLTERATION -A RISING PROBLEM

What is food adulteration?

Food adulteration refers to the alteration of food quality that takes place deliberately. It includes the addition of ingredients to modify different properties of food products for economic advantage. Colour, appearance, taste, weight, volume, and shelf life are such food properties.

How to avoid adulteration?

- Avoid junk and processed foods as they may contain monosodium glutamate (carcinogen)
- Make sure to clean and store all the grains, pulses and other food products
- Wash fruits and vegetables thoroughly in running water before they are used
- Always make sure to check and buy products having an FSSAI-validated label, along with the licence number, list of ingredients, manufactured date, and its expiration.

FOOD PRODUCT	ADULTERANT	HARMFUL EFFECT
Milk and Curd	Water and starch powder.	Stomach disorders
Ghee, Cheese and Butter	Mashed potatoes, Vanaspati	Gastro-intestinal disturbances
Pulses	Dyes, chemical and Lead Chromate.	Stomach disorders.
Coffee powder	Chicory, tamarind seeds powder.	Diarrhoea.
Edible Oils	Mineral oil, Karanja oil, castor oil and artificial colours.	Gallbladder cancer, allergies, paralysis, cardiac arrest, and increased LDL cholesterol.
Spices	Pesticide residues, sawdust, chalk dust, industrial dyes, arsenic, lead metal etc.	Cancer and Stomach disorders.
Fruits and Vegetables	Chemical dyes, Malachite green, calcium carbide, copper sulphate and oxytocin saccharin wax.	Stomach disorders, vomiting, and dyes used are highly carcinogenic.
Ice Cream	Pepper oil, ethyl acetate, butyraldehyde, nitrate, washing powder.	affect organs including lungs, kidneys, and heart,

MOLECVLAR

gastronomy

Molecular gastronomy applies scientific principles and techniques to cooking. Chefs use chemistry to create innovative dishes and transform flavors and textures. One of the key aspects of molecular gastronomy is the deconstruction of dishes.

Chefs dissect familiar recipes, breaking them down into their essential components and reassembling them in innovative ways. This approach not only showcases the chefs' creativity but also encourages diners to appreciate the nuances of flavors and textures in a new light.



For example, a classic dessert might be deconstructed and reimagined as a gel, foam, or powder, presenting a delightful surprise to the senses. Molecular gastronomy represents the epitome of culinary evolution, celebrating the marriage of science and art, challenging traditional culinary norms, and inviting diners to embark on a sensory adventure.

By Ajisth Kumar Of 11 J

DIAMONDS FOR CHEAP

Lab-grown diamonds

are the new trend in the jewelry world. No longer limited to celebrities like Rihanna and Kendall Jenner, who have been spotted wearing them, they are making waves globally. In June 2023, Indian Prime Minister Narendra Modi presented First Lady Jill Biden with a 7.5-carat lab-grown diamond, a gesture valued at 40.5 Lakhs, but surprisingly costing only 15 Lakhs.

Although lab-grown diamonds have been in existence since the 1940s, they have recently disrupted the traditional diamond industry. These lab-created stones share identical optical, physical, and chemical properties with natural diamonds. While they currently represent a small percentage of the market, their demand is steadily increasing, driven by the fact that lab-grown diamonds cost 30-40% less than their natural counterparts.

The majority of lab-grown diamonds today are produced through a process known as chemical vapor deposition (CVD). In this method, carbon gas is used to heat a diamond seed in a chamber, causing the carbon to adhere to the seed and grow into a larger diamond. This method provides scientists with greater control, facilitating the production of large, gem-quality diamonds more efficiently. CVD can also occur at lower pressure and temperature.

To enhance the color of white diamonds, a process called High Pressure and High Temperature (HPHT) is employed. In conclusion, lab-grown diamonds represent the future of jewelry — sustainable, fashionable, and aesthetically pleasing. Most importantly, they are affordable. So, if you aspire to shine bright like a diamond, just like Rihanna, choosing a lab-grown diamond is the way to go.

BY BAIBHAB and C.KUMARAN of 12-O

nanotechnology

 by Reneesa Jaiswal of XI-G

Nanotechnology: Unlocking the Potential at the Nanoscale

Nanotechnology is a field of science and engineering dedicated to the creation and utilization of structures, devices, and systems by manipulating atoms and molecules at the nanoscale. The nanoscale is defined as having one or more dimensions of the order of 100 nanometers (100 millionth of a millimeter) or less.

Nanoparticles, with sizes ranging from 1 to 100 nanometers, are just a fraction of the average diameter of a single human hair, which is approximately 80,000 nanometers. Their diminutive size grants them unique properties not observed in larger-scale materials, as the conventional rules of chemistry and physics no longer apply. For instance, carbon nanoparticles are six times lighter than steel and a hundred times stronger.

Exploring Nano-tech in the Medical Field

The potential of nanotechnology in medicine is vast. The reduced sizes of components achieved through Nano engineering could pave the way for the creation of complete surgical robots or miniature medical devices. A significant application lies in the targeted delivery of drugs to specific organs or tissues, offering a more localized and less toxic alternative to conventional chemotherapy for treating cancers. Additionally, coated nanoparticles could be directed to specific sites and then activated by intense light, effectively destroying diseased tissue and cells. Nanotechnology holds substantial promise in the rapidly advancing field of human tissue engineering.



Categories of Nanotechnology

- Nanomaterials: Nanomaterials are materials that have been engineered or manipulated at the nanoscale, leading to new properties or behavior compared to their bulk counterparts.
- Nano electronics: Nano electronics involves the use of tiny transistors and other electronic components at the nanoscale, to create faster and more efficient electronic devices.
- Nano-optics: Nano-optics involves the manipulation of light at the nanoscale, leading to the development of new optical devices and technologies.
- Nanomedicine: Nanomedicine is the application of nanotechnology to the medical field. It involves the use of tiny particles and devices at the nanoscale to diagnose and treat diseases.
- Nano-robotics: Nano-robotics involves the development of tiny robots and machines that can operate at the nanoscale.



The dangers of Drinking tap water

Water is a fundamental element of life, essential for our survival. It is readily available to us through various sources, one of the most common being tap water. While tap water is generally considered safe for consumption in many developed countries, it is crucial to be aware of the potential dangers associated with it. This essay explores the risks and concerns related to drinking tap water, including contamination, health implications, and the importance of water quality regulation.

Contamination Risks

One of the primary concerns regarding tap water is contamination. Despite rigorous efforts to maintain water quality, contamination can still occur at various stages of the water supply process. Contaminants may include:

Microorganisms: Harmful bacteria, viruses, and parasites can find their way into tap water, causing waterborne diseases like cholera, typhoid, and gastroenteritis.

Chemicals: Pollutants such as pesticides, heavy metals (e.g., lead, arsenic), and industrial chemicals can leach into water sources and make their way into the tap water supply. Prolonged exposure to these chemicals can have severe health consequences, including developmental issues and cancer.

Pharmaceuticals: Traces of pharmaceuticals and personal care products have been detected in tap water in some regions, raising concerns about their potential long-term effects on human health.

Radon: In areas with high levels of naturally occurring radon gas, it can dissolve into groundwater and contaminate tap water. Radon exposure is linked to lung cancer.



Health Implications

Consuming contaminated tap water can have dire health implications. Infants, the elderly, and individuals with compromised immune systems are particularly vulnerable. The potential health risks associated with tap water consumption include:

Gastrointestinal Issues: Contaminated water can cause stomachaches, diarrhea, and vomiting due to the presence of bacteria and viruses.

Lead Poisoning: Lead, often present in older plumbing systems, can leach into tap water. Even low levels of lead exposure can lead to developmental delays in children and cognitive impairments.

Chronic Illnesses: Long-term exposure to certain contaminants in tap water may contribute to chronic illnesses such as cancer, kidney problems, and neurological disorders.

Weakened Immune System: Drinking water with harmful microorganisms can weaken the immune system, making individuals more susceptible to infections and diseases.

Conclusion

While tap water is a convenient and readily available source of hydration for many, it is essential to recognize the potential dangers associated with it. Contamination risks, health implications, and the importance of stringent water quality regulation underscore the need for vigilance when it comes to tap water consumption. As responsible consumers, we should stay informed about the quality of our tap water, use filtration systems when necessary, and advocate for continued efforts to ensure safe and clean drinking water for all. By doing so, we can help minimize the dangers and promote better health outcomes for ourselves and future generations.

-By Kevin mathew Of 11M

WHAt is CHEmistry?

By Aarav Lenka Of Class XI J

Chemistry is an integral part of our daily lives, influencing a wide range of activities and products that we encounter daily. Here's a short note on the importance of chemistry in daily life:

-Food and Nutrition:

Chemistry is essential in food production and preservation. It helps determine the nutritional content of foods and ensures that they are safe to eat. Concepts like pH, chemical reactions, and food additives are crucial in the culinary world.



-Medicine and Healthcare:

Chemistry plays a critical role in pharmaceuticals, from drug development to formulation and testing. Chemistry is also involved in medical diagnostics, with tests based on chemical reactions and molecular interactions.

-Household Cleaning Products:

Cleaning products like detergents, soaps, and disinfectants rely on chemical principles to remove dirt, stains, and germs effectively. Surfactants, enzymes, and chemical reactions are involved in these products.

-Energy Production:

Chemistry is at the heart of energy production, whether it's the combustion of fossil fuels, the operation of batteries in our devices, or the chemical reactions in solar panels and fuel cells.



In terms of Medicine too:

Medicine: (The Dolo you take when you have a fever? Yes, that has chemicals!) Chemistry plays a pivotal role in medicine, influencing virtually every aspect of the development, understanding, and application of pharmaceuticals and medical treatments. Here's a brief note on the significance of chemistry in medicine:

- Pharmacology:

Understanding the chemical interactions between drugs and the human body is essential in pharmacology. Chemists study how drugs are absorbed, distributed, metabolized, and excreted (known as ADME) to optimize dosages and minimize side effects. This knowledge helps ensure that drugs are effective and safe for patients.

In Terms of Nanochemistry: (Oooh, a strong word, but used so regularly) Nanochemistry is a specialized branch of chemistry that focuses on the manipulation and study of matter at the nanoscale, typically involving particles and structures with dimensions ranging from 1 to 100 nanometers.



How nuclear weapons Work?

Nucleus of heavy atoms, when split into two smaller nuclei, release excess energy, the process named as fission.

In contrast, fusion transpires when two or more lightweight nuclei fuse together to form a heavier nucleus under the effects of extremely high temperatures and pressures, releasing energy in the process.

This is the energy used in Nuclear weapons.



Plutonium-239 and uranium-235 are the most common isotopes used in nuclear weapons. "Little Boy"- the first nuclear weapon ever used during wartime- worked by shooting a hollow uranium-235 cylinder at a target "plug" of the same material

SUDHA, 11N

For a nuclear weapon to work, a critical mass has to be attained, which results in a fission chain reaction. However, for modern nuclear weapons, they detonate chemical explosives around a sub-critical sphere(or pit) of uranium-235 or plutonium-239. The force compresses the pit and brings the atoms closer, making it denser, reaching the critical mass. Then neutrons are injected, which causes the fission chain reaction and creates an explosion.



THE LITTLE BOY



By Baibhab B and C. Kumaran of 12O





By Eidree Tripathi of 11Q



Para position being the most stable position .



By Loyolo Bernardh Mary J Of 12 M



By Ashish Kashyap Of 11J



HIYA MATE !! ITS YOUR BUDYY TUNGSTEN HERE, YES THE SAME ONE WHICH IS USED FREQUENTLY IN LIGHT BULBS, NOW I HAVE BEEN REPLACED BY NEW LED'S, STILL I CAN PROUDLY SAY "THOSE WERE THE DAYS" !



I AM THE MOST ELECTRONEGATIVE BUT USED BY YOU DAILY, GUESS WHAT, I AM PRESENT IN YOUR TOOTHPASTE !! I AM PRESENT IN THE FORM OF SODIUM FLOURIDE AND HELP OUT TOO KEEP YOUR TEETH LOOK FRESH AND SHINY



QUESTION PAPER 1. Co + 2Fe → 2. Ba + 2Na→ Students answer: 1. Co + 2Fe → Coffee 2. Ba + 2Na→ Banana





Let's Laugh Out loud!!!

- What do you call an acid with attitude? Ans. A-mean-oh-acid
- Never ever trust the atoms because they MAKE UP everything
- Two men walked into a bar . One man orders H2O.The other says "I will have H2O too"

The second man diesThe end.

- Don't drink water while studying because Chemistry says ,if you add more water the concentration decreases.
- Wanna hear a joke about sodium, bromine and oxygen ? NaBrO.

How to Classify Science

- If it moves, it's biology.
- If it stinks, it's chemistry.

If it doesn't work, it's physics.

- 1.1 made a chemistry joke.There was no reaction.
- 2. What do you call a tooth in a glass of water?A: One molar solution.
- 3. Gold is the best element because it's Au-some.
- 4. Did you know that you can cool yourself to -273.15 C and still be 0K?

5.What was Avogadro's favorite sport? A: Golf, because he always got a mole-in-one.

- 6. What did one titration say to the other? A: "Let's meet at the endpoint."
- 7. What do you call a wheel made of iron?A: A ferrous wheel.
- 8. What kind of fish is made out of 2 sodium atoms? A: 2 Na (Tuna)
- 9. Never trust an atom, they make up everything.
- 10. What do you call an acid with attitude?A: Amino acid(A-mean-oh acid).
- 11. I think these jokes are sodium funny. In fact, I slapped my neon that one!

By Riona Nath (12 'F')

INTERESTING CHEMISTRY FACTS

Angelina Jolly (12 R)

- > Bee stings are acidic, while wasp stings are alkaline
- The rarest occurring natural element in the earth's crust is Astatine (At). The entire crust has about 28 g of the element.
- Every hydrogen atom in a human's body is likely 13.5 billion years old because they were likely created at the birth of the universe
- > Super fluid helium defies gravity and climbs on walls
- > The air bags of a car are packed with sodium azide salt, which is very toxic
- > 20% of the world's oxygen is produced in the Amazon rain forest
- Mars is red because of the presence of Iron oxide (or rust) particles.
- > A handful of salt into a glass may level down the water
- It is possible to turn lead into gold
- There are more water molecules found in a bucket than the estimated number of grains of sand on the planet
- > The human body is the cause of metallic smells found in coins and other metals
- Chemical processes have been in use since 1000BC
- The amount of gold on the planet would fit a cube sized at 21 x 21 meters
- The heaviest element is Osmium (Os).







Across

- 2 _____ carbocations are the most stable.
- 5 Acid catalyzed dehydration will convert cyclohexanol to _____
- 6 A less toxic alternative to PCC is _____ oxidation
- 8 Acid-Catalyzed Hydration displays _____ regioselectivity, with the OH bonding to the more highly substituted carbon of the alkene
- 9 Commonly used for oxidation of primary alcohols to aldehydes
- 11 Polar _____ solvents accelerate SN2 reactions.
- 14 A Lewis acid is an electron pair ____
- 15 2-Butene + Br2 ---> 2,3-
- 16 _____ cleaves C=C bonds and gives 2 carbonyl groups in its place.
- 17 A way to view a molecule down a C-C single bond and evaluate relative orientations of attached groups. _____ projection.

Down

- _____ reagent is used to oxidize primary alcohols to carboxylic acids
- 2 Dissolving metal reduction turns internal alkynes to _____ alkenes
- 3 What is the 2nd step of a radical chain mechanism
- 4 ____ Oxidation

7 CH3CH3

- 10 ____ center. A tetrahedral atom with 4 different groups bonded to it.
- 12 The addition of Bromine to an alkene creates a bridged _____ ion intermediate.
- 13 Stereoisomers that are nonsuperposable mirror images of each other.

Fundamentals of chemistry



Across

- 4 Characteristic that can be seen and measured without changing the substance
- 8 Parts of the mixture cannot be distinguished from the whole
- 10 Simplest form of matter existing under normal laboratory conditions
- 11 Force holding two elements together
- 12 Negatively charged particle that moves around the nucleus
- 13 Equal to the sum of the masses of protons and neutrons in an atom
- 16 Matter can be changed but not created or destroyed
- 17 Contain chains and/or rings of carbon and most contain hydrogen and oxygen
- 19 Compound that contains none or just a single carbon atom
- 22 The ability of a substance to react with other substances
- 23 Electrons that will be shared or transferred in a covalent bond
- 24 States of matter, such as gas, liquid or solid
- 25 Electrons are transferred from one atom to another causing change to both atoms

- Substances that are combined together but not chemically
- 2 Subatomic particle that has a positive electrical charge
- 3 Result of a reaction between elements or compounds
- 4 Chart that arranges elements by atomicnumbers and similarities in properties
- 5 Unit of measure used to count atoms or molecules
- 6 Substance comprises of two or more different elements and joined chemically
- 7 Parts of the mixture that comprise the whole can be seen and distinguished
- 9 Anytihng that has mass and takes up space
- 14 Compounds resulting when metals and nonmetals bond ionically
- 15 Elements and compounds present when a reaction begins
- 18 Smallest unit of an element, keeps its own chemical properties
- 20 Central core of an atom
- 21 Subatomic particle that is electrically neutral



CHEMISTRY OF LIFE

Across

- 1 Basic unit of matter.
- 3 Forms when electrons are shared between atoms.
- 8 A process that changes one set of chemicals into another set of chemicals.
- 11 Mostly made from carbon and hydrogen atoms
- 13 Join together to make polymers
- 16 The elements or compounds that enter into a chemical reaction.
- 18 Indicates the concentration of H+ ions in solutions.
- 19 A negatively charged atom

- 1 The proteins are polymers of molecules.
- 2 The smallest unit of most compounds.
- 4 When molecules are close together, a slight attraction can develop between the oppositely charged regions of nearby molecules.
- 5 Macromolecules containing hydrogen, oxygen, nitrogen, carbon, and phosphorus.
- 6 Macromolecules that contain nitrogen and also hydrogen, oxygen, and carbon.
- 7 The substance that is dissolved.
- 9 Chemists call this the _____ that is needed to get a reaction started.
- 10 An attraction between molecules of different substances.
- 12 Contains the sugar deoxyribose.
- 14 Contains the sugar ribose.
- 15 A substance formed by the chemical combination of two or more elements in definite proportions.
- 17 A pure substance that consists entirely of one type of atom

Chemical Reactions Vocab



Across

- If this is higher, the rate of a chemical reaction will increase because there are more reactant particles in the same volume
- 4 a substance that releases energy when it is burned
- 8 A reaction that absorbs energy from the surroundings
- 10 An irreversible change in which a new substance is formed by breaking bonds or forming new ones
- 12 An increase in this will speed up a reaction because more of the reactants will be exposed and able to react
- 13 a solid that formed from the solution of a chemical reaction
- 15 Something you can observe about a substance without changing it
- 18 The substance(s) that you have as a result of a chemical reaction
- 19 You are performing an experiment in a beaker with no lid, this is considered a
- 20 A chemical reaction in which two simple substances combine to make a more complex substance
- 21 A substance that slows down a chemical reaction by preventing the reactants from coming together

- 2 A property that has to do with the chemical make-up of a substance OR how it reacts with other substances
- 3 If this increases, the rate of reaction will increase due to the particles having more energy and moving faster
- 5 This is a natural/biological catalyst in our bodies
- 6 a chemical reaction in which a complex substance is broken down into simpler substances
- 7 We use these to change the amount of atoms of an element we have
- 9 A substance that speeds up the rate of a chemical reaction by reducing the amount of activation energy required
- 11 A chemical reaction in which elements switch places. Can be single or double
- 14 A reaction that releases energy into the surrounding environment
- 16 The substances you have that react together at the beginning of a chemical reaction
- 17 a special type of reaction between oxygen and a fuel



LINGRIG

Welcome to this vibrant realm, where the symphony of life plays out in myriad forms and colors. In the Living World section of our magazine, we delve into the pulsating heart of nature's grand tapestry.

Here, each article is a brushstroke, painting a portrait of the intricate dance of living organisms — from microscopic wonders to towering giants. Through engaging narratives and insightful features, we invite you to traverse the landscapes of biology, where every page whispers the stories of survival, adaptation, and the awe-inspiring beauty of the living world that surrounds us.
CONTENTS

- 1. Brain
- 2. CRISPR
- 3. Pandemics through time
- 4. Developers of mRNA based COVID Vaccine
- 5. Painkillers: It's Working in Our Body
- 6. Synthetic biology- Redesigning of Organisms
- 7. Astrobiology- Study of life in the

Universe

8. Coffee addiction

BRAIN BY- M. KAYALVIZHI CLASS - XI P

The brain is an amazing three - pound organ that controls all functions of the body, interprets information from the outside world, and embodies the essence of the mind and soul.

Cerebrum: is the largest part of the brain and is composed of right and left hemispheres. It performs higher functions and controls voluntary actions like interpreting touch, vision and hearing, speech, emotions and fine control of movement.

Cerebellum: Its function is to coordinate muscle movements, precision of voluntary actions, maintain posture, controls and balance.

Brainstem: acts as a relay centre connecting the cerebrum and cerebellum to the spinal cord. It performs many involuntary functions such as breathing, heart rate, body temperature, sleep cycles, digestion, coughing, and swallowing.

The cerebral hemispheres have distinct fissures, which divide the brain into lobes. Each hemisphere has 4 lobes: frontal, temporal, parietal, and occipital. Each lobe may be divided, once again, into areas that serve very specific functions. Aphasia is a disturbance of language affecting speech production, comprehension, reading or writing, due to brain injury – most commonly from stroke or trauma. The type of aphasia depends on the brain area damaged. There are two types of aphasia - Broca's area and Broca's area.

The brain and spinal cord are covered and protected by three layers of tissue called meninges. About 75 percent of the brain is made up of water. This means that dehydration, even in small amounts, can have a negative effect on the brain functions. Dreams are believed to be a combination of imagination, phycological factors, and neurological factors. They prove that your brain is working even when you are sleeping.



Fact: your brain is far more active that at night than during the day.

CRISPR

Normally, we think of our DNA as being set in stone. But what if it isn't? What if you could literally change your DNA? That is what CRISPR promises. Short for Clustered Regularly Interspaced Short Palindromic Repeat, CRISPR is essentially a search and cut/paste function all rolled into one, but for DNA. This organizational pattern appears naturally in bacteria, and scientists have only recently figured out how to use it to edit DNA sequences in other organisms — including humans.

CRISPR is taking off in a big way due to its staggering potential. Imagine if you could cure genetic diseases, change your eye colour, or make people permanently resistant to tricky viruses like HIV. It's easy to see the potential for life-changing benefits and great harm at the same time, and that's why there's currently so much excitement about CRISPR.



WHAT IS CRISPR?

CRISPR is an acronym for Clustered Regularly Interspaced Short Palindromic Repeat. This name refers to the unique organization of short, partially palindromic repeated DNA sequences found in the genomes of bacteria and other microorganisms. While seemingly innocuous, CRISPR sequences are a crucial component of the immune systems of these simple life forms. The immune system is responsible for protecting an organism's health and well-being. Just like us, bacterial cells can be invaded by viruses, which are small, infectious agents. If a viral infection threatens a bacterial cell, the CRISPR immune system can thwart the attack by destroying the genome of the invading virus. The genome of the virus includes genetic material that is necessary for the virus to continue replicating. Thus, by destroying the viral genome, the CRISPR immune system protects bacteria from ongoing viral infection.

HOW DOES IT WORK?

The CRISPR immune system works to protect bacteria from repeated viral attack via three basic steps:

Step 1) Adaptation – DNA from an invading virus is processed into short segments that are inserted into the CRISPR sequence as new spacers.

Step 2) Production of CRISPR RNA – CRISPR repeats and spacers in the bacterial DNA undergo transcription, the process of copying DNA into RNA (ribonucleic acid). Unlike the double-chain helix structure of DNA, the resulting RNA is a single-chain molecule. This RNA chain is cut into short pieces called CRISPR RNAs.

Step 3) Targeting – CRISPR RNAs guide bacterial molecular machinery to destroy the viral material. Because CRISPR RNA sequences are copied from the viral DNA sequences acquired during adaptation, they are exact matches to the viral genome and thus serve as excellent guides.



WHAT ARE SOME APPLICATIONS OF CRISPR? IN INDUSTRY

The inherent functions of the CRISPR system are advantageous for industrial processes that utilize bacterial cultures. CRISPR-based immunity can be employed to make these cultures more resistant to viral attack, which would otherwise impede productivity. In fact, the original discovery of CRISPR immunity came from researchers at Danisco, a company in the food production industry. Danisco scientists were studying a bacterium called Streptococcus thermophilus, which is used to make yogurts and cheeses. Certain viruses can infect this bacterium and damage the quality or quantity of the food. It was discovered that CRISPR sequences equipped S. thermophilus with immunity against such viral attack. Expanding beyond S. thermophilus to other useful bacteria, manufacturers can apply the same principles to improve culture sustainability and lifespan.



THE FUTURE OF CRISPR

IN MEDICINE

The flexibility, simplicity, and efficiency of the CRISPR system has resulted in its rapid development for numerous applications especially in the field of medicine. As well as CRISPR-based therapeutics for gene therapy, CRISPR has been used to create relevant disease models, identify pathogenic genes, in high-throughput screening, and even as a diagnostic tool.

IN LAB

Beyond applications encompassing bacterial immune defences, scientists have learned how to harness CRISPR technology in the lab to make precise changes in the genes of organisms as diverse as fruit flies, fish, mice, plants, and even human cells. Genes are defined by their specific sequences, which provide instructions on how to build and maintain an organism's cells. A change in the sequence of even one gene can significantly affect the biology of the cell and in turn may affect the health of an organism. CRISPR techniques allow scientists to modify specific genes while sparing all others, thus clarifying the association between a given gene and its consequence to the organism.

Since CRISPR mediated genome editing technologies have provided an accessible and adaptable means to alter, regulate, and visualize genomes, they are thought to be a major milestone for molecular biology in the 21st century. So far, CRISPR systems have been broadly applied in gene function analysis, human gene therapy, targeted drug development, animal model construction and livestock breeding, which fully prove their great potential for further development. However, there are still some limitations to overcome in the practical applications of CRISPR systems, and great efforts still need to be made to evaluate their long-term safety and effectiveness.

PANDEmics through time

Over the last three years the word "pandemic" has slowly worked its way into our lives and made a severe impact on them. We all faced the COVID-19 pandemic for well over three years and it is now no longer defined as a Public Health Emergency of International Concern (PHEIC).

In December 2019, a new coronavirus causing severe acute respiratory disease occurred in Wuhan, China. It was an emerging infectious disease with widespread and rapid infectiousness. has, to date, infected lt 771,679,618 people around the world and 6,977,03 people have succumbed to it. As we all know during this time in order to keep ourselves safe we isolated ourselves and went into lockdown.

Once vaccines were produced they were distributed and social distancing was implemented. These lockdowns and protocols were not easy to implement in a time of science and technology and this raises the question: how would we have dealt with pandemics a few centuries ago?



The Black Death was a pandemic that swept Europe from 1347 to 1351, killing an unprecedented number of people compared to all other documented outbreaks or wars during that period. The black death is a type of infection caused by the Yersinia pestis (Y. pestis) bacterium which is spread mostly by fleas on rodents and other animals. Humans who were bitten by the fleas with plague. then came down Originating in China, the epidemic that led to the Black Death traveled westward via trade routes to the Mediterranean and northern Africa. By 1350, it had spread to Scandinavia and northern Britain, having reached southern England in 1348.The Italian poet Boccaccio described the illness as frighteningly contagious, saying that "the mere touching of the clothes appeared to itself to communicate the malady to the toucher."

It was also a very effective sickness. Even those who went to bed at night in perfect health could wake up dead. hysicians used outdated, risky, and unhygienic methods like boil-lancing and bloodletting, as well as superstitious customs like burning fragrant plants and taking vinegar rosewater or baths.Because they did not understand the biology of the disease, many people believed that the Black Death was a kind of divine punishment. This made the disease spread more as people would come together and pray for forgiveness. Nowadays, plague is easily treated with antibiotics and the use of standard precautions to prevent infection.



Here we can safely say whether past, present or future pandemics are undeniably dangerous and will always be difficult to manage and cure as not only do they bring disease to the masses but also fear. In the past there was limited knowledge about disease and epidemics but this did not stop physicians from trying to find cures. They were mostly potions, fumigations, bloodletting, pastes and animal cures. A doctor would come to inspect suspected cases of plague and isolate the infected and their families in their homes. Now, we know how to identify pathogens and manufacture vaccines to prevent future infections. However different the times are social distance and quarantining are preventive methods that are always followed to reduce the risk of spreading the disease.

DEVELOPERS OF MRNA-BASED COVID VACCINE



This year's Nobel Prize in Physiology or Medicine goes to a transformative medical technology that significantly altered the path of the pandemic and saved millions: the mRNA vaccines against COVID. Katalin Kariko and Drew Weissman were jointly awarded the prize for their contributions that have paved the way for promising new developments in the field of vaccinations using the knowledge of mRNA and how it interacts with our immune system.

usually made with Vaccines are weak/inactivated whole viruses but in recent times researchers have been investigating smaller viral parts like viral DNA or RNA. mRNA(messenger RNA) molecule that contains the is a instructions that directs the cells to make proteins. mRNA vaccine is a type of vaccine that uses a piece of this to produce an immune response. The vaccine delivers pieces of mRNA into immune cells, which use this as a blueprint to make foreign proteins that would normally be produced by a The protein molecules pathogen. stimulate a strong immune response that teaches the body to identify and kill the corresponding pathogen on subsequent exposure.

Karikó and Weissman began studying in vitro synthetic mRNA technology in the 1990s, when they worked together at the University of Pennsylvania. Starting in the 2000s, Karikó and Weissman early conducted several animal trials with mRNA vaccines for a variety of different pathogens such as Zika, influenza and HIV. "In every animal model we looked at, HIV was the only one that didn't work well," Weissman says. "Just about every single one of them gave us 100 percent protection." During the pandemic, the mRNA technology led to the production of highly effective vaccines against SARS-CoV-2, the COVID-causing virus, and particularly ones that were adaptable for large-scale rollout.

PAINKILLErs : it's Working in ovr Body

Painkillers, also known as analgesics, play a crucial role in alleviating pain and improving the quality of life for millions of people worldwide. These medications primarily target the nervous system to modify the perception of pain. The two main categories of painkillers are nonopioid analgesics, such as acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs) like ibuprofen.

Acetaminophen, commonly found in overthe-counter medications, works by inhibiting an enzyme in the brain called cyclooxygenase (COX). This enzyme is involved the production in of prostaglandins, substances that promote pain and fever. By reducing prostaglandin levels, acetaminophen helps lower pain sensations and reduce fever. On the other hand, NSAIDs work by blocking both COX-1 and COX-2 enzymes, thereby reducing the production of prostaglandins. Prostaglandins not only contribute to pain but also play a role in inflammation and By inhibiting fever. these processes, **NSAIDs** effectively combat pain associated with conditions like arthritis or injuries.

Opioid analgesics, such as morphine or oxycodone, work differently by binding to specific receptors in the brain and spinal cord known as opioid receptors. These receptors are part of the body's natural pain control system. When opioids attach to them, they inhibit the transmission of pain signals, providing powerful pain relief. While painkillers offer valuable relief, it's essential to use them responsibly and under medical guidance. Prolonged or excessive use of certain painkillers, especially opioids, can lead to dependence and other health risks. Understanding the working mechanisms of painkillers helps healthcare professionals both and individuals make informed choices for managing pain effectively and safely.

> By- Roshi Ranjan Of XII-Q

synthetic biology Redesigning of organisms

- By Ananya Pathak, Anika Gupta and Risha Agarwal Of Grade XI



GOALS OF SYNTHETIC BIOLOGY

The development, growth, and demise of cells and organisms are governed by oscillators, which are regularly repeated cycles of response and chemical synthesis that are genetically controlled.

INTRODUCTION

The application of engineering principles to biology is the focus of the emerging synthetic interdisciplinary field of biology. It aspires to create biological systems and parts that do not already exist in the natural world through (re-)design and fabrication. With the help of synthetic biology, researchers can quickly produce cataloged DNA sequences and assemble them into new genomes. Synthetic biology combines the chemical synthesis of DNA with genomics knowledge. expanding Synthetic biology studies how to build artificial biological systems, using many of the same tools and experimental techniques. The focus is often on taking parts of natural biological systems, characterizing and simplifying them, and using them as components of an engineered biological system.

Redesigning organisms so that they produce a substance, such as a medicine or fuel, or gain a new ability, such as sensing something in the environment, are common goals of synthetic biology projects.

Some examples of what scientists are producing with synthetic biology are:

- Microorganisms harnessed for bioremediation to clean pollutants from our water, soil and air.
- Rice modified to produce beta-carotene, a nutrient usually associated with carrots, that prevents vitamin A deficiency. Vitamin A deficiency causes blindness in 250,000
 500,000 children every year and greatly increases a child's risk of death from infectious diseases.
- Yeast engineered to produce rose oil as an eco-friendly and sustainable substitute for real roses that perfumers use to make luxury scents.



SYNTHETIC BIOLOGY BREAKTHROUGHS

Early in 2006, Dr. Jay Keasling, director of the Berkeley Center for Synthetic Biology, and three post-doctoral researchers discovered and reengineered a yeast containing bacterial and wormwood genes into a chemical factory to produce a precursor to artemisinin for use as an inexpensive anti-malarial drug.

In January 2008, the JCVI created the first synthetic bacterial genome, Mycoplasma genitalium JCVI-1.0, representing the largest man-made DNA structure (also published in Science). Genome transplantation, synthesis and assembly are essential enabling steps toward the ultimate goal of a fully synthetic, activated cell.

ASTROBIOLOGY STVDY OF LIFE IN THE VNIVERSE

Introduction

The study of life in the cosmos is known as astrobiology. It is the study of life in the universe. The search for life beyond the Earth requires an understanding of life, and the nature of the environments that support it, as well as planetary , planetary systems and stellar interactions and processes. Astrobiology is also known as exobiology or xenobiology, A variety of other supporting equipment including micro-balances, freeze dryer, stereo microscope, a torch, rotary evaporator, ultrahigh purity water, a vacuum system, balances, fume hoods, gas regulators,

meteorite safes etc are used in this field of study. Astrobiology makes use of molecular biology, biophysics, biochemistry, chemistry, astronomy, cosmology, geology, physical and ichnology etc. to investigate the possibility of life on other worlds and help recognize biospheres that might be different from that on Earth.

NASA's Mars 2020 mission is the next NASA's step in long-term robotic exploration of Mars. The rover Perseverance will provide important data relevant to astrobiology research, along with a vast amount of geological information about the landing site and the planet at large that will help put the astrobiological data into context. The rover will collect data that could be used identify biosignatures of ancient to microbial life. What really sets this mission apart is that Perseverance will be collecting a suite of samples to be returned to Earth via a Mars Sample Return mission. The opportunity to bring back samples from another planet will allow our researchers to interrogate them with all of the sophistication and that Earth-based thoroughness instrumentation provides.



It's difficult to pin down when the search for life among the stars morphed from science fiction to science, but one key milestone was an astronomy meeting in November 1961. It was organized by Frank Drake, a young radio astronomer who was intrigued with the idea of searching for alien radio transmissions. Astronomer Frank Drake helped found the science of astrobiology in the 1960s by searching for radio broadcasts from alien civilizations.

Although no compelling evidence of extraterrestrial life has yet been found, the possibility that biota might be a common feature of the universe has been strengthened by the discovery of extrasolar planets (planets around other stars), by the strong suspicion that several moons of Jupiter and Saturn might have vast reserves of liquid water, and by the existence of microorganisms called extremophiles that are tolerant of environmental extremes. The principal areas of astrobiology research can be classified as

- (1) understanding the conditions under which life can arise
- (2) looking for habitable worlds
- (3) searching for evidence of life.

- By Ananya Pathak, Anika Gupta and Risha Agarwal Of Grade XI

coffee addiction

-By Pratyusha Pal of XI R

Do we love coffee because we are addicted to it, or because coffee's chemical makeup makes sense for our body? Coffee is not a pleasant tasting experience for almost anybody on the first try. Many people just hate the taste. However, coffee contains a lot of antioxidants, and caffeine, the much needed "pick-me-up". Could this be the reason we end up "loving it"? Or is just the addiction?

Coffee is a brewed drink prepared from roasted seeds, commonly called coffee beans, of the coffee plant. They are seeds of coffee cherries that grow on trees in over 70 countries, cultivated primarily in Latin America, Southeast Asia, and Africa. Green unroasted coffee is one of the most traded agricultural commodities in the world. Due to its caffeine content, coffee often has a stimulating effect on humans.



Caffeine is a bitter, white crystalline xanthine alkaloid that is a psychoactive stimulant drug. Caffeine was isolated in 1820 by a German chemist, Friedlieb Ferdinand Runge. Caffeine is found in varying quantities in the beans, leaves, and fruit of some plants, where it acts as a natural pesticide that paralyzes and kills certain insects feeding on the plants.[6] It is most commonly consumed by humans in infusions extracted from the bean of the coffee plant and the leaves of the tea bush, as well as from various foods and drinks containing products derived from the kola nut. In humans, caffeine acts as a central nervous system (CNS) stimulant, temporarily warding off drowsiness and restoring alertness.



Caffeine is the world's most widely consumed psychoactive substance, but, unlike many other psychoactive substances, is legal and unregulated in nearly all jurisdictions. Caffeine is a potent and quickacting drug which produces an effect similar to the stress response in our bodies. Caffeine affects each person differently, depending on individual circumstances such as weight, build, etc. It has an almost instant effect on your mind-body which will continue to influence your state for 6-8 hours afterwards.

Every time we drink tea, coffee, cocoa, chocolate, or cola we are giving our body a 'hit' of caffeine. Along with nicotine and alcohol, caffeine is one of the three most widely used mood -affecting drugs in the world.

If you have more than two or three caffeine drinks per day your 'habit' may be affecting you emotionally and physically much more powerfully than you might expect.

Some commonly observed effects of caffeine are:

- 1. Stimulates your heart, respiratory system, and central nervous system.
- 2. Makes your blood more `sludgy' by raising the level of fatty acids in the blood.
- 3. Causes messages to be passed along your nervous system more quickly
- 4. Stimulates blood circulation
- 5. Raises blood pressure
- 6. Causes your stomach to produce more acid
- 7. Irritates the stomach lining
- 8. Makes digestion less effective by relaxing the muscles of your intestinal system In addition to the above effects prolonged or very heavy caffeine use can produce the following:

9. `Caffeine nerves' a jittery feeling with shaking hands, palpitations, and wobbliness in the legs

Overuse

In large amounts, and especially over extended periods of time, caffeine can lead a condition known as caffeinism. to caffeine Caffeinism usually combines dependency with a wide range of unpleasant physical and mental conditions including nervousness, irritability, anxiety, tremulousness, muscle twitching (hyperreflexia), insomnia, headaches, respiratory alkalosis, and heart palpitations. There are four caffeine-induced psychiatric disorders recognized by the Diagnostic and Statistical Manual of Mental Disorders, Edition: caffeine Fourth intoxication, caffeine-induced anxiety disorder, caffeineinduced sleep disorder, and caffeine-related disorder not otherwise specified.



Caffeine intoxication:

An acute overdose of caffeine usually in excess of about 300 milligrams, dependent on body weight and level of caffeine tolerance, can result in a state of central nervous system over-stimulation called caffeine intoxication (DSM-IV 305.90), or colloquially the "caffeine jitters". The symptoms of caffeine intoxication are not unlike overdoses of other stimulants. It may include restlessness, fidgetiness, nervousness, excitement, euphoria, insomnia, flushing of the face, increased urination, gastrointestinal disturbance, muscle twitching, a rambling flow of thought and speech, irritability, irregular or rapid heart beat, and psychomotor agitation. In cases of much larger overdoses, mania, depression, lapses in judgment, disorientation, disinhibition, delusions, hallucinations, and psychosis may occur, and rhabdomyolysis (breakdown of skeletal muscle tissue) can be provoked. Extreme overdose can result in death

What do the experts suggest?

To avoid uncomfortable withdrawal effects it is wise to ease off caffeine over a period of 7-14 days to reduce the discomfort. Reduce and then stop the richest sources (especially coffee) first. It is unwise, particularly if you are a heavy user, to suddenly stop caffeine altogether.

When you stop caffeine you allow your body to catch up on its lost rest. This takes some time. Using caffeine to force yourself into activity is like flogging an exhausted horse. For the first few weeks after stopping caffeine you may find that you are sleeping deeper and for longer.

Conclusion:

Though the effect of coffee or caffeine on our body is debated many agree for it being positive while many agree for it being negative. The most accurate statement at such a debate will be using it in a controlled way can be useful rather harmful. As, it is well said _"Conscience keeps more people awake than coffee."_

ICIERCE BULLE

JEE ADV ANCED 2023 ALL INDIA RANK ACHIEVERS

Illuminating a beam of glory and splendour or to both themselves and our institution, our students have exhibited their incredulous efforts and neverending determination in the JEE Mains 2023 Exam by securing impressive ranks. May their journey ahead be filled with growth, learning and triumph!! Best Wishes, God Bless.



NEET 2023 All INDIA RANK ACHIEVERS

We're marvelled to announce the stellar performance of our students in the NEET 2023 exam who have created with their ceaseless fire, an incomparable, fabulous legacy. Their unmatched resolution coupled with an inspiring fervour for perfection has brought to our institution a magnanimous success. May their consistent efforts pave the way for a future filled with achievements and accolades!! Best Wishes, God Bless.



INSPIRE AWARDS -MANAK 2023





DIVIJA SRIVASTVA CLASS X B Project: Fixcy- Depression cure bot and an old age companion set.

SUJAYARAVINDA KANNAN CLASS IX J Project : Automatic parking buzzer

They received an amount of Rs. 10,000/- for their idea/innovation by Department of Science and Technology (DST).

Our heart swells with pride as we share the exemplary results of our students in the INSPIRE 2023 exam. They have bestowed upon our institution the fruits of their persistent, unfathomably and inspiring endeavours. May they keep aspiring for the stars and shine bring in all their pursuits!! Best Wishes, God Bless.

national science olympiad

Our students hail triumphant as we share with all their brilliant scores in the NSO 2023 exam. Our institution exultantly celebrates their incredible feat and wishes them a bright future ahead!! Best Wishes, God Bless.

SL NO.	CLASS	NAME OF THE STUDENT	INTERNATIONAL RANK	
1.	9	SWAPNEEL DEY	51	
2.	9	ADARSH KUMAR BEHERA	50	
3.	9	ARJUN SRIVASTAVA	21	
4.	11	ISHIKA BHUIN	30	
5.	11	VENYA VELMURUGAN	84	
6.	12	ATHARV NEMA	16	

ICQRESVLT2022-23

Demonstrating their magnificent zeal and flair in the ICQ 2023 exam, we're ecstatic to announce the excellent performance of our students who have brought grandeur to our institution and themselves. May their path adorned with opportunities and achievements!! Best Wishes, God Bless.

SL NO.	CLASS	NAME OF THE STUDENT	SCHOOL RANK	
1.	11	NIKHIL DEVISETTY	3	
2.	11	VIDEEP REDDY JALAPALLY	2	
3.	11	VEDIKA GOYAL	4	
4.	11	ishika bhuin	1	
5.	11	VENYA VELMURUGAN	4	

6.	11	SHREYA BALASUBR AMANYA N	4	
7.	10	AANYAA AGARWA L	5	

SPOT (SCIENCE PROMOTION ORIENT TEST)



SHAUNAK THAKUR IX O – RANK 1

Three students got selected for Spot 100 final exam. Shaunak Thakur(IX O admission no-BE/1087/2022-23)was ranked no 1 and got full scholarship for a 4 days internship program, organized by SPOT. All three students were awarded with a certificate and a medal.

Conducted annually by the Vikram Sarabhai Science Foundation, the Science Promotion Orient Test (SPOT) assesses conceptual knowledge and one's understanding of science. We're proud to share the remarkable performance of our enterprising young minds as they sail through the trials of competitions with their perseverance and unwavering spirit. May they roar to new heights and dance to the rhythm of success!! Best Wishes, Good Luck

SCIENCE WEEK CELEBRATIONS 24.7.2023 TO 28.7.2023

Event : Science week assembly Grades: 8 to 10

The students of classes 8 to 10 enthusiastically presented a mesmerizing assembly, showcasing the different concepts of science. What is more interesting than playing quizzes? A science quiz was wonderfully conducted by the Science Department for students of classes 8 to 10. A jubilant crowd of students of classes 8 to 10 took part in the Outstanding Science Exhibition, presenting innovative working models, charts and experiments. A fun poster making event was held for the exhiburant batch of class 8 to 10 students, which led to all the students making eye-catching and mind blowing posters.

























Event : Science week assembly

"Science is a way of thinking much more than it is a body of knowledge." – Carl Sagan As a field, Science is one of the greatest collective endeavors of humanity.

Assemblies not only instill confidence but also motivates children to showcase their talents. It teaches important lessons and also fosters healthy educational culture and discipline.

MadAD : Through their advertisemental promotions, students of class XI presented their innovative ideas of how science influences marketing and businesses.

Dance : To address a very crucial matter involving narcotics, the Biology department presented an inspiring dance performance to share a very prime message with our audience.

Skit : The students of Grade XI collectively collaborated to present an incredible performance in the form of a skit, titled as 'How Dr. Greatback accidentally discovered the Pacemaker'.



Event : Talk Show

The Biology Department organized a Talk Show, where Freelance Wildlife Photographer, Environmentalist and National Geographic certified wildlife Enthusiast, Mr. Jai Sharma was the Guest Lecturer and he conducted a workshop. Presence of the students of Grade XII undoubtedly enhanced the overall success of the Event.



Event : Poster Making

Poster Making Sessions were conducted for Grade XI students in their respective classrooms where they brought out the artists within themselves and presented different ideas of Physics using eye-catching visual elements.



Event : Talk Show On Eminent Scientists

Students of Grade XI participated in interactive sessions in their classrooms, delivering speeches on Eminent Scientists, All Across the World.



Event : Science Exhibition

EVENT: FUN WITH SCIENCE GRADES: 11TH AND 12TH The Students of grade XI displayed their flair for science by putting up an impressive and outstanding exhibition on the different concepts of Science.





Event : Paper Presentation

"Chemistry states that the more energy you put into a bond, the harder it is to break."

The Chemistry Department conducted interactive Paper presentation where groups of students spoke a few words while showcasing their Powerpoint presentations on the following topics:

- 1. Chemistry of Warfare
- 2. Science of Allergens
- 3. Effects of Lack of Chemical elements in a Human Body
- 4. Nitric oxide as Neurotransmitter
- 5. Green Chemistry: Its principles & alternative reaction media
- 6. How Chemical Weapons became Main threat to Wars
- 7. Nanotechnology
- 8. Carbon Dating



Event : Treasure Hunt

The Physics Department conducted a Treasure Hunt, with the objective of Bring out Physics in a Fun Manner. The response to the competition was overwhelming with Enthusiastic Participants of Grade XI & XII working in small teams to brainstorm and decode clues & riddles regarding Different Concepts Of Physics, using their knowledge and quick wit.



Event : Chemistry Talk Show By DR. Aman Bajpai

A Chemistry Talk Show, centered on the idea "The Role of Chemistry in Drug Discovery and Development", was proudly presented by the Chemistry Department, having Dr Aman Bajpai (Ph.D) as the guest lecturer. The Seminar mainly focused on a few Points:-

- 1. Advancement in Drugs.
- 2. Understanding Disease and Target Identification
- 3. Drug Design and Synthesis
- 4. High Throughput Screening
- 5. Structure Activity Relationship (SAR)
- 6. Medicinal Chemistry and Optimization
- 7. Pharmacokinetics and Toxicity Studies
- 8. Preclinical Studies & Clinical Trials.






PHYsics DEPArtmEAt

(Left to Right) 1.Mr.Balaji Siva Prasad 2.Mr.Murthy Kancharla 3.Ms. Inderpreet Kaur 4.Ms.Kruthi.R 5.Ms.S Aparna Raju 6.Ms.Monika Sharma 7.Ms.Raghy Nair 8.Ms.Shabana Shagul 9.Mr.Joseph Sagayaraj K G

CHEMistry DEPArtmEnt

(Left to Right) Mr. S Sanjeeva Reddy Ms.Swetha Madapura S Ms.Nishu Jain Ms.Divya Singh Ms.Divya Singh Ms.Shweta Gupta Ms. S Chitra Ms.Bhavita B Ms.Archana Prasad Mr.Mutta Suryanarayana

Biology DEPArtment

0

(Right to Left) 1.Ms.Reshmi Ranjit 2.Ms.Tasneem Sultana 3.Ms.Anjali Kumar 4.Ms.Manaswini Rath 5.Ms.Reena Ullas

Thank you for reading the Second edition of



Delhi Public School Bangalore East Address: Dommasandra Post, Survey No. 43/1B & 45, Kodati Sulikunte Road, Sulikunte, Bengaluru, Karnataka 562125