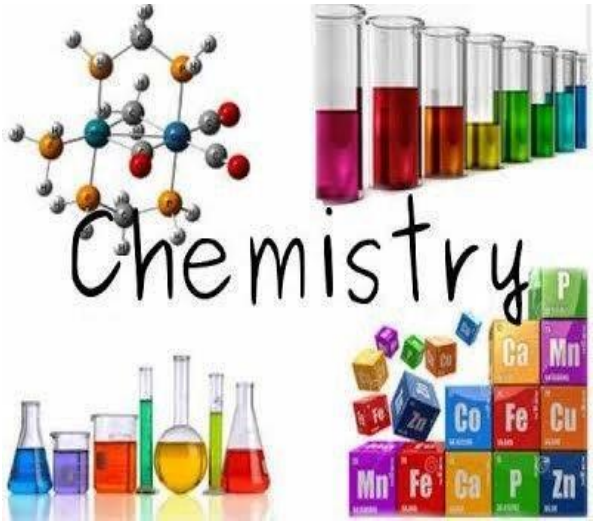


July - 2018
Vol. 7
Issue: 1

CHEMFLASH

THE CHEMISTRY NEWS LETTER

EASWARI ENGINEERING COLLEGE

CONTENTS:

Quotes:

"Chlorine is a deadly poison gas employed on European battlefields in World War I. Sodium is a corrosive metal which burns upon contact with water. Together they make a placid and unpoisonous material, table salt. Why each of these substances has the properties it does is a subject called chemistry." - CARL SAGAN

A chemical compound once formed would persist for ever, if no alteration took place in surrounding conditions. But to the student of Life the aspect of nature is reversed. Here, incessant, and, so far as we know, spontaneous change is the rule, rest the exception—the anomaly to be accounted for. Living things have no inertia and tend to no equilibrium - THOMAS HENRY

MESSAGE FROM THE HOD'S DESK

Dr. C. Ravichandran
Professor and Head

The department of chemistry has brought out its quarterly news letter **chemflash**. Its focus is on all the recent happenings in the field of chemistry. This news letter is sure to give a suitable platform to all the budding engineers to widen their perspective. I express my heartiest congratulations to all the staff and students who were behind the success of chemflash.

I seek their continued co-operation in all the future endeavours.

Dr. C. Ravichandran

ACHIEVEMENTS

ACADEMIC RESULTS:

Mrs. R. Anithadevi & Mrs. AR. Anusa have produced 100 % results in Environmental Science and Engineering, II semester.

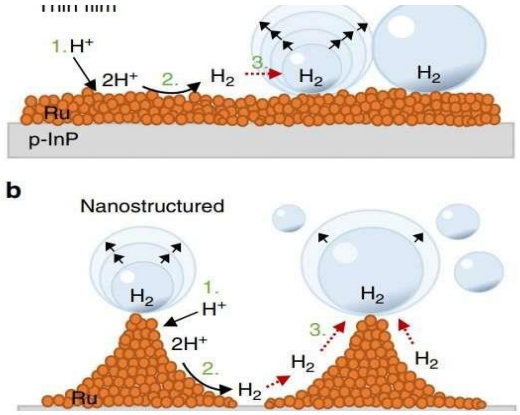
PAPER PUBLICATION:

Marimuthu Ponram, Umamahesh Balijapalli, Baskaran Sambath, Sathiyanarayanan Kulathu Iyer, c Venkatachalapathy B,a Ravichandran Cingarama and Karthikeyan Natesan Sundaramurthy were published a research article entitled, " A new and simple fluorescent probe bearing mono-sulfur (1) and tetra-sulfu Development of paper based chemosensor for the detection ofmercury ions usingmono and tetra sulfur bearing phenanthridines RSC – New Journal of Chemistry, 42, 8530 2018

Answers to puzzles:

	Across	Down
1.	Electron	2.Two
5.	Reaction	3. Proton
6.	Plasma	4. Hydrogen
9.	Neutron	1. H
11.	Noble	6. Periodic
13.	Mass	7. Metal
14.	Carbon	8. Nucleus
		10. Number 12. ion

Solar hydrogen generation in microgravity environments



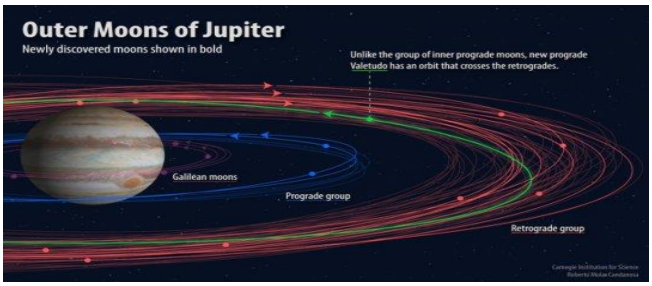
An international team of researchers has found a way to make solar hydrogen generation more efficient in microgravity environments. In their paper published in the journal *Nature Communications*, the group describes what they learned from experiments with a photoelectrochemical cell falling in a drop tower. The researchers explain that the current process involves using an electrode made of a semiconductor that is light absorbing: Typically, a p-type indium phosphide. The electrode is then coated with a thin layer of a rhodium catalyst. They note that each drop occurred over approximately 9.3 seconds—enough time for their device to produce hydrogen gas. The researchers found that their change to the surface of the electrode resulted in the production of hydrogen gas at the same rates as devices in normal gravity

Long-term space missions require extra-terrestrial production of storable, renewable energy. Hydrogen is ascribed a crucial role for transportation, electrical power and oxygen generation. We demonstrate in a series of drop tower experiments that efficient direct hydrogen production can be realized photoelectrochemically in microgravity environment, providing an alternative route to existing life support technologies for space travel. The photoelectrochemical cell consists of an integrated catalyst-functionalized semiconductor system that generates hydrogen with current densities 15 mA/cm^2 in the absence of buoyancy. Conditions are described adverting the resulting formation of ion transport blocking froth layers on the photoelectrodes. The current limiting factors were overcome by controlling the micro- and nanotopography of the Rh electrocatalyst using shadow nanosphere lithography. The behaviour of the applied system in terrestrial and microgravity environment is simulated using a kinetic transport model. Differences observed for varied catalyst topography are elucidated, enabling future photoelectrode designs for use in reduced gravity environments.

Cross sectional illustration of a gas bubble evolution model on the thin-film and nanostructured photoelectrode. Whereas H_2 is formed at discretionary nucleation spots on the thin-film electrode surface (a) resulting in gas bubble coalescence and the formation of a bubble froth layer, the nanostructured Rh surface favours the formation of H_2 gas bubbles at the induced Rh tips, catalytic hot spots (b). Here, concentration gradients along the surface facilitate H_2 transfer to the bubbles upon formation. The distance between the hot spots prevents the coalescence of the formed gas bubbles.

Twelve new moons for Jupiter

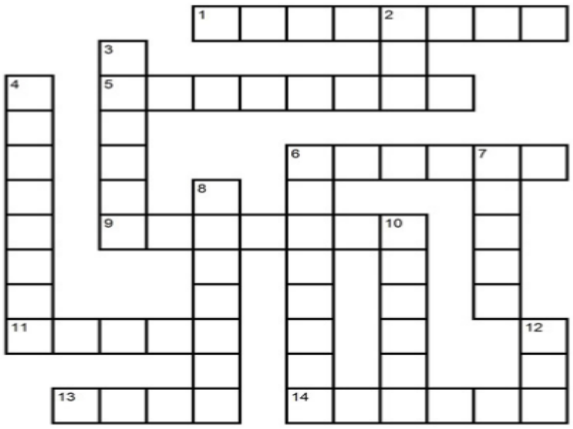
Twelve new moons orbiting Jupiter have been found -- 11 'normal' outer moons, and one that they're calling an '*oddball*.' Astronomers first spotted the moons in the spring of 2017 while they were looking for very distant solar system objects as part of the hunt for a possible massive planet far beyond Pluto.



Various groupings of Jovian moons with the newly discovered ones shown in bold. The 'oddball,' called Valetudo after the Roman god Jupiter's great-granddaughter, has a prograde orbit that crosses the retrograde orbits.

M. Deepika- I year CSE

Chemistry crossword puzzles



Across:

1. The subatomic particle of an atom that has a negative charge is called a(n)_____.

5. A chemical _____ occurs when 2 or more molecules interact with each other causing the molecules to change.

6. The 4 fundamental states of matter are: Solid, Liquid, Gas and _____.

9. The subatomic particle of an atom that does not have an electric charge is called a(n) _____.

11. The _____ gases are found in group 18 of the periodic table, the last column on the right.

13. The amount of matter in a object?

14. Organic chemistry is the branch of chemistry that deals with compounds containing_____.

Down:

2. How many hydrogen atoms are in a molecule of water?

3. The positively charged subatomic particle in the nucleus of an atom is called a(n)_____.

4. The chemical element with atomic number 1. It's the first element in the periodic table.

6. The _____ table is a tabular arrangement of the elements.

7. A type of material that is considered a good conductor of electricity and heat

8. The central core of the atom containing protons and neutrons

10. The atomic _____ is the number of protons in an atom.

12. A charged atom or molecule

N. Akshara- I year EEE A

Earth's Oldest Color Dates Back More Than 1 Billion Years

It is the world's oldest-known color produced by a living organism, according to new research.

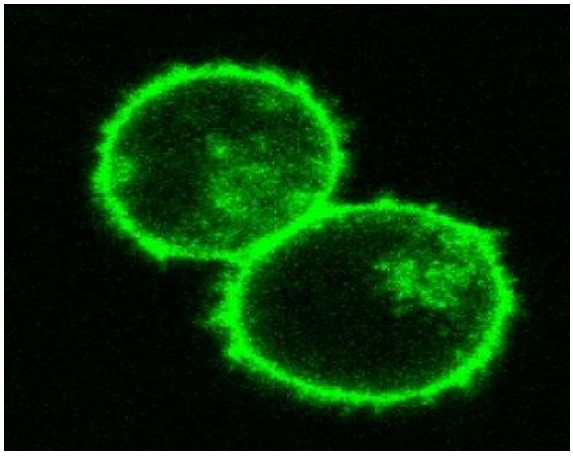
Researchers extracted the pigment from bacteria fossils preserved in rocks under the Sahara Desert in Mauritania, West Africa. Inside those teensy bacteria, the scientists found chlorophyll — a pigment used today by plants for photosynthesis — dating back to about 1.1 billion years ago. That's about 600 million years older than similar chlorophyll fossils found previously, scientists reported in the new study.

Their findings hint that cyanobacteria, bacteria that survive on sunlight, appeared much earlier than algae, which have been traced to around 650 million years ago. And bacteria likely dominated Earth's ancient oceans for hundreds of millions of years, according to the study.

Chlorophyll is what gives modern plants their green color, though the fossilized chlorophyll in the cyanobacteria samples was dark red and deep purple in its concentrated form, the scientists reported.When they pulverized the fossils to analyze the bacteria molecules, the researchers distilled the colors to find a brilliant pink. This colorful remnant suggests that ancient sunlight-eating organisms cast a pink tint to a long-gone ocean, lead study author Nur Gueneli, of the Research School of Earth Sciences at the Australian National University.

Preethi B.V- I year EIE B

T cell engineering breakthrough sidesteps need for viruses in gene-editing



In an achievement that has significant implications for research, medicine, and industry, UC San Francisco scientists have genetically reprogrammed the human immune cells known as T cells without using viruses to insert DNA. The researchers said they expect their technique -- a rapid, versatile, and economical approach employing CRISPR gene-editing technology -- to be widely adopted in the burgeoning field of cell therapy, accelerating the development of new and safer treatments for cancer, autoimmunity, and other diseases, including rare inherited disorders.

The new method, offers a robust molecular "cut and paste" system to rewrite genome sequences in human T cells. It relies on electroporation, a process in which an electrical field is applied to cells to make their membranes temporarily more permeable. "This is a rapid, flexible method that can be used to alter, enhance, and reprogram T cells can give them the specificity to destroy cancer, recognize infections, or tamp down the excessive immune response seen in autoimmune disease. To demonstrate the new method's versatility and power, the researchers used it to repair a disease-causing genetic mutation in T cells from children with a rare genetic form of autoimmunity, and also created customized T cells to seek out and kill human melanoma cells.

Viruses cause infections by injecting their own genetic material through cell membranes, and since the 1970s scientists have exploited this capability, stripping viruses of infectious features and using the resulting "viral vectors" to transport DNA into cells for research, gene therapy, and in a well-publicized recent example, to create the CAR-T cells used in cancer immunotherapy.

T cells engineered with viruses are now approved by the U.S. Food and Drug Administration to combat certain types of leukemia and lymphoma. But creating viral vectors is a painstaking, expensive process, and a shortage of clinical-grade vectors has led to a manufacturing bottleneck for both gene therapies and cell-based therapies. Even when available, viral vectors are far from ideal, because they insert genes haphazardly into cellular genomes, which can damage existing healthy genes or leave newly introduced genes ungoverned by the regulatory mechanisms which ensure that cells function normally. These limitations, which could potentially lead to serious side effects, have been cause for concern in both gene therapy and cell therapies such as CAR-T-based immunotherapy.

Scientists completely replaced native T cell receptors in a population of normal human T cells with new receptors that had been specifically engineered to seek out a particular subtype of human melanoma cells. T cell receptors are the sensors the cells use to detect disease or infection, and in lab dishes the engineered cells efficiently homed in on the targeted melanoma cells while ignoring other cells, exhibiting the sort of specificity that is a major goal of precision cancer medicine.

Without using viruses, the researchers were able to generate large numbers of CRISPR-engineered cells reprogrammed to display the new T cell receptor. When transferred into mice implanted with human melanoma tumors, the engineered human T cells went to the tumor site and showed anti-cancer activity.

S. Karthick Raja- I year Mech B

Chemistry factoids:

Elemental silicon has a large impact on today's world economy. Most free silicon is used for steel refining, aluminum-casting, and in chemical industries. But it is the small portion (less than 10%) of highly purified silicon used in semiconductor electronics that is most critical for today's computer technology and electronic industries.

Differences between Normal cells and cancer cells

Normal Cells

Normal cells stop growing (reproducing) when enough cells are present. For example, if cells are being produced to repair a cut in the skin, new cells are no longer produced when there are enough cells present to fill the hole; when the repair work is done.

Normal cells are either repaired or die (undergo apoptosis) when they are damaged or get old

Normal cells secrete substances that make them stick together in a group.

Normal cells stay in the area of the body where they belong. For example, lung cells remain in the lungs.

Normal cell reproduce themselves and then stop when enough cells are present.

Normal cells mature. Normal cells become damaged, the immune system (via cells called lymphocytes) identifies and removes them

Normal cells perform the function they are meant to perform. For example, normal white blood cells help fight off infections

Angiogenesis is the process by which cells attract blood vessels to grow and feed the tissue. Normal cells undergo a process called angiogenesis only as part of normal growth and development and when new tissue is needed to repair damaged tissue.Normal Cells

Cancer Cells

Cancer cells don't stop growing when there are enough cells present. This continued growth often results in a tumor (a cluster of cancer cells) being formed.

Cancer cells are either not repaired or do not undergo apoptosis. For example, one protein called p53 has the job of checking to see if a cell is too damaged to repair and if so, advise the cell to kill itself. If this protein p53 is abnormal or inactive then old or damaged cells are allowed to reproduce. The p53 gene is one type of tumor suppressor gene that code for proteins that suppress the growth of cells.

Cancer cells fail to make these substances, and can "float away" to locations nearby, or through the bloodstream or system of lymph channels to distant regions in the body.

Cancer cells, because they lack the adhesion molecules that cause stickiness, are able to travel via the bloodstream and lymphatic system to other regions of the body—they have the ability to metastasize. Once they arrive in a new region they begin to grow, often forming tumors far removed from the original tumor.

Cancer cells reproduce rapidly before the cells have had a chance to mature.

Cancer cell grow rapidly and divide before cells are fully mature, remain immature.

Cancer cells are able to evade (trick) the immune system long enough to grow into a tumor by either by escaping detection or by secreting chemicals that inactivate immune cells that come to the scene.

Cancer cells may not be functional. In leukemia, the cancerous white blood cells are not functioning as they should, people can be more at risk for infection even with an elevated white blood cell count.

Cancer cells undergo angiogenesis even when growth is not necessary. One type of cancer treatment involves the use of angiogenesis inhibitors—medications that block angiogenesis in the body in an effort to keep tumors from growing.

Chemistry Poem

Periodic table of elements,

The true heart of chemistry,

Atoms randomly disperse,

Directionless, blinded and betrayed,

Valencies in their course traverse,

Swaying in the number brigade .

Hariharan V- I year Mech A

Prepared By:	Approved By:
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