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CHEM-ZONE
SEPTEMBER 2021

CHEMISTRY IS LIKE MAGIC BUT REAL

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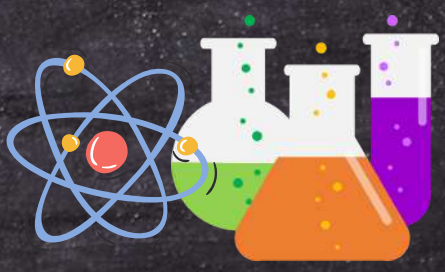
BE LESS CURIOUS ABOUT PEOPLE AND MORE CURIOUS ABOUT IDEAS.

~Marie Curie

CONTENTS

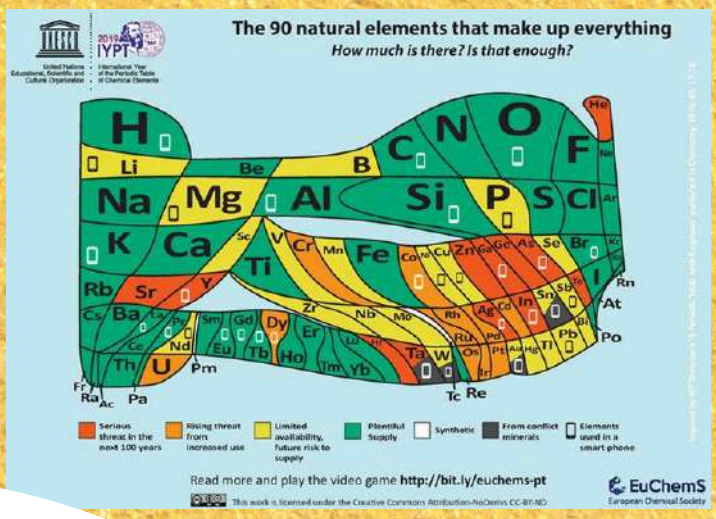


Edited by Jisa Xavier


NEW
FRONTIERS...
Edited by Jisa Xavier

Periodic Table [Updated Version]

The latest attempt to order elements in this manner was recently published in the Journal of Physical Chemistry by scientists Zahed Allahyari and Artem Oganov. Their approach, building on the earlier work of others, is to assign to each element what's called a Mendeleev Number (MN). The latest study uses: an element's atomic radius and electronegativity. If one orders the elements by their MN, nearest neighbours have, unsurprisingly, similar MNs.



What is the benefit of this approach?

Importantly, it can help to predict the properties of binary compounds that haven't been made yet. This is useful in the search for new materials that are likely be needed for both future and existing technologies.

After 150 years, we can see that periodic tables are not just a vital educational tool; they remain useful for researchers in their quest for essential new materials. But we should not think of new versions as replacements for earlier depictions. Having many different tables and lists only serves to deepen our understanding of how elements behave.

Credits-https://theconversation.com/periodic-table-scientists-propose-new- way- of-ordering-the-elements-150881

Content by - Parveen Khan

ACTINIUM'S IONIC RADIUS REVISED AFTER DECADES

Chemistry of one of Earth's rarest elements remains mysterious, though not for lack of trying

The ionic radius of actinium(III) may be far smaller and closer to the lanthanides than the most recent measurements from the 1950s and 70s suggest, a review by researchers at Lawrence Livermore National Laboratory, US, has found. This could have potential ramifications for cancer therapies.

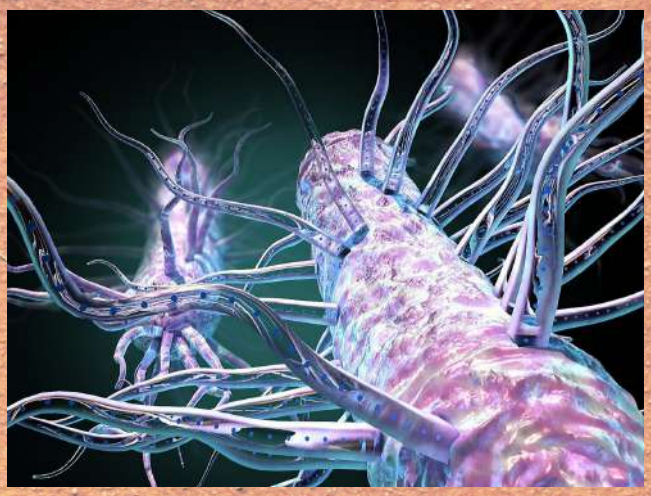
Actinium-225 glows blue because the alpha particles it emits ionise the surrounding air

Actinium was discovered by French chemist André-Louis Debierne in 1899. But it exists in such small quantities naturally — usually from the radioactive decay of heavier elements — that it can't be extracted and used in experiments. Instead, researchers rely on actinium created in nuclear reactors. Even so, the element is often in short supply, with only microgram quantities available to a handful of teams around the world.

This means experimentalists have to be selective in the research they perform, often relying on data from earlier work. This is why much of the element's chemistry remains a mystery. Now, a group led by Gauthier Deblonde at Livermore's Seaborg Institute has taken a forensic approach to previous data, predominantly crystallography during the 1950s and 1970s, comparing it with more recent x-ray absorption experiments.

CONTENT BY:
SHAHIN JAMADAR

HIDDEN BACTERIAL HAIRS POWER NATURE'S 'ELECTRIC GRID'



Almost all living things breathe oxygen to get rid of excess electrons when converting nutrients into energy. Without access to oxygen, however, soil bacteria living deep under oceans or buried underground over billions of years have developed a way to respire by "breathing minerals," like snorkeling, through tiny protein filaments called nanowires. Two proteins within buried bacteria, lacking oxygen, pump out nanowires, which essentially "exhale" electrons. Scientists are seeking to use this natural electrical grid to generate electricity, new biofuels and even self-healing electronic components. Just how these soil bacteria use nanowires to exhale electricity, however, has remained a mystery. Since 2005, scientists had thought that the nanowires are made up of a protein called "pili" ("hair" in Latin) that many bacteria show on their surface. However, in research published 2019 and 2020, a team led by Malvankar showed that nanowires are made of entirely different proteins. "This was a surprise to everyone in the field, calling into question thousands of publications about pili," Malvankar said.

For the new study, graduate students Yangqi Gu and Vishok Srikanth used cryo-electron microscopy to reveal that this pili structure is made up of two proteins And instead of serving as nanowires themselves, pili remain hidden inside the bacteria and act like pistons, thrusting the nanowires into the environment. Previously nobody had suspected such a structure. Understanding how bacteria create nanowires will allow scientists to tailor bacteria to perform a host of functions -- from combating pathogenic infections or biohazard waste to creating living electrical circuits, the authors say. It will also assist scientists seeking to use bacteria to generate electricity, create biofuels, and even develop self-repairing electronics.

Content by Maira Kalokhe

Hardest Amorphous material can scratch even Diamond

Compressing Buckyballs (A hollow spherical molecule composed of a large number of carbon atoms) at high temperatures makes ultra-hard and strong carbon materials.

Applying high temperatures and pressure to buckminsterfullerene C60 produces amorphous carbon materials with a compressive strength similar to diamond, scientists have found. Amorphous materials have no long -range order and can be made by compressing sp2 carbon precursors. under ambient conditions, C60 remains stable at pressure up to 25GPa. but at temperatures abobe 800˚C it compresses at 5GPa to form a disordered carbon material as the extreme conditions cause the fullerene's bonding character to change from sp2 to sp3. The resulting material's physical properties depend on the ratio of sp2 to sp3 carbons. Raising the temperature during synthesis increases the sp3 fraction, producing a harder material.

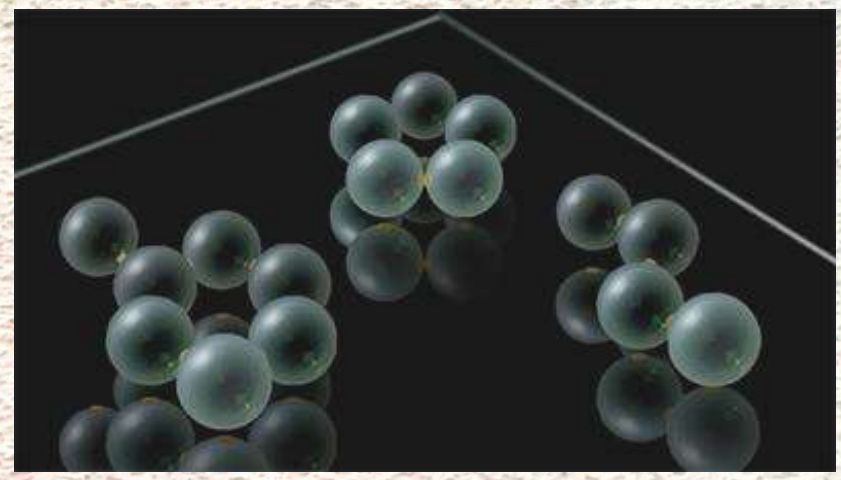
The hardest among these amorphous materials made by an international team of researchers was created at 1200˚C. Its tetragonally-arranged network of sp3 carbons is so hard it scratches diamond and is of a similar compressive strength, which describes the material's ability to withstand being squashed under a load. But unlike insulating diamond, the material has a small bandgap, making it a semiconductor. This could be useful in solar cells and photoelectric applications as the bandgap is similar to silicon.

SOURCE- https://www.chemistryworld.com/

Content by Nafia Ansari

Molecule sized camera to watch chemical reactions in real – time.

Scientists at Cambridge University have gotten a glimpse at chemical reactions in real time using molecule sized camera. The device is made up of gold nanoparticles, semi-conductor nanocrystals called quantum dots and also some molecular glue. The device is a simplified version scientists have for monitoring how various chemical compounds form during reactions, in comparison to the current available methods. The team that built this device are currently using it to improve technology behind solar cells. Scientists were surprised themselves considering how Powerful and How straight forward it is to assemble. The first attempt caused the gold nanoparticles to grow out of control, making it fall out of solution under study. But once Quantum dots were added the device regulated its assembly and stopped at appropriate size. This self- limiting property was absolutely unexpected. It also paved path to new potential research towards understanding the role of addition of one nanoparticle responsible for controlling the other nanoparticle.



Content by -Shakeeb khan.

CHEMISTRY IN

PHARMA

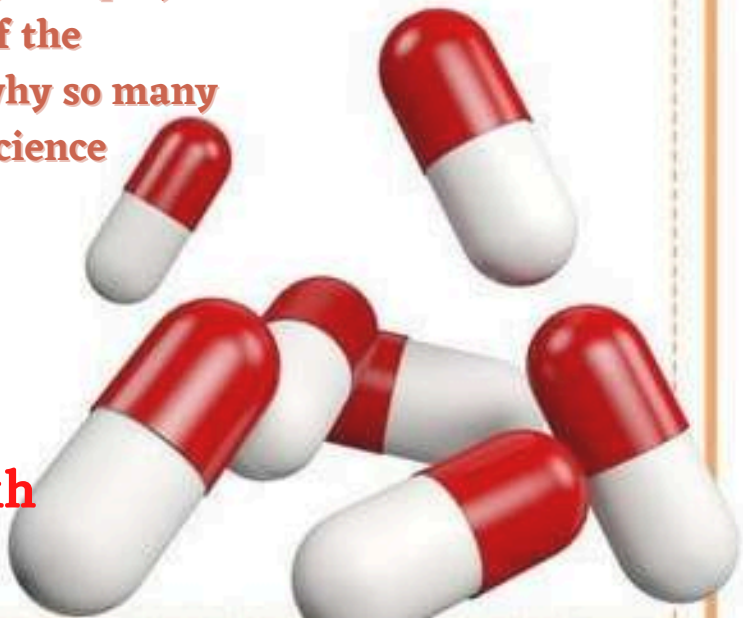
Edited by Jisa Xavier

ROLE OF CHEMISTRY IN PHARMACEUTICAL INDUSTRY

The pharmaceutical industry encompass a wide and varied range of specialities. but, one Consistent element is the role of chemistry in each part of pharmaceutical sciences.

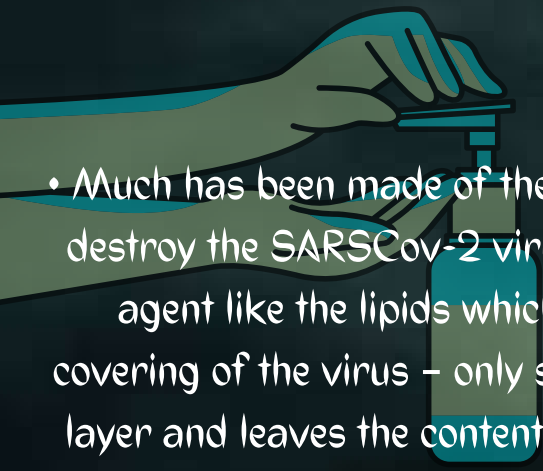
Chemistry Plays an important role in the pharmaceutical industries whereby knowledge of chemistry is used to inform research and further the discovery, research and development of a new medicine this is the reason why people with a degree specializing in chemistry find it useful and practical to supplement their knowledge with the dedicated training the pharmaceutical research and development field. As we all know the current scenario in this time the chemistry and pharmaceutical industry are booming. Pharma industry and scientist were focused on how to tackle this deadliest virus. Chemistry plays key roles for understanding viral structure to the development of chemical preventive measure and drug for covid-19. Covid-19 is an infectious disease caused by the novel severe acute respiratory syndrome coronavirus -2 (SARS-CoV-2).

Conclusion: It is clear that chemistry can play a critical role in almost every aspect of the pharmaceutical industry, which is why so many students enter with a Bachelors of Science degree with a chemistry focus.



Content By:- Salman Shaikh

COVID-19, WHY CHEMISTRY MATTERS?



• Much has been made of the need to wash your hands to destroy the SARSCov-2 virus. Soap is a surface active agent like the lipids which make up the protective covering of the virus – only stronger. It disrupts the lipid layer and leaves the contents open to the environment – this usually destroys the fragile RNA.

• Why is alcohol is used in hand sanitisers? Above a certain percentage in a mixture with water, alcohol (and most usually ethanol or iso-propyl alcohol) can disrupt the lipid layer, but it also denatures the proteins, by disrupting the hydrogen bonding, which give them their specific shape and so renders them ineffective.

• Given that SARS-Cov-2 is known to survive on surfaces, the use of bleaches to attack the virus there is also suggested. Bleach operates by being a strong oxidising agent and attacks the proteins, which have amide links and easily removed hydrogen atoms and this molecular damage stops the virus from working.

• The spikes are what makes SARS-Cov-2 as dangerous as it is, but they might also be core to how we defeat it. They are key to the antibody test that will tell patients if they have had COVID-19, and although vaccine is an umbrella term to describe a number of mechanisms, one way is to make a harmless part of the virus and train the immune system to react to it. Those spikes are the basis of several vaccine developments that have been reported.

CONTENT BY -
MAIRA KALOKHE

PHARMA NEWS!!!

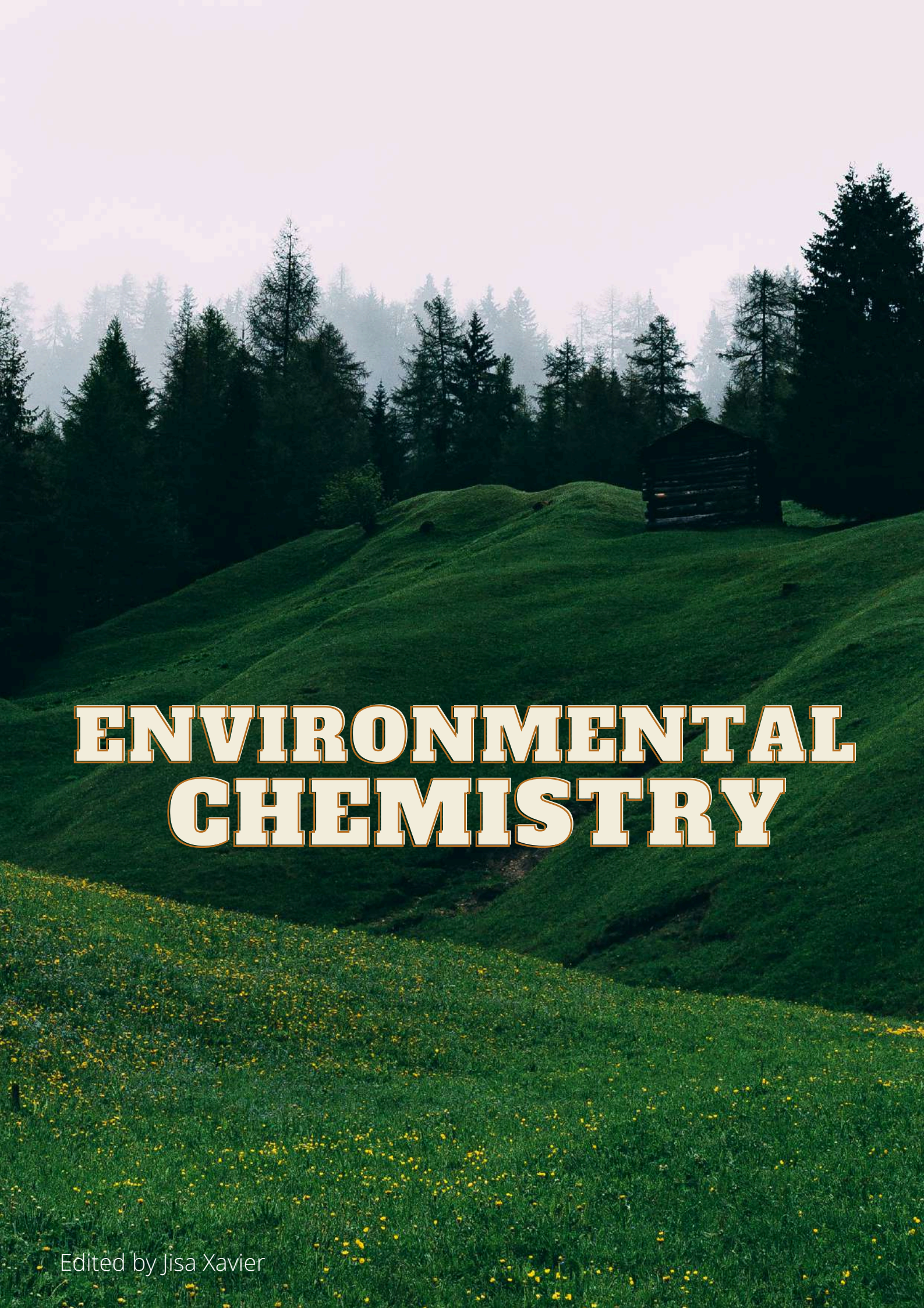
Making biological drugs with spider silk protein.

The HIV drug lopinavir and ritonavir is a child friendly formulation and heat stable and is in the form of pellet. This decision was taken on May25,2017. This opened the Cipla Pharmaceutical (A market Leader in the HIV segment).
The pellets, which come in capsule weight, can be sprinkled over a small amount of soft food. For infants can ingest them by swallowing or pellets can be added to a spoonful of breast milk or put on the infant's tongue.

Researchers at Karolinska Institute have managed to synthesise lung surfactant, a drug used in the care of preterm babies (mimicking the production of spider silk). Animal studies reveal it to be just as effective as the biological drugs currently in clinical use.

The manufacturing process is based on the method spiders use to keep their extremely easily aggregated proteins soluble for silk produce lung surfactant protein C because it is probably the world's most aggregation inclined protein. Since this much simpler and cheaper, it might one day be possible to use our synthetic lung surfactant to treat more lung disease.
Source: - http://www.worldpharmanews.com/research/3951

CONTENT BY-
MAAZ SHAIKH



ENVIRONMENTAL CHEMISTRY

Edited by Jisa Xavier

CAN BOILING SEA WATER MAKE IT POTABLE

It is said water is life on planet earth , water is appropriately around 71% it is available in abundance.
Since it is available in abundance why can't we just simply boil and drink the Ocean water answer no , it is not an good option the salinity of water acts as an obstacle .
salinity is the amount of dissolved salts present in the water these salts forms complexes which is due to the bipolar nature of H20 Molecules. simply boiling water would not have any impacts on the salinity.if One tends to drink sea water is disturbed resulting to the equilibrium Hypertonic state . leads to a medical condition know as this hypernatremia , simply rise in sodium level in blood this can also lead to a sever over Condition where the blood cell may expand finally exploding like an inflated Balloon if a person is exhausted or dehydrated drinks sea water , the sand altiness outside the cell increases and the person will end up more water from the body then removing he / she seawater is 60 times saltire intakes. than
Fresh water elimination of this saltiness to gain pure potable water is done by the method called reverse Osmosis.
Water is important elementary source of life which few people tend to forget very often . Desalination is not exactly the solution for water crisis Around the globe but it fulfills the gap between the water supply and demand

.

Content by:- Saqlain Khan

Let's go GREEN with CHEMISTRY

Most manufactured products involve one or more chemical processes. We cannot imagine what our life will be like without the products produced by the chemical industry. However, on average, only a small proportion of the resources we take from the Earth is converted into the desired products in current chemical processes, and large amounts of wastes and hazardous materials are generated. taking this into consideration, the concept of GREEN CHEMISTRY was established. It is the utilization of a set of principles to reduce or eliminate the use or generation of hazardous substances in the design, manufacture and applications of chemical products.

1) EFFICIENT SYNTHETIC ROUTES:-

Most current chemical production processes lack efficiency in using feed stocks and produce large amount of wastes. Increasing atom economy is crucial for reducing both the depletion of raw materials and the generation of waste. Another way to eliminate waste is integration of different reactions and processes, in which the by-product in one reaction is the feedstock of another.

2) GREEN ENGINEERING AND PRODUCTS:-

It should be emphasized that green chemistry covers engineering aspects and green products. Many current pharmaceuticals, fine chemicals, commodity chemicals and polymers are produced by industrial chemical processes which are harmful and therefore, clean, energy-efficient and mass-efficient processes and technologies are essential tools for uman health and the environment need be designed and produced to replace hazardous products.

3) GREENER AND FUNCTIONAL SOLVENTS:-

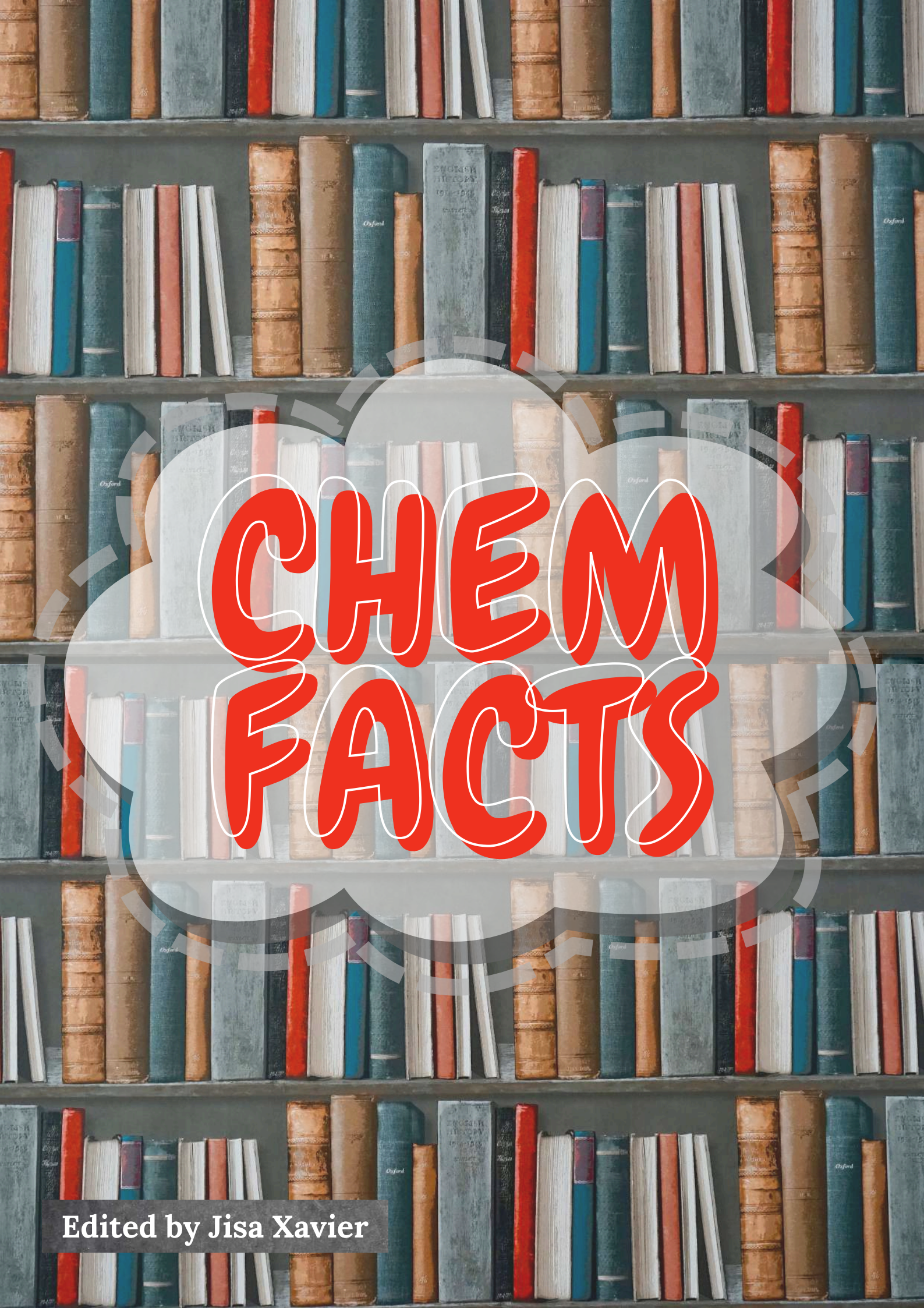
Huge amounts of toxic, flammable and volatile organic solvents are used in chemical processes to prepare chemicals and materials, leading to solvent waste and environmental pollution. The use of greener solvents such as water, supercritical fluids, ionic liquids, non-toxic liquid polymers and their various combinations in chemical processes has become a major focus of research in academia and industry. Because of their special properties and functions such as low toxicity, ease of availability and recycling, and high process efficiency, green solvents can be used to optimize chemical processes, decrease solvent usage and processing steps, and develop new routes and technologies that meet the requirements of sustainability.

4) GREENER CATALYSIS:-

Catalysis plays a key role in the chemical industry because most chemical processes need catalysts to accelerate reactions, enhance selectivity and lower energy requirements. Current catalysts are often based on expensive, toxic, harmful or noble metals. Green catalysts have some common characteristics such as high activity, selectivity, stability, ease of separation and reuse and should be based on environmentally benign. The design and use of green catalysts and catalytic systems to achieve the dual goals of environmental protection and economic benefits is an important task, and is essential for the sustainability of the chemical industry.

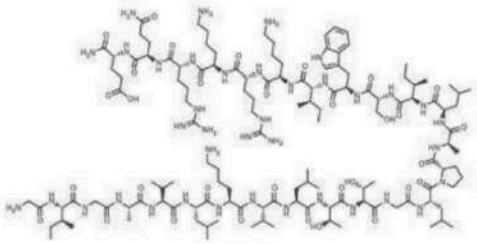
Green chemistry will be one of the most important fields in the future. Although this field has developed rapidly in the last 20 years, it is still at an early stage. Promoting green chemistry is a long-term task, and many challenging scientific and technological issues need to be resolved; these are related to chemistry, material science, engineering, environmental science, physics and biology. Scientists, engineers and industrialists should work together to promote the development of this field. There is no doubt in saying that the development and implementation of green chemistry is a tool for the sustainable development of the chemical industry.

By JISA XAVIER



Edited by Jisa Xavier

Bee Stings



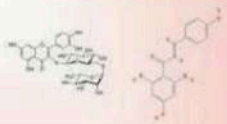
Melittin

BEE VENOM IS A COMPLICATED MIXTURE OF PEPTIDES, PROTEINS AND OTHER SMALLER CHEMICAL COMPOUNDS. MELITTIN, A PEPTIDE, IS THE PRINCIPAL TOXIC COMPONENT OF DRY BEE VENOM, COMPRISING 50-55%.

THE MAGIC OF TOMATOES

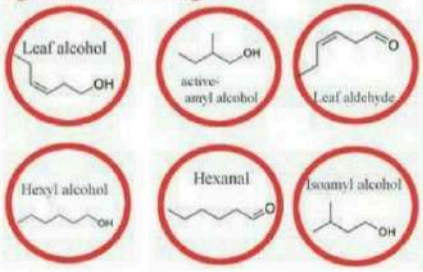
Solanum Lycopersicum belongs botanically to fruits and not to vegetables. An amazing food and beauty ingredient rich in minerals, micronutrients, antioxidants and flavonoids

The red color is because of "lycopene", a carotene which is formed during the ripening of tomatoes



Rutin and Chalconaringenin are the two most abundant flavonoids in tomato

There are more than 20 chemicals imparting to the flavor of tomatoes, the most significant ones being:

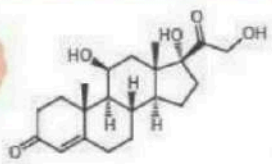


Tomato is a popular hair & skin care ingredient because of its hydrating, anti-oxidant and sebum regulating ffunctions.

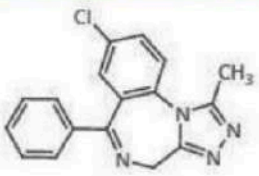
FIGHTING STRESS AND ANXIETY

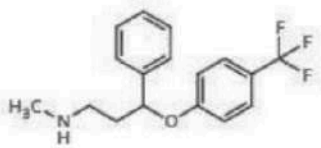
For some, gift shopping and family dinners during the holidays can be stressful and anxiety-inducing. For others, anxiety is a year-round battle. Here, we look at some of the medications that can provide respite.

WHAT IS THE CAUSE?



HOW ARE STRESS AND ANXIETY TREATED?

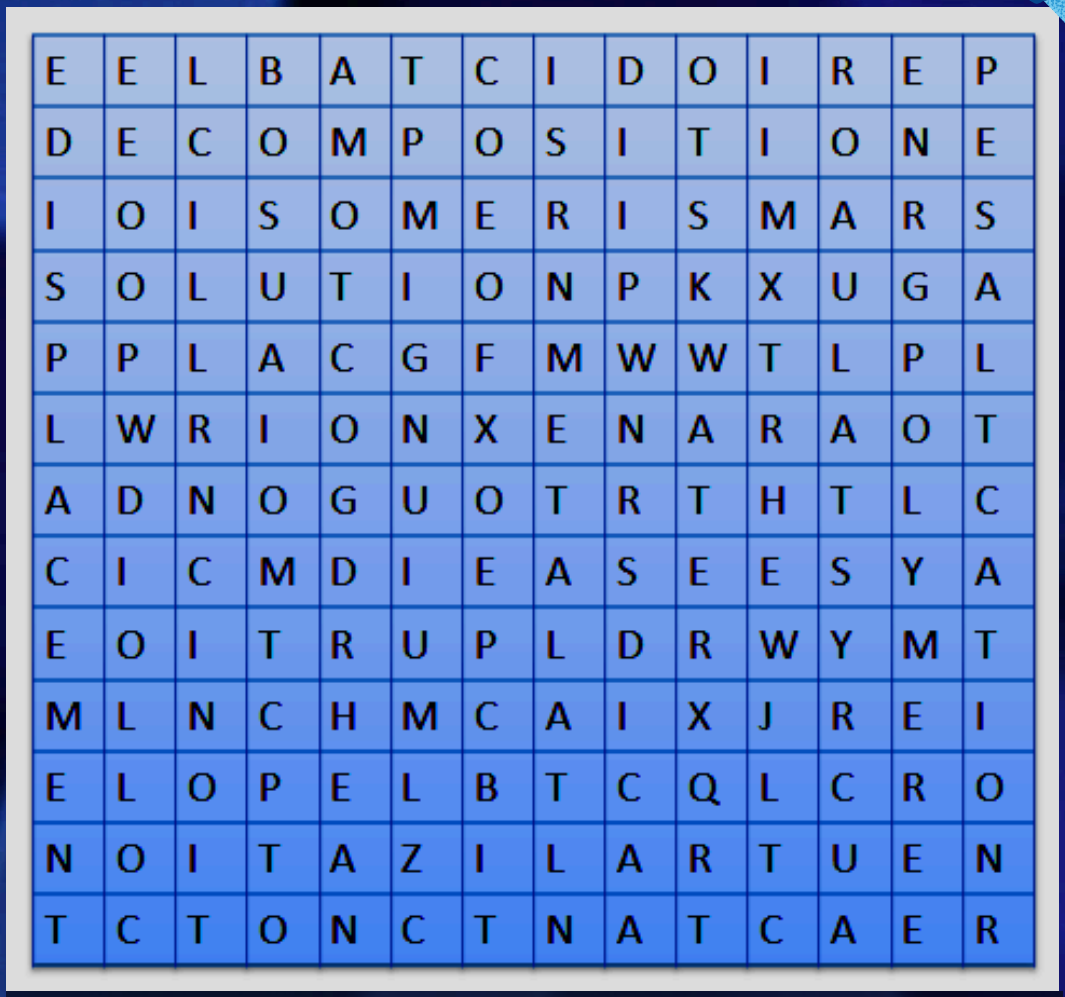




Content by : Rukhsar Ansari

Edited by Jisa Xavier

WORD SEARCH



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Crystal *Colloid* *Ion* *Acid*
Reactant *Isomerism* *Salt* *Decomposition*
Water *Polymer* *Solution* *Product*
Cation *Neutralization* *Displacement*
Ionic *Temperature* *Periodic Table*

Edited by Jisa Xavier

RIDDLE TIME

1.

I may not be gold but I make gold look more beautiful. I help you fly and even though I'm not popular, my prices run high. What am I?

2.

Yellow in color, I can be a laboratory risk. You'll most often find me used in an explosive. What am I?

3.

What is black when you purchase it, red while you are using it, and grey when you discard it?

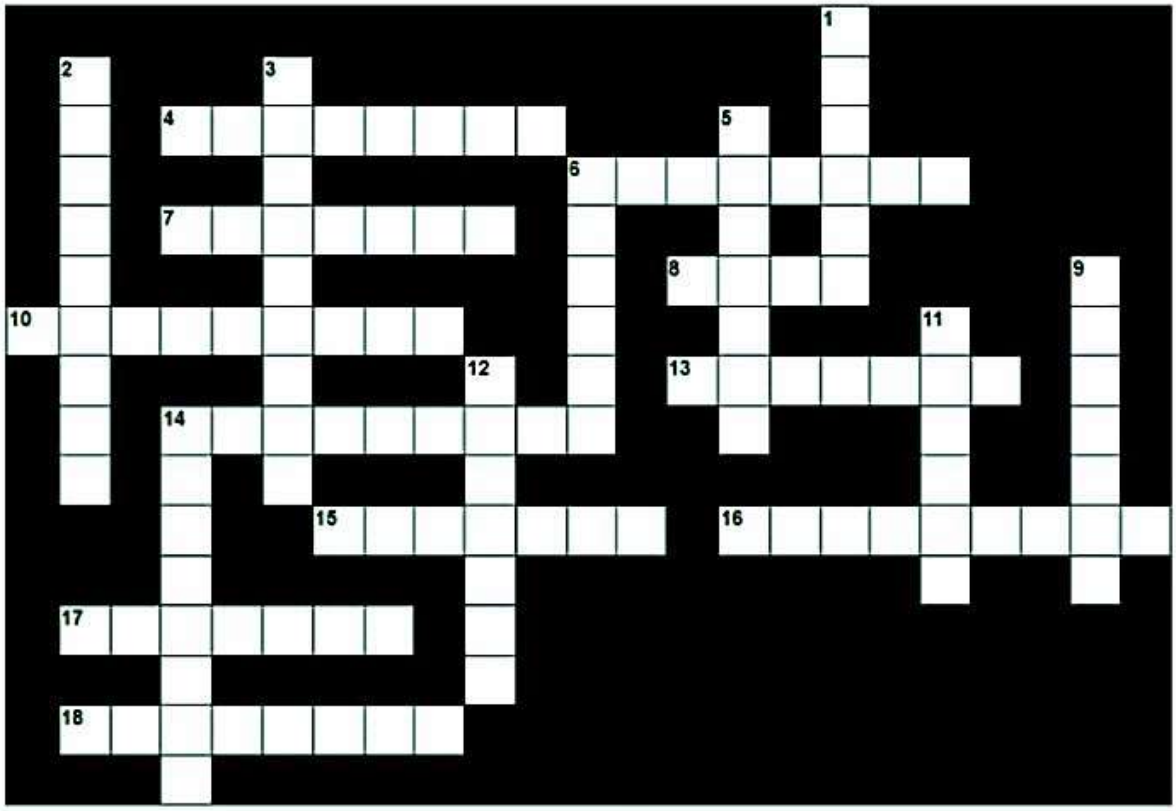
4.

If you mix me with Hydrogen, you'll sense a nasty smell of rotten eggs. I am also the reason why skunks have an offensive odour. What am I?

You call me a metal but I flow like a liquid Even though I can kill you, you will keep me around I am not as dense as gold yet my shine is like silver I will always be up when you are feeling down What am I?

CONTENT BY-
MAIRA KALOKHE

ELEMENT CROSSWORD



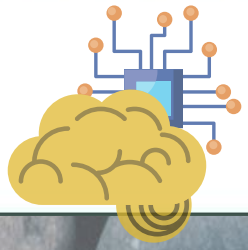
Check

Across:

4. Lightest halogen
6. Most abundant element of periodic table also fuel of future
7. A nuclear fissile fuel
8. An inert gas used to make high-voltage indicators and lasers
10. Element with Atomic no 12
13. Element widely used in computer chips and solar cells
14. As a thin foil, this element is a packaging material
15. Element used in batteries, solar cells, electroplating
16. 4th element of periodic table
17. Element used in light weight batteries
18. Consist of 74 protons

Down:

1. Life on earth
2. Second most reactive of the rare earth metals
3. The compounds of this element has greatest demand in fertilizers
5. A well-known poison. compounds are sometimes used as rat poisons and insecticides
6. Alpha particle
9. Rarest and most valuable precious metal in the world
11. One of the ferromagnetic transition element
12. Element with atomic number 83
14. The rarest element on Earth



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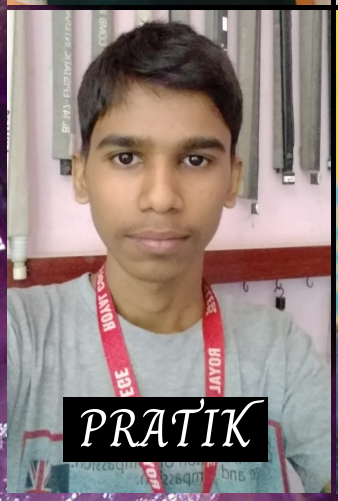
CHEM MEMES

Content by : Misbah Shaikh
Pratik Kumtakar

Chem zone September 2021
presented by :



& PARVEEN

"TEAMWORK IS THE SECRET THAT MAKES COMMON PEOPLE ACHIEVE UNCOMMON RESULTS"...

CHEMISTRY

WE ARE PERFECT FOR SOLVING PROBLEMS BECAUSE WE HAVE ALL THE SOLUTIONS

YOU CAN MAIL US YOUR ANSWERS OF FUN CHEM VIA EMAIL ID GIVEN BELOW

chemzone21@gmail.com