CHEMISTRY MAGAZINE 2022-23

BROWN RING

The Beauty of Perfection

Department of Chemistry
Kuriakose Gregorios College, Pampady

Principal's Note

I'm so happy and proud to see that the Department of Chemistry of our College is publishing a scientific magazine titled " Brown Ring". This magazine definitely will reflect the scientific rigor and enthusiasm in the minds of our students. Indeed the articles highlight the spirit of scientific enquiry embedded in the minds of our students through their wonderful teachers and also reflect the adaptive mindset and creativity developed by the students. Contributing an article along with the studies is possible only when there is a smooth flow of knowledge without any fear and doubt. Inquisitiveness for recent developments in the field of a subject like chemistry will surely help knowledge seekers to understand the opportunities, strengths and challenges in their area of study. Moreover getting an opportunity to publish an article during undergraduate studies will definitely enhance the sense of self-confidence and self respect in the minds of students. Hearty congratulations to team chemistry especially to the Head of the department Dr. Thomas Baby for taking the initiative to publish a magazine like this. I'm sure that this "Brown Ring" will become a symbol of the quality of Gregorians of all times.

Salute to all the teachers and students of the Department of Chemistry for your team spirit and dedication to this novel venture. Wishing you all the very best.

Dr. Mini Joseph
Principal
K. G. College, Pampady

HOD'S Message

I hope this message finds you well. I am delighted to share with you the remarkable advancements and groundbreaking activities taking place within our department.

Chemistry, as a field, continues to push the boundaries of scientific knowledge and innovation, and our department is trying to spread the essence of it. Our dedicated faculty and talented students are working tirelessly to unravel the mysteries of matter and create transformative solutions for society.

For the last couple of years our department is trying to familiarise the fields of nanotechnology, sustainable materials, drug discovery, catalysis, and renewable energy through various seminars and workshops. These accomplishments not only advance scientific understanding but also a motivation to the students to improve the quality of life.

At Kuriakose Gregorios College Pampady, we believe in fostering a collaborative and interdisciplinary environment that encourages creative thinking and fosters scientific excellence. Our faculty members are renowned experts in their respective fields, and their expertise and mentorship inspire our students to excel and embrace the spirit of scientific inquiry.

Speaking of our students, they are the lifeblood of our department. Their passion, curiosity, and dedication to chemistry are truly inspiring. Our faculty members are actively involved in outreach programs, organizing science fairs, workshops, and lectures to ignite a love for chemistry and inspire the next generation of scientists.

The Brown Ring Magazine definitely provide a platform to share our achievements and scientific proficiency with a broader audience.

Thank you for your attention, and I look forward to the possibility of sharing our Department's remarkable achievements with the readers of Brown Ring Magazine.

Warm regards,

Dr. Thomas Baby
Assistant Professor & Head
Department of Chemistry

BROWN RING TEST

Brown ring test can be performed by adding Iron (II) sulphate to a solution of a nitrate then slowly adding concentrated H_2SO_4 such that it forms a layer below the aqueous solution.

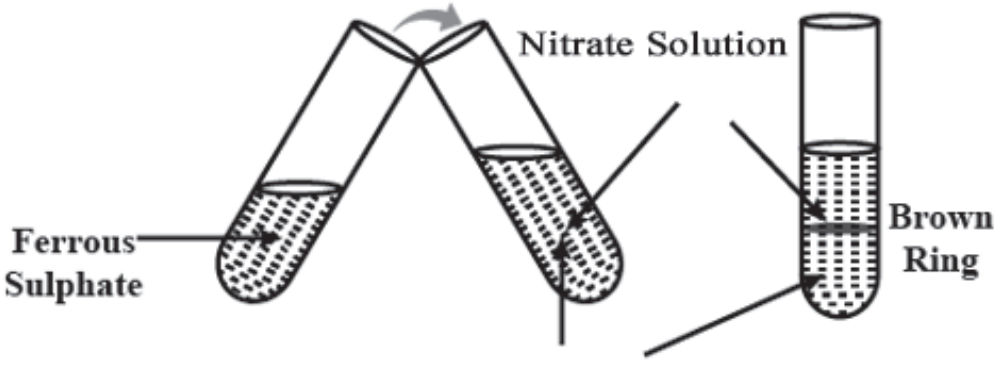
A brown ring will form at the junction of the two layers indicating the presence of nitrate ion.

The overall reaction is the reduction of the nitrate ion by iron (II) which is reduced to iron (I) and formation of nitrosonium complex where nitric oxide is oxidised to NO.

$$NO_3^- + 3Fe^{2+} + 4H^+ \rightarrow Fe^{3+} + NO + 2H_2O$$

$$[Fe(H_2O)_6]^{2+} + NO \rightarrow [Fe(H_2O)_5NO]^{2+} + H_2O$$

Brown ring



Nitrate + Sulphuricacid

INNER PAGES

SPECTROSCOPY

Aiswarya S.
D3 Chemistry

Spectroscopy is the general field of study that measures and interprets the electromagnetic spectra that result from the interaction between electromagnetic radiation and matter as a function of the wavelength or frequency of the radiation.

Spectroscopy and its applications form a significant part of modern chemistry and physics. From its derivation the word spectroscopy appears to mean the watching of images, but the modern subjects covers the interaction of electromagnetic radiations with matter. The most important consequence of such interaction is that energy is absorbed or emitted by the matter in discrete amounts called quanta. The absorption or emission processes are known throughout the electromagnetic spectrum, ranging from the gamma region to the radio region.The ways in which the measurements of radiation frequency are made experimentally and the energy levels deduced from these comprise the practice of spectroscopy.

Spectroscopy is the precise study of color as generalized from visible light to all bands of the electromagnetic spectrum. Historically, spectroscopy originated as the study of the wavelength dependence of the absorption by gas phase matter of visible light dispersed by a prism.

The central theory of spectroscopy is that light is made of different wavelengths and that each wavelength corresponds to a different frequency. The importance of spectroscopy is centered around the fact that every different element in the periodic table has a unique light spectrum described by the frequencies of light it emits or absorbs consistently appearing in the same part of the electromagnetic spectrum when that light is diffracted. This opened up an entire field of study with anything that contains atoms which is all matter. Spectroscopy is the key to understanding the atomic properties of all matter. As such spectroscopy opened up many new sub-fields of science yet undiscovered.

The various branches of spectroscopy generally involve measurements of two important experimental parameters which are the energy of the radiation absorbed or emitted by the system and the intensity of the spectral lines. For instance in chemical analysis, the most common types of spectroscopy include atomic spectroscopy, infrared spectroscopy, ultraviolet and visible spectroscopy, Raman spectroscopy and nuclear magnetic resonance

Taking advantage of the properties of absorbance and with astronomy emission, spectroscopy can be used to identify certain states of nature. The uses of spectroscopy in so many different fields and for so many different applications has caused specialty scientific subfields. Such examples include:

- Determining the atomic structure of a sample
- Studying spectral emission lines of the sun and distant galaxies
- Space exploration
- Cure monitoring of composites using optical fibers.

There are several applications of spectroscopy in the fields of medicine, physics, chemistry, and astronomy.

- Spectroscopy is used as a tool for studying the structures of atoms and molecules. The large number of wavelengths emitted by these systems makes it possible to investigate their structures in detail, including the electron configurations of ground and various excited states.
- Spectroscopy also provides a precise analytical method for finding the constituents in material having unknown chemical composition.
- In a typical spectroscopic analysis, a concentration of a few parts per million of a trace element in a material can be detected through its emission spectrum. ●

NATURE IS THE ULTIMATE CHEMIST

Anjlu Thomas
D3 Chemistry

Chemistry is responsible for all the achievements of mankind as well as the pollution to the environment. Waste treatment is expensive and hazardous. Now comes the importance of waste disposal and minimize laboratory hazard. The answer is green chemistry.

Green chemistry is a chemical research and engineering that promotes design of products and processes that reduce the use and generation of hazardous substances. It aims to prevent pollution at its source and avoid problems before it happens as well as apply on any chemical choice and also known as sustainable energy. This is a strong method to stop pollution, diminish waste, peril reaction and to get rid of pessimistic environmental impacts. Green chemistry incorporates the life rhythm of a chemical reaction from its depiction, manufacture and utilization.

Begining of 1995, Green chemistry encouraged and within 2005 the evolution happened was the use of supercritical carbon dioxide as green solvent, aqueous hydrogen peroxide for clean oxidation, participation of hydrogen in asymmetric synthesis, supercritical water oxidation and dry media reactions.

Researchers created sole step process of making biodiesel coming out of second hand coffee grounds and identified that dried ground bannana peels are cheaper and 20 times powerful in get straight water with heavy metals.The focus of green chemistry is on reuse or recycle chemicals, build chemicals less problematic, dispose chemicals and reduction of chemicals starting its orgin.

Green chemistry works mainly on gaining zero waste. Paul Anastas and John C. Warner proposed 12 basic principles of green chemistry. The first principle “It is better to prevent waste than to treat or clean up waste after it has been created” covers all principles. Make synthetic methods to boost final products, generate substances that are less malignant, solvent use guide to considerable waste along with its purification offer more solvents so minimize auxiliary substances, try to assemble reactions at room temperature and pressure, reduce derivatives, catalytic reagents are more used than stoichiometric reagent so it lower the temperature and save energy, monitor the reaction even after its completion to detect unwanted by-products and substance in laboratory choose in accordance to reduce accidents.

Bhopal gas disaster, chernobyl disaster tells us to carefully handle chemicals in a laboratory together with the importance of maintaining factories. Those places still rote with chemicals and inhabitable to humans. The incidents which caused the end of the second world war by America towards Japan vibrate all mankind. Every misfortune says the need of green chemistry. Chemistry is an unavoidable and important part of our life. Use chemistry to heal, to protect and to build a future. ●

BE A BETTER WORLD

APPLICATIONS OF CHEMISTRY

Aswin Sajan

D3 Chemistry

Since ancient civilizations, chemistry has been related to metals, mining, the production of colors, medicine, and some technical industries like tanning, dyeing clothes and the production of glass, The ancient Egyptians used some chemicals in mummifying their dead.

The pharmacological industry is one of the most important applications of chemistry, All food consist of chemicals even if they are organically grown, Fuel and all parts of the car are made up of chemicals.

The dyeing of fabrics is a chemical process, Chemical reactions can be used to produce the electricity, The water treatment and purification is an important chemical method.

Chemistry is related to many fields in our life, So, Chemistry is considered the centre of most other sciences like biology, physics, medicine, agriculture, and other sciences.

Some of the applications of chemistry in various industries are explained below:

Food Industry

Chemicals can play a significant role in the manufacturing and preservation of food. Food additives, for example, can extend the shelf life of foods; others- such as colours, can enhance the appeal of foods. Flavourings are used to improve the taste of food. As a source of nourishment, food supplements are employed.

Examples of Chemicals in Food

Esters, which are flavouring agents, are chemical molecules created when alcohol and carboxylic acid combine chemically.

Alcohol is a hydrocarbon derivative that is organic in nature.

Ethyl Butanoate gives pineapple its flavour.

Vinegar is largely made up of acetic acid.

By combining different alcohols with different acids, new or diverse flavours can be created.

Agriculture

Chemical analysis- analyses the ratios of soil components and the degree of availability of these components for planting or cropping, aids agriculture by assisting in the selection of suitable soil for planting a specific crop.

Chemistry has provided the world with essential fertilisers, herbicides, insecticides, and fungicides to aid in the production of healthy and nutritious crops, fruits, and vegetables. Urea, calcium superphosphates, ammonium sulphate, and sodium nitrate are all significant fertilisers

Farms must be highly systematic in determining which strategies to use to make the most optimal use of their resources. To feed the globe, modern farming techniques rely on a wide range of chemical agents.

Soaps and Cleaners

Soaps are created from natural animal fats and vegetable oils that have undergone a saponification process. Soaps are one sort of cleaner, but there are many more that employ different substances and procedures to remove filth from various uses.

Body gels, fabric softeners, laundry detergents, bathroom tile solutions, and all-purpose cleaning solutions would not exist without the chemistry involved in making specialized soaps and cleansers. Synthetic sulphates have made it possible for us to use a new generation of gentler cleaning products for our bodies and homes. Green chemistry has enabled us to generate numerous discoveries in developing healthier, ecologically friendly solutions.

Colourants

Minerals or petroleum are used to make the most common colours and pigments used in industry.

Colourants enable us to make items such as clothing more vibrant. Laser dyes, inkjet printing, photodynamic therapy, and surgery are a few of the various uses for dyes and pigments. Each of these applications uses dyes or pigments created specifically for the purpose.

Medicines

Medicines are chemical compounds with healing properties that can be extracted from natural sources or prepared in laboratories. Chemistry is important in both medicine and pharmacy because it helps to understand the nature of hormone and enzyme functions as well as the role of medicine in the human body.

Let's have a look at some of the most important medications in chemistry-

Analgesics are pain relievers that are used to treat a variety of ailments.

Tranquilisers are medications that are used to treat mental illnesses. Take, for instance, tension.

Antiseptics are used to destroy or prevent the growth of microorganisms on the skin, wounds, and cuts.

Disinfectants are chemicals that kill microorganisms but are not suitable for human consumption.

Antibiotics are chemical molecules produced by some microorganisms that can be employed to kill infection-causing microorganisms.

Antacids are substances used to eliminate excess acid from the stomach and increase the pH to a healthy level.

Textiles

Textiles may undergo a variety of chemical and non-chemical treatments during the manufacturing process, including preparation and pre-treatment, dyeing, printing, and fabric refining.

Textiles and clothing contain a wide range of chemicals. Some are used to provide a product with a specific effect, such as biocides to prevent mould from forming on shoes, dyes to give clothing their distinct colours, and water repellents to make outdoor wear more practical. Special chemicals are sometimes used to keep the clothes from becoming wrinkled or mildewy during long periods of transit. To fight foul odour, some clothing and shoes include bacteria-killing chemicals. Oils and greases, starch, sulphonated oils, waxes, and certain surfactants can all be found in textiles.

Cosmetics

For the production of cosmetics, a variety of chemical combinations are used. The texture and feel of these beauty products are determined by the chemicals incorporated. Cosmetics are made up of a variety of industrial chemicals. Synthetic chemicals and naturally occurring processed chemicals are both examples of industrial chemicals.

Fuels

Any chemical with stored energy is referred to as a fuel. Photosynthesis and respiration are two processes that store this energy in chemical bonds in the molecules. During oxidation, energy is released. The most prevalent type of oxidation is the combustion, which is the direct reaction of a fuel with oxygen.

Wood, gasoline, coal, and a variety of other fuels have energy-rich chemical bonds that are formed using the Sun's energy and released when the fuel is burned (i.e., the release of chemical energy). Chemical fuels, often known as fossil fuels, are a valuable source of energy and are thus widely employed to meet the needs of an energy-dependent civilization.

Wars

TNT, RDX, HMX, gunpowders used in bullets, and other explosives used in wars are all chemical compounds. It was the chemistry that allowed these chemicals to be used during the war. Nuclear weapons, which have become more well-known in recent years, are also chemical compounds.

Nanochemistry

Nanochemistry unites – unsurprisingly – nanoscience and chemistry. Nanochemists work from the atom up, with the aim of engineering nanosized materials. They use a number of methods to prepare and assemble 'little pieces of matter' which display unique magnetic, electronic, optical, chemical and mechanical behaviors attributable only to their nanometer size. Nanochemistry has uses in chemical, physical and materials science, engineering and biological and medical applications.

Chemistry is a big part of our everyday life. We find chemistry in the food we eat, the air we breathe, the soaps we use, our emotions and literally every object we can see or touch. We live in a world of matter. The human body itself is a mixture of matter of different types.

Hence chemistry is very important efficient life style, in fact it is essential for our very survival.

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BRANCHES OF CHEMISTRY

Jesvin P. Boban
D3 Chemistry

Chemistry is the branch of science that deals with the properties, composition, and structure of elements and compounds, how they can change, and the energy that is released or absorbed when they change.

Chemistry is classified into:

1. Analytical Chemistry
2. Biological/Biochemistry
3. Inorganic Chemistry
4. Organic Chemistry
5. Physical Chemistry

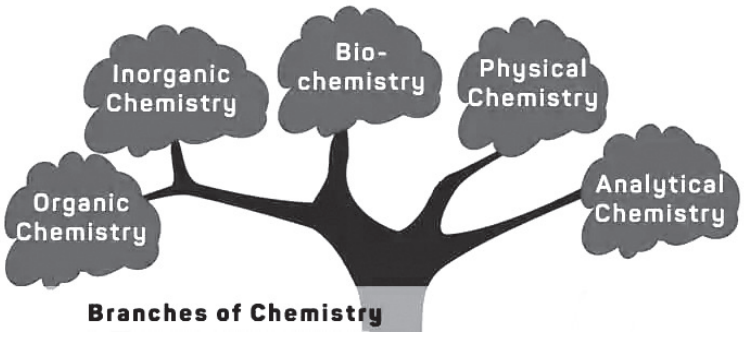
Analytical chemistry - This branch of chemistry focuses on the development and application of methods and techniques for determining the composition of matter. Analytical chemists use various methods, such as spectroscopy and chromatography, to identify and quantify the chemical components of a sample.

Biochemistry - Biochemistry is the branch of chemistry that focuses on the chemical processes and substances that occur in living organisms. Biochemists study the structures and functions of biomolecules, such as proteins, enzymes, and DNA, as well as the reactions and pathways that these molecules undergo in cells. Their research has applications in fields such as medicine, agriculture, and environmental science.

Inorganic chemistry - Inorganic chemistry is the study of the properties and reactions of compounds that do not contain carbon. These compounds, known as inorganic compounds, include minerals, metals, and other non-carbon-based substances. Inorganic chemists use their knowledge to develop new materials, such as metals and alloys, with specific properties and applications.

Organic chemistry - Organic chemistry is the study of the structure, properties, and reactions of compounds containing carbon. These compounds, known as organic compounds, are the basis of life and are found in all living organisms. Organic chemists use their knowledge to design and synthesise new compounds, such as drugs and other chemicals, with specific properties and functions.

Physical chemistry - Physical chemistry is the branch of chemistry that combines the principles of physics with those of chemistry to understand the behaviour and properties of matter. Physical chemists use advanced mathematical and computational techniques to study the structure and behaviour of atoms and molecules, as well as the nature of chemical reactions and their kinetics. ●



OZONE DEPLETION

Farhana Kabeer
D2 Chemistry

Scientific world defines energy as the ability to do work.If energy is not enough, then the whole process of the world will affected.Earth,human beings, animals, plants, non-living things everyone needs energy. The one of the main source of energy is from sun- THE SOLAR ENERGY. Solar energy is needed for everyone. The primary food producers – plants needed solar energy for photosynthesis. There begins our world .Human needed energy of sun. The body creates vitamin D "the sunshine vitamin" from the sunlight.

Sunlight is essential for all animals. Different animals need different amount of sunlight. Even though the hyper exposure of sunlight causes hazards. The UV rays from the sun is harmful for all beings. It damaging DNA in plants, proteins, etc. and for animals it causes health problems.

There is a shield that protect Earth from the harmful ultraviolet rays of sun. That is OZONE LAYER. It has some important job. It is a thin layer in earth's atmosphere that absorbs all the harmful ultraviolet rays coming from sun. It situated on the stratosphere between 15 km to 30 km above the earth. The layer containing a high concentration of ozone molecules. The ozone layer was discovered in 1913 by French physicists Charles Fabry and Henry Buisson.

All life on earth were protected by ozone layer .This shield keeps the full power of the suns UV radiation ,from reaching the surface of the Earth. If this radiation completely reaches to Earth, it can lead to complete disaster – skin cancer and cataracts.

The ozone layer and its "hole "became a trending news among climate stories in 1980s to 2010s. Now it replaced by climate change caused by excess carbon dioxide emission and greenhouse gases.

However the "hole" in ozone is still a serious matter. The hole is called as Ozone depletion by world.

Ozone depletion is the slow thinning of ozone layer . Through these thinning greater amount of harmful UV rays reaches to earth .Most ozone depletion occurs in polar regions ,mainly Antarctica.

Chlorofluorocarbons (CFCs) are the main enemy of the ozone layer. CFCs doesn't directly destroys ozone layer, it was chlorine from CFC which destroys the earth's ozone layer .Refrigerators are the one of the source of CFC . Hydrochloro flurocarbons (HCFCs) and hydrofluorocarbons (HFCs) are also ozone depleting substances, because they release chlorine atoms in to the stratosphere. Some other threats for ozone layer are chemicals like methyl bromide and methyl chloroform . New one is dichloromethane emission ,which is a naturally occurring chemical ,but it also formed from industrial production. This ozone depletion eventually lead to worldwide extinctions of all animals. It remaining as a threat for ecosystem.

Although, Ozone hole shows signs of recovery. The 1987 Montreal protocol by UN, on substances that deplete the Ozone layer helps to reduce the CFCs and other ozone depleting chemicals emission. The 2016 amendment also helps to reduce HCFCs emission and lead to ozone recovery. Scientific world believes that the Ozone layer will fully recovered around 2050. But now it remains as a serious concern. ●

JUNK FOOD

Nandhana C.V.
D3 Chemistry

Unhealthy food is the junk food we eat from outside and is also known as fast food in ordinary language. Unhealthy food does not contain any essential nutrients needed for the growth and development of the body. Unhealthy food is not only served in the restaurants but the food, if kept for a longertime at home, also becomes unhealthy.

Unhealthy food gives us a lot of problems related to the heart, liver, eyes, and brain.Junk foods are foods that make us fall unhealthy and can cause serious health problems. Junk food makes us lazy all day, as we get lots of fats from it.Eating lots of junk food can make you gain weight and cause you serious diseases like obesity.

While the occasional night of junk food won't hurt much, eating Junk foods regular has been shown to lead to increased risks of obesity and chronic diseases. Cardiovascular disease, type 2 diabetes, non-alcoholic fatty liver disease and some cancers all have causes in excessive junk food consumption.To live a healthy life, one must consider having a nutritional and healthy diet. A diet with ample of nutrients can give the body the energy it wants to work.There are cells in the body whose only function is to extract nutrients from the food you are eating, which is why the health of the body depends on the food you eat. Even if they are having food, they prefer to eat it fast.

Having junk food destroys our food cycle

Junk foods have a high concentration of fats and carbohydrates, which are not very body-friendly. Obesity can be caused due to the consumption of junk foods. Junk foods are also tough to digest.To lead a healthy life, one must quit junk food.Eliminate temptation at home. Lay a healthful foundation by stocking up nutritious meals,desserts and snacks.

Set realistic expectations for yourself

Identify those times of the day when you're most vulnerable to a junk-food attack. Choose grlled or broiled versions of foods that are typically fried. Focus on eating healthy foods. Avoid situations that may encourage a junk attack Cook large quantities and put extra meals in the freezer. ●

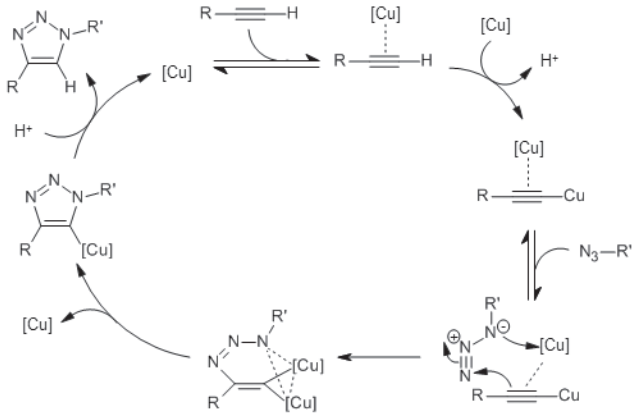
CLICK REACTIONS

Rugma K. Vinod
D3 Chemistry

The Nobel Prize in Chemistry 2022 was awarded jointly to Carolyn R. Bertozzi, Morten Meldal and K. Barry Sharpless “for the development of click chemistry and bioorthogonal chemistry”. When I found the news in the paper, yes I am familiar with the word chemistry, and Nobel Prize… but what is

Click chemistry. While voyaging through Google and YouTube, I marvelled at the enormous contributions of Click chemistry.

Click chemistry is as simple as Lego toys. When two pieces of Lego toys are joined it makes a “click sound”. And it forms a complex one. The basic idea of click chemistry is that it can snap molecular building blocks into complex ones quickly and efficiently. Using water as a solvent and having the reaction can be carried out at room temperature is the merits and peculiarity of Click chemistry, which solves the difficulty of conducting complicated chemical reactions in the field of Science.



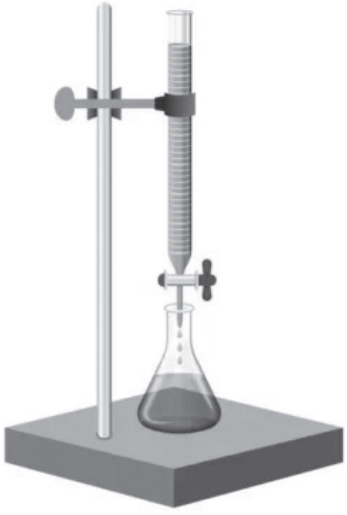
Why do we need Click chemistry and what is its significance? Chemists are often amazed by the complexity of chemical molecules present in plants, animals and microorganisms. They imitated nature to produce these complex molecules. For example, indole is present in the amino acid tryptophan. In nature, starting from a reactant, followed by a sequential reaction forms many intermediates and finally, the complex molecule is formed, in addition, certain by-products are also formed. In a biological system, these intermediates and by-products are used in several ways. It may be also used in chemical reactions. But in an artificial system, we are having so many intermediates and by-products which is having no use in particular, less efficient and more expensive. So it is very difficult to proceed with the reaction. Click chemistry was an actual alternative to this problem. Chemicals are clicked together to form new molecules. Barry pioneered the concept of click chemistry, a form of simple and reliable chemistry, where the reaction occurs quickly and undesirable byproducts can be averted.

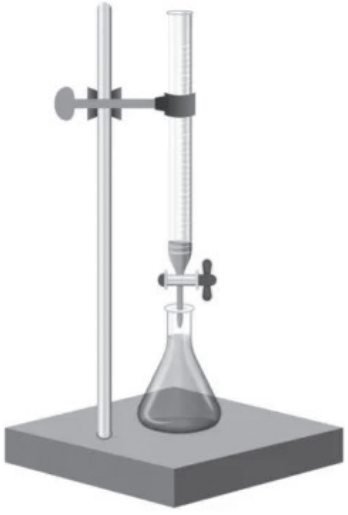
Meldal discovered a reaction that showed how adding certain compounds can result in a click chemical reaction. That is the copper catalysed, azide-alkyne cycloaddition. Bertozzi used click chemistry to develop reactions that can occur inside living organisms and created a new type of biological pharmaceutical to attack tumour cells. Using bio-orthogonal reactions, Bertozzi took click chemistry to a new dimension. Her bio-orthogonal reactions take place without disrupting the normal chemistry of the cell and it is used now globally to explore cells and track biological processes. Click chemistry and bio-orthogonal chemistry have applications in agriculture, pharmaceuticals, and dyes. Presently bio-orthogonal chemistry is widely used in cell mapping, targeted tumour therapy, and clickable antibodies. Yeah, click chemistry is the right answer to many of the problems we are facing nowadays. Hoping that click chemistry can expand its extent for a safe and effective world.

VOLUMETRIC ANALYSIS

Alfiyamol C.F.
D2 Chemistry

Volumetric analysis is a chemical analytical procedure based on measurement of volumes of reaction in solutions. It uses titration to determine the concentration of a solution by carefully measuring the volume of one solution needed to react with another. In this process, a measured volume of a standard solution, the titrant, is added from a burette to the solution of unknown concentration. When the two substances are present in exact stoichiometric ratio, the reaction is said to have reached the equivalence or stoichiometric point. In order to determine when this occurs, another substance, the indicator, is also added to the reaction mixture. This is an organic dye which changes color when the reaction is complete. This color change is known as the end point; ideally, it will coincide with the equivalence point. For various reasons, there isusually some difference between the two, though if the indicator is carefully chosen, the difference will be negligible. A typical titration is based on a reaction of the general type aA+bB ? products where A is the titrant, B the substance titrated, and a:b is the stoichiometric ratio between the two. Some indicators include Litmus, Methyl Orange, Methyl Red, Phenolphthalein, and Thymol Blue. Titration can be applied to any of the following chemical reactions: • Acid–base • Complexation • Oxidation–reduction • Precipitation Only acid–base and oxidation– reduction titration will be treated here, though the fundamental principles are the same in all cases. Acid–base titration involves measuring the volume of a solution of the acid (or base) that is required to completely react with a known volume of a solution of a base (or acid). The relative amounts of acid and base required to reach the equivalence point depend on their stoichiometric coefficients. It is therefore critical to have a balanced equation before attempting calculations based on acid–base reactions. Below we define some of the common terms associated with acid–base reactions. A molar solution is one that contains one mole of the substance per liter of solution. For example, a molar solution of sodium hydroxide contains 40 g (NaOH=40 g/mol) of the solute per liter of solution. As described in chapter 13, the concentration of a solution expressed in moles per liter of solution is known as the molarity of the solution. ●





STATES OF MATTER

Rupa K. Vinod
D3 Chemistry

The matter is something that occupies space and has mass. A state of matter is one of the distinct forms in which matter can exist.There are four states of matter which are observable in everyday life – Solid, Liquid, Gas and Plasma. Many intermediate states are known to exist, for example, Liquid Crystals. And there are states which are known to exist only in extreme conditions.Bose-Einstein condensate exists only in extremely cold conditions whereas Quark-gluon plasma exists at high energy states.Fermionic condensate is another important state of Matter. Let's see in detail the seven states of matter.

Solid

A Solid has a definite shape and volume and the molecules are closely packed together. Salt, Sugar etc. are examples of solids.

Liquid

A liquid has a definite volume but it takes the shape ofits container. Examples include water, oil etc.

Gas

It has neither a definite shape nor a definite volume. Examples are Oxygen, Carbon dioxide etc.

Plasma

It has neither a definite volumenor a definite shape. Plasma is ionized gas. It may be formed by heating and ionizing a gas. Because plasma contains charged particles it can conduct electricity. Examples include the sun, stars, lightning, neon signs etc.

Bose-Einstein Condensate

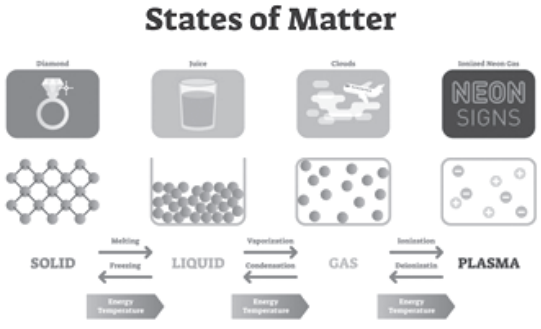
It is a state of matter typically formed when a gas of bosons at very low densities is cooled to temperatures very close to absolute zero. It is a superfluid phase.

Fermionic Condensate

It is also a superfluid phase formed by fermionic particles at low temperatures.

Quark-gluon plasma

It is a state of matter exists at high temperature and density. It is the state with the high energy level. ●



DDT THREAT

Shimina Shaji
D2 Chemistry

Dichlorodiphenyltrichloroethane is commonly known as DDT. It is a colourless, tasteless, and almost odorless crystalline chemical compound. It is also an oraganochloride. DDT was first synthesized in 1874 by the Austrian chemist Othmar Zeidler. DDT's insecticidal action was discovered by the Swiss chemist Paul Hermann Muller in 1939. DDT was used in the second half of World War II to limit the spread of the insect-borne diseases malaria and typhus among civilians and troops. It is also toxic and dangerous to the environment. DDT has been formulated in multiple forms, including solutions in xylene or petroleum distillates, emulsifiable concentrates, water-wettable powders, granules, aerosols, smoke candles and charges for vaporizers and lotions. Human health effects from DDT at low environmental doses are unknown. Following exposure to high doses, human symptoms can include vomiting, tremors or shakiness, and seizures. Laboratory animal studies showed effects on the liver and reproduction. DDT is considered a possible human carcinogen. Many of the serious ecological ramifications of DDT-use resulted in massive and widespread population declines of many high trophic level species of birds over large geographic areas. DDT may react with Iron and Aluminium and also react with oxidising materials. It is soluble in oil and fat and insoluble in water. The major environmental damage is it is strongly absorbed by soil and It causes hormone problems in animals. ●

The Two New Elements

Oganesson is a synthetic chemical element with the symbol **Og** and atomic number 118. It was first synthesized in 2002 at the Joint Institute for Nuclear Research (JINR) in Dubna, near Moscow, Russia, by a joint team of Russian and American scientists. In December 2015, it was recognized as one of four new elements by the Joint Working Party of the international scientific bodies IUPAC and IUPAP. It was formally named on 28 November 2016.The name honors the nuclear physicist Yuri Oganessian, who played a leading role in the discovery of the heaviest elements in the periodic table. It is one of only two elements named after a person who was alive at the time of naming, the other being seaborgium, and the only element whose eponym is alive as of 2023.

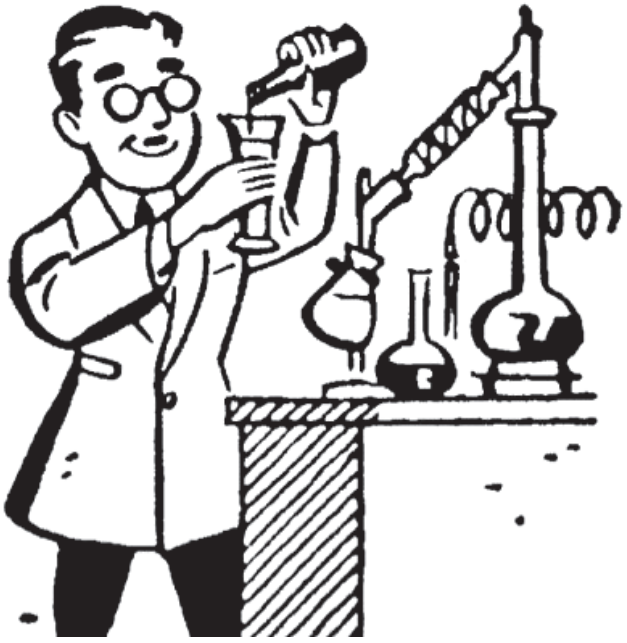
Tennessine is a synthetic chemical element with the symbol **Ts** and atomic number 117. It is the second-heaviest known element and the penultimate element of the 7th period of the periodic table. The discovery of tennessine was officially announced in Dubna, Russia, by a Russian–American collaboration in April 2010, which makes it the most recently discovered element as of 2023. One of its daughter isotopes was created directly in 2011, partially confirming the results of the experiment. The experiment itself was repeated successfully by the same collaboration in 2012 and by a joint German–American team in May 2014. In December 2015, the Joint Working Party of the International Union of Pure and Applied Chemistry (IUPAC) and the International Union of Pure and Applied Physics (IUPAP), which evaluates claims of discovery of new elements, recognized the element and assigned the priority to the Russian–American team. In June 2016, the IUPAC published a declaration stating that the discoverers had suggested the name *tennessine* after Tennessee, United States, a name which was officially adopted in November 2016.

HOW TO KEEP CHEMISTRY LAB CLEAN

Siyana Salim
D2 Chemistry

Maintaining a clean laboratory is a joint responsibility of all laboratory personal including management and laboratory chemists. It is not sufficient to entrust it solely to the sanitation workers and absolve yourself of your responsibilities.

The importance to clean lab equipment, when an unclean laboratory is as harmful as an inaccurate result. The apparatus especially glassware used in labs must be cleaned after every use. The remeants of previous tests, moisture, or even dust particles can alter the laboratory results. This can result in a waste of money and energy.



Cleaning regularly makes your lab both efficient and safe. Its important to use the right cleaning solution for the different items in your lab. In general, most lab equipment should be washed with detergent and water in the sink immediately after use to prevent the buildup of residue. Some chemicals, such as insoluble organic solution, don't just need water and soap, they also required rinsing with ethanol or acetone to completely remove any remaining deposits. To eliminate bacterial, viral, or fungal contamination ethanol or bleach sprays can be applied to almost any surface.

The first step of cleaning laboratory equipment is to remove loose debris and substances from the contaminated surface you are cleaning. You can do this by wiping with a disposable towel, sweeping or rinsing. Clean the weighing balance pans and powder spills, if any around the balance after weighing your samples. Keep all reagent bottles and chemicals in their respective place after use. After use, keep burettes, pipettes, measuring cylinders, flasks and other glassware after cleaning in their designated stands.

Use ethanol for ethanol - soluble contents, followed by rinses in deionized water. Rinse with other solvents as needed, followed by ethanol and finally deionized water. The cleaning procedure of lab glassware are washing with soap and water. Sock the glassware in soap solution for the at least 10 to 15 min or leave overnight. Scrub with a brush or cloth or sponge if needed. Rinse thoroughly with tap water. Again rinse with distilled or deionized water. If you need this glassware soon, rinse it with acetone or ethanol.

The best way to clean metal apparatus in the laboratory is to clean the equipment through out with soap and water for basis cleaning. You may need to use a wire brush to remove some residue. Rinse with purified water to ensure that all soap residue is removed. Boil purified water in the lab equipment to remove caked-on material like solidified agar or other products. ●

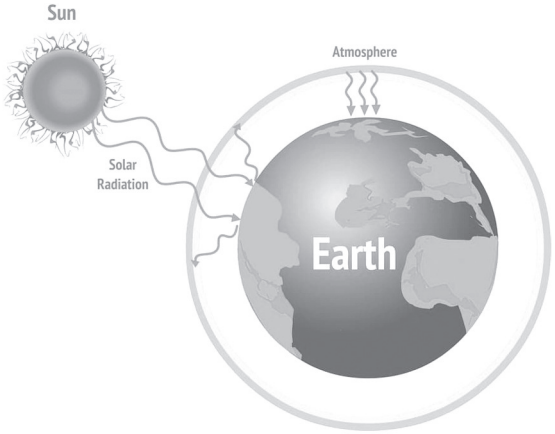
GREEN HOUSE EFFECT

Agnes Anna Johnson
D1 Chemistry

Greenhouse effect is a process in which the temperature of the Earth's surface increases. Greenhouse gases are responsible for greenhouse effect. They are the gases that absorb radiation.

Some of the greenhouse gases are listed below:

1. Carbon dioxide
2. Methane
3. Chloroflurocarbon



Cause of greenhouse effect:

1. Burning of fossil fuels: Fossil fuels are very important and are mainly used in transportation. On burning of fossil fuels carbon dioxide is released.
2. Deforestation: Plants and trees are our life's origin. They provide us oxygen. Due to the cutting of trees, there will be an increase in greenhouse gases which cause greenhouse effect.

Consequences of greenhouse effect:

1. Global warming: It is defined as the rise in temperature of the Earth's surface. It can cause rise in sea level, increased risk in droughts and floods
2. Ozone layer depletion: It is the thinning of the Earth's ozone layer in the upper atmosphere.it increases the amount of ultra violet radiations in the Earth's surface.

Prevention of greenhouse effect:

1. Afforestation: On planting more trees helps in reduce carbon dioxide in the atmosphere.
2. Conservation of energy: Changing to renewable sources of energy such as solar energy, wind energy, as a result we can reduce the use of fossil fuels. It reduces the release of carbon dioxide. ●

INDICATORS

Sreelakshmi Omanakuttan
D3 Chemistry

An indicator is a chemical compound that changes its colour in presence of an acid or base. Indicators are generally derived from plant pigments and are mildly acidic or basic in nature. A physical change in the property can be observed once they come in contact with acidic and basic solutions. The most common application of an indicator refers to the identification of the end points of situations.

Types of Indicators

1. Natural Indicators

2. Artificial Indicators

3. Olfactory Indicators

1. Natural Indicators:The indicators that occur naturally in the environment are called natural indicators.Natural indicator is a sort of indicator that may be found in nature and can be used to detect whether a material is acidic or basic.

Example:Turmeric, Red cabbage, etc.

2. Artificial Indicators:Those indicators that are obtained through some chemical reaction but not naturally or are prepared artificially in the laboratory are artificial indicators.

Example:Methyl orange, Phenolphthalein, etc.

3. Olfactory Indicators:These are those indicators that do not show a color change but a change in smell when added to acid or a base. Thus olfactory indicators are those indicators whose smell changes depending upon the nature of medium, whether it is acidic or basic.

Example:Vanilla extract, Onion, etc.

Universal Indicators: The common Indicators may or may not show colour change over a wide range of pH but only for a small range. Universal indicators change colors at wide ranges of pH. They are not used for titration purposes because the endpoint detection is very difficult as it changes colors with changing pH.Universl indicators are in the form of paper strips or solution forms.

Acid-base Indicators

Acid-base indicators are weak acids or bases commonly used to find out the endpoint in acid or base neutralization titration. Indicators change their color with the change of pH.

Theories acid- base indicator

1. Ostwald theory
2. Quinonoid theory

1. Ostwald theory: The acid-base indicator is ionized, resulting in a color change.The ionized indicator has a different color than the unionized indicator.As acid and bases are either weak acids or weak bases, the indicator has the potential to ionize.

2. Quinonoid theory: There are two types of tautomeric acid-base indicators with different structures.The two forms are in equilibrium. Two types of compounds can be found in nature: benzenoid and quinonoid.

(b). The two forms of the solution differ in color. One of the tautomeric forms is interconverted into another, causing the color change.

(C). The acidic one is the predominant form, while the other is alkaline.

Importance of Indicators

1. In biology, chemistry,civil engineering, water pollution, agriculture, forestry, food science, environmental science, water treatment, oceanography,medicine, nutrition and agronomy, among other areas, the nature of a substance is important.

2. Litmus is even made from lichens. It's a colour combination that goes when put it in water. It's then absorbed into filter paper to make one of the pH indicators, which used to assess whether something is acidic or basic. ●

CHANDRAYAAN

Chandrayaan is the name of India's lunar exploration program, which includes a series of missions to the Moon. The program is operated by the Indian Space Research Organisation (ISRO), India's space agency. There have been three main missions in the Chandrayaan program:

1. Chandrayaan-1: Chandrayaan-1 was India's first lunar mission and was launched in October 2008. It was an orbiter mission designed to study the Moon from orbit. The mission was highly successful and made several important discoveries, including evidence of water molecules on the lunar surface. Unfortunately, the orbiter lost contact with ISRO in August 2009, but its impact on lunar exploration was significant.

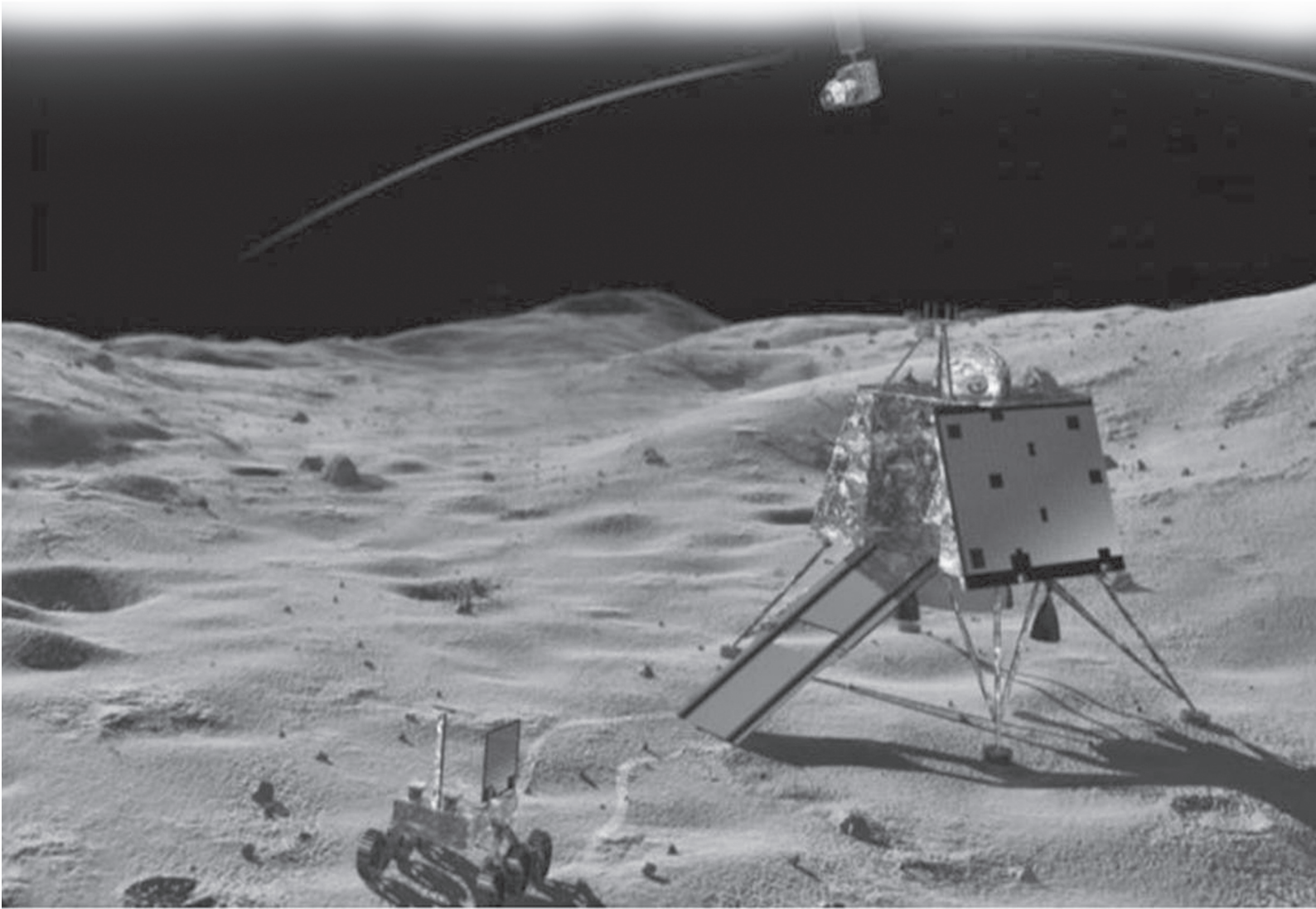
2. Chandrayaan-2: Chandrayaan-2 was launched in July 2019 and was a more ambitious mission. It consisted of an orbiter, a lander named Vikram, and a rover named Pragyan. The goal of Chandrayaan-2 was to study the Moon's south polar region, where there is evidence of water ice. While the orbiter continues to send valuable data from lunar orbit, the lander's attempted soft landing on the Moon was not successful, and it lost communication during the descent.

3. Chandrayaan-3 is India's third lunar mission and second attempt at achieving a soft landing on the moon's surface. The mission took off from the Satish Dhawan Space Center (SDSC) in Sriharikota on July 14, 2023, at 2:35 pm. It consists of an indigenous Lander module (LM), Propulsion module (PM) and a Rover with an objective of developing and demonstrating new technologies required for Inter planetary missions.

Mission Objectives of Chandrayaan-3: To demonstrate Safe and Soft Landing on Lunar Surface To demonstrate Rover roving on the moon and To conduct in-situ scientific experiments.

Features: The lander (Vikram) and rover payloads(Pragyan) of Chandrayaan-3 remain the same as the Chandrayaan-2 mission. The scientific payloads on the lander aim to study various aspects of the lunar environment. These payloads include studying lunar quakes, thermal properties of the lunar surface, changes in plasma near the surface, and accurately measuring the distance between Earth and the moon.

Congratulations to our great Seientists
Proud of our Nation



HYDROGEN-AN ALTERNATIVE ENERGY SOURCE

Haripriya S. and Riya Sara Roy

III Year-B.Sc Chemistry,CatholicateCollege, Pathanamthitta, Kerala-689645

One of the promising lines of inquiry of our society today is to address the adverse effect of climate change by minimizing the use of conventional carbon-based fossil fuels with alternative energy sources. The unbridled use of fossil fuels is a serious problem that has become increasingly evident over the years and such fuels contribute considerably to environment pollution. There is a need to find new sustainable source of energy with low emission of greenhouse gases. Hydrogen is known as the greenest fuel for the planet for the future.Thus, the use of renewable energy through technology that offers maximum efficiency with minimal pollution and reduced carbon emission has become a major goal. The use of hydrogen as a fuel is one of the most promising solutions for future system of clean energy and researchers have paid their attention to the development of hydrogen fuel vehicles, elegant transportation methods, exploration of smart material for efficient hydrogen production etc. The aim of this present talkis to provide an overview of features related to potential use of hydrogen as an alternative energy source considering its specific chemical and physical characteristics. Some aspects pertainingthe storage and transportation of hydrogen, India's advancement in devolving hydrogen energy, carbon neutral policy, etc will be highlighted during this presentation. ●

HYDROGEN AN ALTERNATIVE ENERGY SOURCE

Daine Babychen and
Brayan Sebastian Mukkadan

St Berchmans College, Changanasserry

As oil prices rise, interest in alternative fuels increases. The world is now at a turning point in planning for the energy supply of the future, as the effects of climate change must be taken into account and in the long run fossil fuels will become scarce. Hydrogen offers a variety of routes to achieve the transition to renewable fuel blends. Hydrogen has been the most common element in the universe since the beginning, and there is compelling logic that leads us all to believe that this gas can certainly provide an almost infinite source of energy. term for the world. In fact, most of the hydrogen currently produced in the world is produced by refining hydrocarbons. Hydrogen cleanliness and fuel cell efficiency together provide an attractive alternative to fossil fuels. The transition to a true hydrogen economy is uncertain and by no means inevitable in the future. The extend to which hydrogen might be adopted will depend variously, on technological advances and on developments in primary energy markets, electricity generation and transportation.

Keywords: alternative fuels, hydrocarbons, fossil fuels, hydrogen. ●

HYDROGEN – AN ALTERNATIVE ENERGY SOURCE

Saranya S. and Sreenadh M.

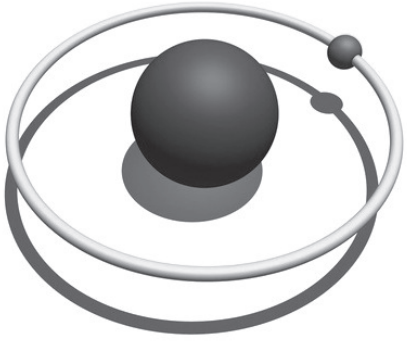
St. Marys College, Manarcad

ABSTRACT

Alternative energy is any amount of energy derived from non-fossil fuel sources. It is of low environmental impact also. Alternative energy sources are any source we use to supplement or even replace traditional energy sources used for power generation. Energy produced from alternative sources does not contribute to the greenhouse effect that causes climate change.

Hydrogen as alternative

Hydrogen is the most abundant chemical element in the universe. It is a simple, gaseous body that enters into the composition of water. Hydrogen is not a direct source of energy but rather an energy carrier. It serves primarily as a means of storing energy, especially for renewable energy when all their production cannot be consumed. It can also be used to produce energy, to power hybrid vehicles or autonomous energy production systems. The heat produced during the hydrogen production process can also be used locally to heat buildings. A fuel cell system, which includes a fuel reformer, can utilize the hydrogen from any hydrocarbon fuel-from natural gas to methanol, and even gasoline. Since the fuel cell relies on chemistry and not combustion, emissions from this type of a system would still be much smaller than emissions from the cleanest fuel combustion processes.



Advantages and benefits of hydrogen

The prospects for the hydrogen economy are good. It could play a major role in the energy transition since it has a high energy efficiency, emits no pollutants locally and can contribute to massively reducing greenhouse gas emissions.

Production, Storage and Distribution

There is much debate over which production method is optimal for large-scale commercial output. While countries and companies are exploring different alternatives, all are in very preliminary stages. Hydrogen, due to low density, creates significant storage challenges. In the industrial sector, hydrogen storage has been addressed using salt caverns, aquifers, underground pipelines or in cylinders if compressed.

Global intervention

Many countries have some form of ongoing activity to reduce emissions. Clearly, some are far more advanced and proactive than others. For the most part, this has been driven by government intervention as new laws are passed in efforts to clean up our environment. However, not many countries have experimented with adopting hydrogen as a source of energy.

HYDROGEN – A SECURE ENERGY FUTURE

Krishnaja K.K. and Pooja K.P.

S.B.College, Changanasserry

Hydrogen is an energy carrier that can transform our fossil fuel dependent economy into a hydrogen economy. Hydrogen is the fuel of the future. Electrolysis of water is deemed to be the cleanest route to the production of hydrogen. The use of metal hydrides is the most promising storage material currently. The advantages are high volume efficiency, easy recovery and advanced safety. Hydrogen is the most abundant element on earth. Although hydrogen doesn't exist freely in nature, it can be produced from a variety of sources such as steam reformation of natural gas, gasification of coal and electrolysis of water. The production of hydrogen gas can be emission free with the use of renewable energy sources. Ongoing research and implementation towards a hydrogen economy is required to make this fuel economically feasible. The current focus is directed towards hydrogen being a clean alternative fuel that produces insignificant green house gas emissions. The possibility of hydrogen economy that incorporates the use of hydrogen into every aspect of transportation requires much further research and development. The infrastructure for a hydrogen economy will come with high capital costs. The transport of hydrogen through underground seems to be the most economical when demands grow enough to require a large centralized facility. A drastic change is needed to slow down the effects of our fossil fuel dependent society. Transportation is a necessary part of our current world and the switch to a hydrogen economy can sustainable solution. Hydrogen can be produced by different ways. They are green -renewable based hydrogen production, purple-nuclear energy hydrogen production and blue- coal gasification and natural gas based hydrogen production integrated with carbon capture and storage hydrogen production methods. Among the different products green hydrogen is really important. It is obtained from the electrolysis of water with electricity generated by low carbon power sources also known as renewable energy sources. We should mainly focus on the production of green hydrogen as hydrogen is now emerging as a new energy vector outside its typical role as an industrial feedstock for the production of ammonia and methanol. Further research studies need to be conducted on the commercialization of renewable energy driven hydrogen production methods, infrastructure and market development, commercially viable products and sustainable hydrogen economy.

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THE LIGHTEST THE SIMPLEST BUT THE HIGHEST
HYDROGEN-AN ENERGY SOURCE

Adithyan, Ajith and Hrushikesh K. Nampoothiri
S.B.College, Changansserry

Hydrogen the simplest element on the periodic table one of the first identified element. But this simple element is the basic of many changes in the universe. Most of the stars burns and produce light because of fusion where the main element for fusion is hydrogen. This is why the stars don't need oxygen to burn. In one line we can say that if there is no hydrogen there will be no change and no forms of life.

INTRODUCTION

As we all know that the fossil fuels are draining out through the time and also fossil fuels causes a lot of pollution throughout the usage, so in upcoming years. So here we introduce the hydrogen as source of energy as well as a source of fuel.

SUMMARY

In this presentation we covey the use of hydrogen as a fuel or as an energy source.

***Hydrogen-a history:**Hydrogen was discovered by the English physicist Henry Cavendish in 1766. Scientists had been producing hydrogen for years before it was recognized as an element.

***Introduction of hydrogen as a fuel:** Fossil and nuclear fuel reserves are becoming increasingly limited, and the world's energy future will have to include several renewable alternatives to these failing resources. The present reliance on energy from fossil fuels produces unwanted side effects: environmental pollution, carbon dioxide emissions that accelerate global warming.

***Development of hydrogen in world:**

The momentum behind hydrogen remained strong over the past year. Nine countries – which cover around 30% of global energy sector emissions today – released their national strategies in 2021-2022.

***Advantages of hydrogen as energy source as well as fuel:** There are many advantages for hydrogen and those advantages makes hydrogen a perfect fuel

***Disadvantages of hydrogen:** Coins have two sides likewiseif there is an advantage there should be a disadvantage. In this case hydrogen also have number of disadvantages.

CONCLUSION

Hydrogen is a fuel having a high heat value and benefits of being a green fuel. Also with increased focus by countries across the world in R&D of extracting hydrogen, it is certain that Hydrogen would bethe fuel of the future**.**

"Hydrogen holds great promise to meet many of our future energy needs, and it addresses national security and our environmental concerns. Hydrogen is the simplest, most abundant element in the universe"

- Dan Lipinski

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HYDROGEN - AN ALTERNATIVE ENERGY SOURCE

Poojakrishna A. and Anarkha Sunil

Baselious College, Kottayam

Our world has always been running towards a global energy crisis. But after the Covid 19 pandemic shook the world, now we can say that we are not on the way but in the middle of a global energy crisis, with much to the globe facing shortages and increased price ratings in oil, gas and electricity markets.

What are the real causes of this energy crisis? It's the overconsumption, overexploitation and wastage of energy. We solely depend on natural sources of energy – fossil fuels for our demands. The strain on fossil fuels can in turn put a strain on our water and oxygen sources resulting pollution. It also increases the emission of green house gases resulting global warming. On the other hand another major reason for energy crisis is the unexplored renewable energy sources. Unless we give renewable energy a serious thought the problem of energy crisis cannot be solved.

Its at this point hydrogen as an alternative energy source rise on top. The most abundant element on earth is a powerful energy carrier when used in a hydrogen fuel cell - highly efficient and flexible emitting only water, heat and electricity. But why hydrogen? Becauseits the obvious candidate for the renewable energy carrier for the future due to its availability in form of water, high energy density and lack of negative impact on environment. Hydrogensolves a number of problems when trying to de carbonize the energy and industrial sectors. Countries around the world are already betting on hydrogen as an alternative to fossil fuels. But after all this we have many challenges to overcome for using hydrogen as an energy source. The main challenge is the use if fossil fuels in hydrogen production. Another one is the storage and transportation of hydrogen. Fuel cell efficiency also comes to point as a challenge. Currentstate in technology is that significant advances are needed to make hydrogen economy viable.

On theother hand significant strides have been made, in recent timeswhich gives hope that, hydrogen will, in theforeseeable future, be able to challenge fossil fuels as theprimary energy carrier, but only through a sustained and focused effort.

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HYDROGEN - AN ALTERNATIVE ENERGY SOURCE

Fahimi Thasnim Yoosaf and Reshma R.

S.V.R.N.S.S.College, Vazhoor

Hydrogen is considered an alternative fuel under the Energy Policy Act of 1992. The interest in hydrogen as an alternative transportation fuel stems from its ability to power fuel cells in zero-emission vehicles,it's potential for domestic production and the fuel cells fast filling time and high efficiency.

Hydrogen fuel is considered as the best alternative fuel to our daily used conventional such as coals and gasoline.Hydrogen is an excellent energy carrier and is pollution free.

Hydrogen fuel cells does not exist today,but when technology catches up with the idea,we will see hydrogen being used in fuel cells for heating, cooling and electrical.

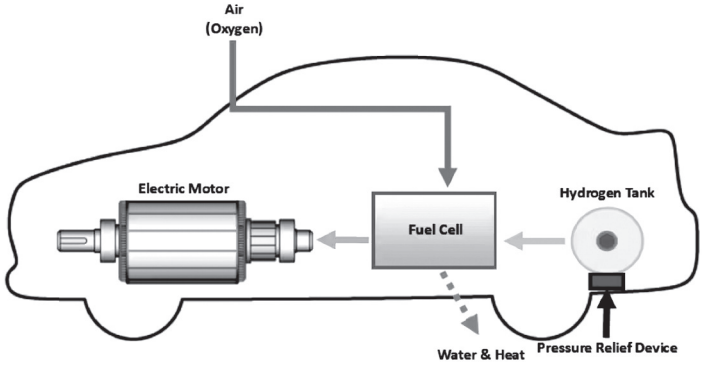
HYDROGEN AN ALTERNATIVE ENERGY FUEL

Maher A. Sadiq, Gauri S. Nair and Bidhya Mary

Baselius College, Kottayam

Hydrogen is a very important fuel of our secure and clean energy future. Hydrogen will be the fuel of the future and gradually it will replace all current fossil fuels. Hydrogen can be used as a fuel for vehicles, to heat homes and offices, to produce electricity, and to fuel ships and aircraft. The present work provides an overview of hydrogen as an alternative fuel, which can be used in internal combustion engines and in fuel.

Hydrogen is one of the energy carriers which can replace fossil fuel, and can be used as fuel in internal combustion engine's vehicles and also in fuel cell vehicles. To use hydrogen as a fuel of internal combustion engine, engine design should be considered for avoiding pre-ignition and abnormal combustion. As a result it can improve engine efficiency, power output and reduce the pollutant emissions. The emission of fuel cell is very low as compared to conventional internal combustion engines but as penalty, fuel cell vehicles need additional space and weight to install the battery and storage tank, thus increases it production cost.



Liquid hydrogen presents another set of safety issues, such as risk of cold burns, and the increased duration of leaked cryogenic fuel. A large spill of liquid hydrogen has some characteristics of a gasoline spill; however, it will dissipate much faster. Another potential danger is a violent explosion of a boiling liquid expanding vapor in case of a pressure relief valve failure.

Hydrogen on-board a vehicle may pose a safety hazard. Such hazards should be considered in situations when the vehicle is inoperable, when the vehicle is in normal operation, and in collisions. Usually, potential hazards are due to fire, explosion, or toxicity. The latter can be ignored, because neither hydrogen nor its fumes in case of fire are toxic. Hydrogen as a source of fire or explosion may come from the fuel storage, from the fuel supply lines, or from the fuel cell itself. The fuel cell poses the least hazard, although in a fuel cell hydrogen and oxygen are separated by a very thin polymer membrane. In case of membrane rupture hydrogen and oxygen would combine, and the fuel cell would immediately lose its potential, which should be easily detected by a control system. In such a case the supply lines would be immediately disconnected.

In conclusion, hydrogen appears to pose risks of the same order of magnitude as other fuels. In spite of public perception, in many aspects hydrogen is actually a safer fuel than gasoline and natural gas. Table 2 compares hydrogen properties with other fuels and ranks their effect on safety.

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HYDROGEN – AN ALTERNATIVE ENERGY SOURCE

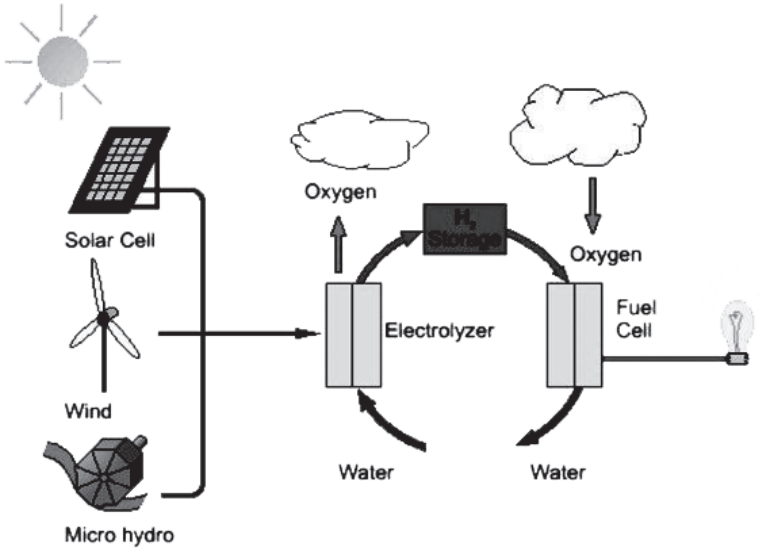
Ansa Sara John and Hridhya Ann Shaiju
BMM Senior Secondary School

The presentation we have prepared is on the topic "Hydrogen – an alternative energy source." The presentation consists of an Introduction to the topic, Advantages and Disadvantages of Hydrogen as an energy source, Hydrogen – Oxygen Fuel Cells and Hydrogen Cars. The presentation concludes with why and how important hydrogen is important in the future as a fuel source. To be distinct from others, we have also merged the above topic with sustainable development goals released by the UN. A short summary of the topic is given below.

As the days go by, our consumption and energy needs are increasing rapidly, thereby compelling us to find an alternative source to replace the depleting and polluting existing fuel sources. One such potential alternative is HYDROGEN. Hydrogen is a possible fuel source capable of providing the requisite energy to work as a fuel. Using hydrogen as a substitute has a lot of merits but the minor demerits are pulling down this alternative; cost of production. The most supporting factor for hydrogen as a fuel is that it is pollution free. Our pollution filled Earth is slowly deteriorating and hence a pollution free source of energy is very much needed today and hence hydrogen is a topic of discussion today.

Speaking about fuel cells, Hydrogen – Oxygen Fuel Cells are the future for tomorrow's generation. One needs to encourage it. Also speaking of Hydrogen Cars, it is one of the most precise replacements for environment friendly vehicles, but is often discouraged due to its high cost of production and maintenance.

All these brings to the conclusion that weighing the advantages and disadvantages of hydrogen as a fuel source, one needs to consider the benefits it will have on nature and the lives of people all around the globe and do what suits the best for this world. ●



HYDROGEN : AN ALTERNATIVE ENERGY SOURCE

Ann Miriam Abraham and Nayanthara S.

C.M.S.College, Kottayam

There is a need in the modern world to provide sustainable means of producing clean energy economically, on a monumental scale. The world's population is inexorably increasing toward the 10 billion mark and carbon based fossil fuel consumption has increased accordingly, leading to unacceptable levels of air pollution in the major conurbations of both advanced and developing countries. Although much of the pollution arises from burning carbon based fossil fuels inside internal combustion engines (ICEs) of motor vehicles and ships, a significant contribution is also made by coal burning thermal power plants used for electricity generation. Hydrogen (H_2) which is stored in near limitless quantity in sea water is the only alternative fuel that is more abundant and environmentally cleaner with the potential of having a lower cost than nonrenewable carbon based fossil fuels, assuming that engineering challenges related to safe implementation and economical extraction of the hydrogen are overcome. Research on hydrogen storage and generator systems based on water (H2O) remains active.

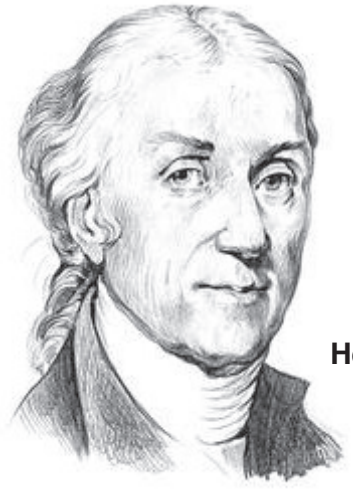
In the near future, hydrogen will become a significant fuel which can solve the local problems connected with air quality. Because hydrogen is the most widespread component on the Earth, it can be obtained from a number of sources, both renewable and non-renewable, moreover, by various processes. Pure hydrogen can be acquired by the energy-demanding electrolysis of water. Global production has so far been dominated by hydrogen production from fossil fuels, with the most significant contemporary technologies being the reforming of hydrocarbons, pyrolysis and co-pyrolysis. In the near future, biological methods can be used.

A new hydrogen clean energy paradigm wherein a hydrogen fuel cell electric generator comprising the novel, scalable, hydrogen generation apparatus, is shown capable of providing power for motor vehicles and for wide ranging applications in ground based clean power generation. At the present time, large scale ground based electric power generation and distribution is centered on an electric grid and an evolving smart grid system. The electric grid is meant to allow all parts of electric power generation units including renewable systems, to supply power that is distributed via transmission lines and substations to households, commercial businesses and industry. The principal problem with the electric power generation and distribution system centered on the electric grid exists because the supply of electric power around the world is inadequate to meet the large projected growth in demand from the proliferation of battery electric vehicles (BEVs).

Although using Hydrogen as an alternative fuel has applications, it has some limitations like storage complications, explosive nature and high cost. The new sustainable hydrogen clean energy paradigm represents in all regards a superior solution to the carbon based fossil fuel systems that it aims to supplant by introducing advanced technology of a new type, offering improved safety through the use of nonvolatile solid sodium metal as an energy carrier, noise free operation with zero emissions, and the potential to be more cost effective by using renewable energy from the sun to recycle high energy materials. ●

HYDROGEN AS AN ALTERNATIVE ENERGY SOURCE

Adithi S. and Nandini Menon
Baselius College, Kottayam



Henry Cavendish

Abstract

The world needs more energy than ever before. Which means we need a sustainable system that can meet these growing demands, whilst also addressing CO2 emissions and the overall impact on the environment. One possible solution is hydrogen, which has the potential to deliver sustainable, efficient and affordable energy at scale.

One of the fundamental attractions of hydrogen is its environmental advantage over fossil fuels, however, hydrogen is only as clean as the technologies used to produce it. The production of hydrogen can be pollutant-free if it is produced by one of three methods:

- Through electrolysis using electricity derived solely from renewable energy sources or nuclear power.
- Through steam reforming of fossil fuels combined with new carbon capture and storage technologies.
- Through thermochemical or biological techniques based on renewable biomass

The energy in 2.2 pounds (1 kilogram) of hydrogen gas contains about the same as the energy in 1 gallon (6.2 pounds, 2.8 kilograms) of gasoline.

Hydrogen and fuel cell technologies provide cost effective and environmentally friendly solutions to improving our energy needs.The benefits of fuel cells are:

- Reduced greenhouse gas emissions
- High Reliability
- Flexibility in installation and operation
- Development of renewable energy resources
- Reduced demand for foreign oil
- Improved environmental quality

With a view to accelerate development of hydrogen energy sector in India, a National Hydrogen Energy Road Map (NHERM) was prepared and adopted by the National Hydrogen Energy Board in January, 2006 for implementation. ●

HYDROGEN AS AN ALTERNATIVE FUEL

Alan Varghese and Aswathy Sunny
St Dominic's College Kanjirappally

Hydrogen has become a new energy substitute from its primitive role used for the production of ammonia, methanol, and petroleum refining. Hydrogen is an energy carrier that can transform our fossil-fuel dependent economy into a hydrogen economy, which can provide an emissions-free transportation fuel. In addition to environmental sustainability issues, energy-scarce developed countries are also facing an energy security issue, and hydrogen or hydrogen carriers seem to be options to address these long-term energy availability issues. Is hydrogen a justifiable means to the attainment of an environmentally beneficial transportation fuel when methods of production are not utilizing clean, renewable energy sources? What exactly are the completely emissions-free methods of producing and utilizing hydrogen in transportation? Can hydrogen be an alternative fuel?

Weas ambitious chemistry students andinterested in green economy,understands the importance of hydrogen as an alternative fuel. As per the Paris agreement, to make meaning full difference in net emission, hydrogen should be prepared by water splitting using renewable energy. The solar to hydrogen efficiency of a photovoltaic electrolysis setups is a key parameter to lower the cost of green hydrogen production and provide the means of a totally emissions-free method of producing hydrogen. Although steam reformation of methane is currently the major route to hydrogen production, the emissions involved could cause an increase in Global warming. Climate change is a serious issue becoming increasingly evident to much of the population. Rising CO_2 levels have directly contributed to the global warming phenomenon. The CO_2levels have been rising dramatically in the past 200 years, along with the global average temperature. Hydrogen is the fuel that could play a significant role in low carbon future and save humans from extinction. ●

Carolyn R. Bertozzi Morten Meldal K. Barry Sharpless

Chemistry Nobel Prize 2022

HYDROGEN- AN ALTERNATE SOURCE OF ENERGY

Christy Benny and Anumol James

B.K.College, Amalagiri

Faced with a growing energy crisis, record greenhouse gas concentrations, and increasing extreme weather events, the focus of governments across the world is on renewables. At COP-27 world leaders – both private and public have united to forge new collaborations and achieve innovative solutions together. Countries have been called on to shift from financing coal in developing countries to financing clean energy. There is unprecedented momentum around the world to fulfill hydrogen's longstanding potential as a clean energy solution. The recent successes of renewable energy technologies and electric vehicles have shown that policy and technology innovation has the power to build global clean energy industries. As we all know hydrogen is the first element of the periodic table. It is the most abundant chemical substance in the universe. Most of the hydrogen on earth exists in molecular forms such as water and organic compounds. When we use renewable electricity to split water into H and O, that is green hydrogen. Green hydrogen was featured in several emission reduction pledges at the UN Climate Conference, COP-27 as a means to decarbonize heavy industry, long-haul freight shipping, and aviation. There are other colors of hydrogen but they use fossil fuels and they only make climate change worse. Government and industry have both acknowledged hydrogen as an important pillar of a net zero economy.

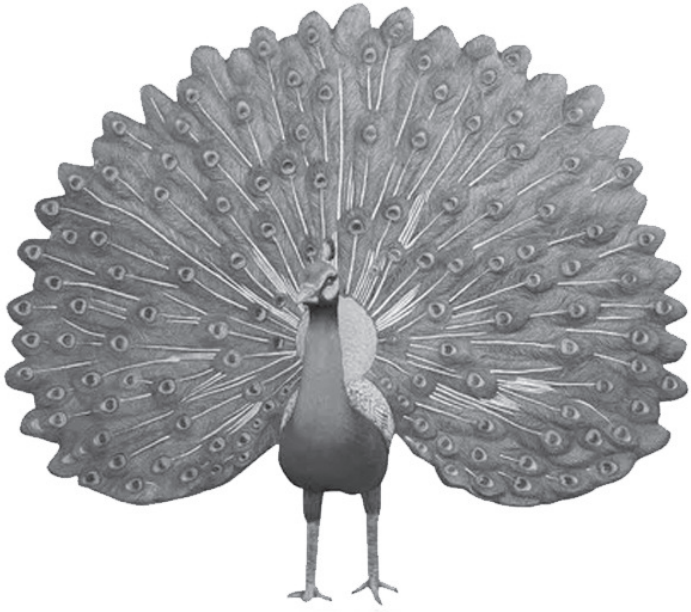
So, when we look at our global energy consumption today, only 20% comes from electricity or electrons. The remaining 80% of our world's energy use is in the form of molecules. Molecules create the reaction and not electrons. Hydrogen is one of the most energy-dense molecules and by mass, it contains three times as much energy as diesel. Well, you might be wondering why aren't we using this already everywhere. The biggest hurdle in the adoption of hydrogen, however, is its price. According to LCOE for fuel cells, it is $103-$152 which makes it more expensive than gas Peaker plants and on par with nuclear and coal. While solar and wind are dramatically cheaper, starting around $40 - $29. Hydrogen doesn't come out as the best solution for a cleaner, safer environment. So why haven't fuel cells faded off into the land of misfit toys? The answer would be its ability to provide a continuous energy source.

We sometimes come across an issue called 'DARK DOLDRUMS'. It is nothing but the exhaustion of renewable energy sources. Imagine that solar and wind energy can't provide sufficient energy on a moody or windless day. This kind of dilemma makes it difficult to eliminate the reliance on fossil fuels. Wherever there is a need for a continuous supply of energy this can be tackled by storing green hydrogen.

In the French Alps, during the summer excess solar energy is stored as Hydrogen and provides power during the winter. While green hydrogen is being used in data centers as an emergency backup and more. Hydrogen fuel cells show important opportunities in powering remote areas without access to the power utility grid. South African government is partnering with several companies to do this, making the South African village the first to be fueled by fuel cells. Hydrogen is

being used as a fuel for freight transport vehicles because of its high energy density, with 1 kg of Hydrogen delivering the same power as a gallon of diesel. It is also much quicker to refuel a hydrogen-powered vehicle. Regional flights and smaller planes are much closer to realizing the green potential of these cells.

India will become a major beneficiary of a new global energy trade in hydrogen and India can develop itself as a net exporter of energy in the future. Australia has already coined the term SHIPPING SUNSHINE to refer to the trade of green hydrogen produced using solar power. The need for clean energy in countries like China, South Korea, and Japan is exponentially increasing and Australia is developing its infrastructure to export green hydrogen to these countries at a frantic pace. India can replicate the Australian models for exporting green hydrogen and creating pockets of hydrogen fuel across the country. India is one of the few countries to have announced its National Hydrogen Plans. The Indian Government is aiming for self-reliance in energy by 2047, and hydrogen will play a key role in helping India achieve this goal. ●



Charm of Nanotechnology....
Peacock Feather.....
Nature's wonder
nanoparticles Play
Making vivid colours

HYDROGEN – AN ALTERNATIVE ENERGY SOURCE

Binuja Varghese and John B. Kottooran

C.M.S. College, Kottayam

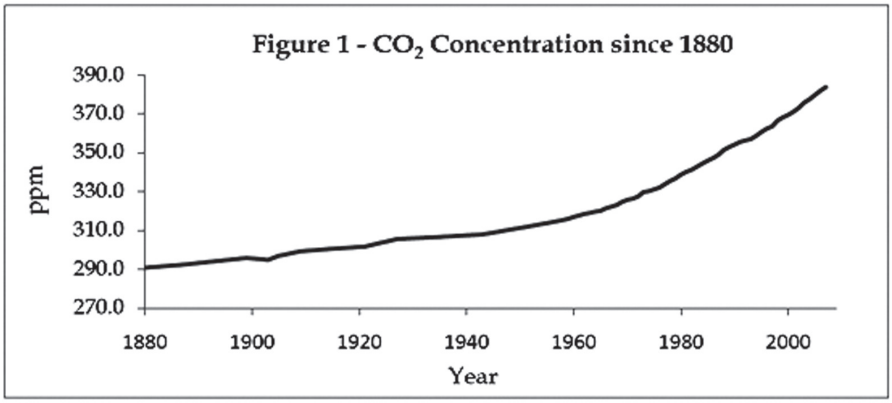
ABSTRACT

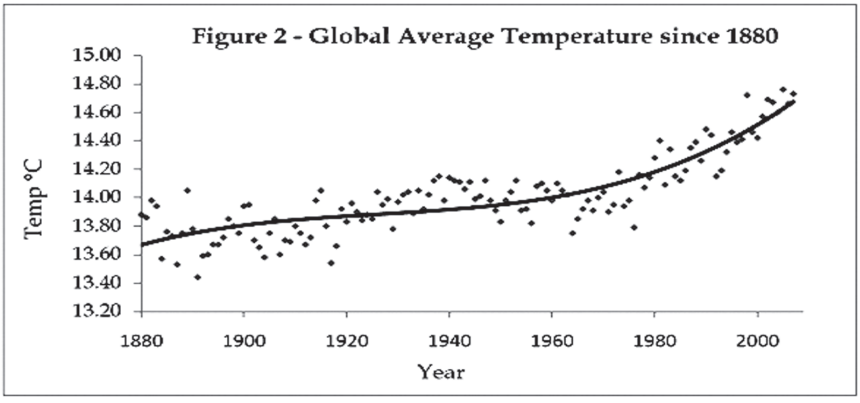
Hydrogen is the fuel of the future. Hydrogen is an energy carrier that can transform our fossil-fuel dependent economy into a hydrogen economy, which can provide an emissions-free transportation fuel. Clean hydrogen is enjoying unprecedented political and business momentum, with the number of policies and projects around the world expanding rapidly.For a sustainable future, we need a more effective energy source to meet the needs of the people. Hydrogen is an excellent source of energy.

INTRODUCTION

Climate Change is the defining issue of our time and we are at a defining moment. climate change are global in scope and unprecedented in scale. Without drastic action today, adapting to these impacts in the future will be more difficult and costly.Greenhouse gases occur naturally and are essential to the survival of humans and millions of other living things.

But after more than a century and a half of industrialization, deforestation, and large scale agriculture, quantities of greenhouse gases in the atmosphere have risen to record levels not seen in three million years. As populations, economies and standards of living grow, so does the cumulative level of greenhouse gas (GHGs) emissions.The concentration of GHGs in the earth's atmosphere is directly linked to the average global temperature on EarthThe concentration has been rising steadily, and mean global temperatures along with it, since the time of the Industrial Revolution;The most abundant GHG, accounting for about two-thirds of GHGs, carbon dioxide (CO_2), is largely the product of burning fossil fuels. The CO_2 levels have rising dramatically in the past 200 years, along with the global average temperature. The graphs below showing the increase in CO_2 and Global average temperature.





Source: Compiled by Earth Policy Institute, with long term historical data from Worldwatch Institute, Signposts 2001, CD-Rom (Washington, DC: 2001); 1960 to 2007 from NOAA/ESRL, "Atmospheric Carbon Dioxide - Mauna Loa," at: www.esrl.noaa.gov/gmd/ccgg/trends/co2_data_mlo.html.

The major source of our energy is from fossil fuels. Global CO2 emissions from energy combustion and industrial processes rebounded in 2021 to reach their highest ever annual level.Here comes the role of Hydrogen as a source of energy. Today hydrogen is recognized as a non-polluting energy carrier because it does not contribute to global warming if it is produced from renewable sources.Hydrogen is considered by more and more specialists to be a true fuel of the future.

Why Hydrogen ?

Hydrogen is a unique element with a lot of properties.Hydrogen is a standard part of most fuels today. Since it is flammable and combustible, it is ideal for fuels. However, there are both pros and cons to this technology.

Using Hydrogen as fuel will lead to a dramatic decrease in pollution and help humans reverse the damage done by fossil fuels. In addition to Hydrogen being so environmentally friendly, it also packs a punch! It takes a lot of energy to separate water. Since so much energy is generated when separating Hydrogen atoms, there is more energy per pound of fuel, compared to other sources. However, with all these benefits of Hydrogen as fuel, there are also disadvantages.

Various Methods to Produce Hydrogen

1) Steam reforming of methane gas

– In presence of nickel catalyst &at 700° C – 1100°C:

$CH_4(g) + H_2O(g) \rightarrow CO(g) + 3H_2(g)$

– **At lower temperatures:**

$CO(g) + H_2O(g) \rightarrow CO_2(g) + H_2(g)$

2) Hydrogen from coal (Gasification)

– At high temperature and pressure:

$Coal + H_2O(g) + O_2(g) \rightarrow syngas$

$Syngas = H_2 + CO + CO_2 + CH4$

3) Electrolysis of water

– Electric current passed through water:

$2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$

4) Solar – Hydrogen system

– Electric current passed through water:

$2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$

Generally the first two methods are used for the bulk production of hydrogen.

STORAGE AND TRANSPORT

Hydrogen is a very light gas with a low density, its storage is an essential obstacle to overcome. These potential hydrogen delivery systems include compressed tube trailers, liquid storage tank trucks, and compressed gas pipelines. One major disadvantage of each system is the high capital costs.

Hydrogen can be stored physically as either a gas or a liquid.

- Storage of hydrogen as a gas typically requires high-pressure tanks (350–700 bar [5,000–10,000 psi] tank pressure).
- Storage of hydrogen as a liquid requires cryogenic temperatures because the boiling point of hydrogen at one atmosphere pressure is “252.8°C.

HYDROGEN ECONOMY

Hydrogen economy is a vision of an energy delivery infrastructure based on hydrogen as a carbon-free energy carrier. Fuel cells would generate electricity from hydrogen with heat and water vapor as byproducts. An alternative energy economy in the form of a parallel power and transportation infrastructure is needed, including technical solutions for energy-efficient hydrogen production, storage technology and delivery infrastructure. Transportation is a necessary part of our current world and the switch to a hydrogen economy can provide a sustainable solution.

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HYDROGEN AS AN ALTERNATIVE FUEL

Gokul M.G and Jojo Manuel P.
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Abstract

- Who is H_2?
- Sources of hydrogen
- Hydrogen based engines and their working
- Why hydrogen?
- Advantages and disadvantages
- Hydrogen in future
- Conclusions

Introduction

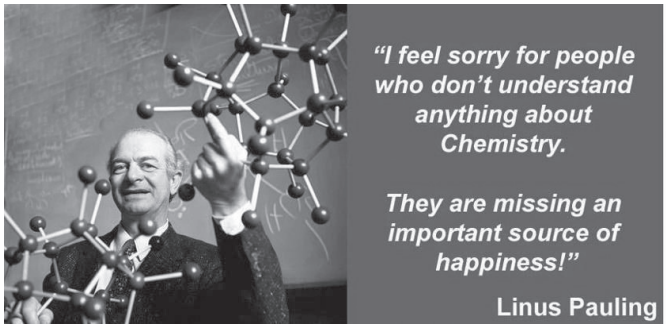
Hydrogen is the first formed, lightest, simplest and abundant element in the universe. Considering the global situation and climatic crisis it is the time to think about an alternative fuel which is environment friendly and sustainable. The hydrogen, which holds the most calorific value is now being a solution to the world oil crisis. It is a clean, harmless, efficient, powerful and highly valuable energy source.

Summary

Most abundant element hydrogen is now becoming a replacement for conventional fuel sources. As we all know that the fossil fuels are increasing the carbon footprint in our atmosphere and making the nature unstable, it is the time to think about a new fuel source which is nature friendly, sustainable and more efficient. We came to a conclusion that hydrogen is the perfect replacement for the conventional fuels. 'Why hydrogen?' is always a question in the mind of every person. It is a fuel source with the most calorific value (150000kJ/kg), zero pollution, abundant, and highly efficient. Still why it is not possible? Difficulty in storage and transportation, safety concerns, under developed engines, even though the running cost is cheaper the initial cost is high. Due to these the hydrogen fuel cell has been suppressed. Now the things are changing, better engines are designed and world is now concerned about carbon emission than cost.

Conclusions

Hydrogen has the potential to be an attractive alternative energy carrier for future fuel needs. Hydrogen can be produced from a variety of feedstocks including natural gas, coal, biomass, wastes, solar, wind, or nuclear. Hence, the participation in hydrogen economy will be much more open than the present energy industry limited to countries with petroleum or coal reserves. The use of hydrogen as a fuel requires development in several industry segments, including production, delivery, storage, and end use. As the technology is developing, more and more hydrogen-based engines are designed and made which leads to the development "hydrogen as an alternative fuel" source which is much more efficient and cleaner. ●



HYDROGEN- AN ALTERNATIVE ENERGY SOURCE

Sreepooja Sankar and Niranjana D.
BCM College, Kottayam

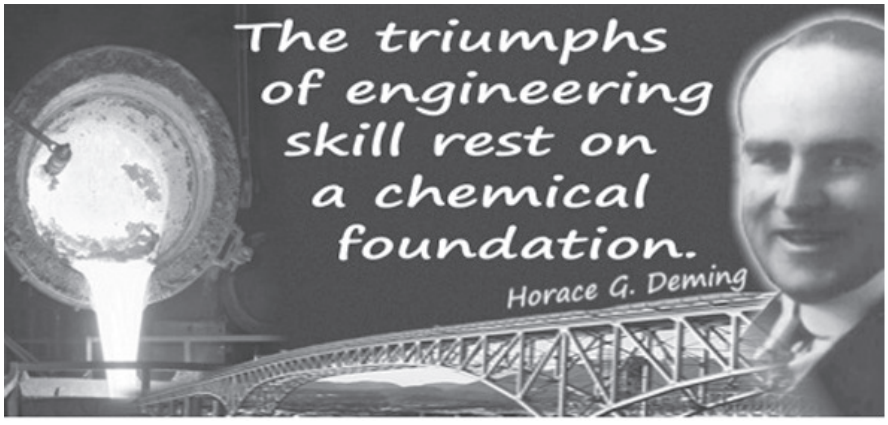
INTRODUCTION

Hydrogen has always been an intimidating topic of study for scientists. Nowadays, hydrogen is being studied for its properties and uses and also it is being considered to be used as an alternative energy source. Now, how hydrogen can be used as an alternative energy source?

HYDROGEN AS AN ENERGY SOURCE

Hydrogen is a clean fuel. It is an energy carrier that can be used for many applications. It can serve as an alternative to liquid and fossil fuels. To speak of its chemistry hydrogen is the first element of the periodic table and it is non-toxic, odourless, tasteless, colourless and non-metallic. It is a highly combustible diatomic gas. But….to make it simple, When we use hydrogen as a fuel it creates no trash. Hydrogen is considered an alternative fuel due to its ability to power fuel cells in zero-emission electric vehicles, its potential for domestic production and the fuel cell's potential for high efficiency.

Hydrogen is a very abundant basic earth element. However, it is time-consuming to separate hydrogen gas from its companion substances. Even if it is time-consuming, the results provide a powerful clean source of energy. Unlike other energy sources, hydrogen doesn't emit carbon dioxide when burnt. It doesn't emit any harmful substances. It reacts with oxygen without burning and the energy it releases can be used to generate electricity which is used to drive an electrically driven car motor. Other energy sources such as nuclear energy, coal, gasoline etc are either toxic or found in hazardous environments. Since hydrogen is friendly towards the environment, it can be used in ways that other fuels can't possibly match. It is a non-toxic substance which is rare for a fuel source. Since it is environmentally friendly it is safer than other fuel sources. It is both powerful and efficient. It can even be used as fuel for powerful machines like spaceships. Hydrogen is three times more powerful than gasoline and other fossil fuels. Hence hydrogen can accomplish more with less. It is fuel efficient. Compared to other energy sources it is much more fuel efficient as it can produce more energy per pound of fuel. This means that when a car is fueled with hydrogen, it can go farther than a vehicle loaded with the same amount of fuel but using any other traditional energy source. Hydrogen fuel cells are two or three times more efficient than any other traditional combustion technologies. It is a renewable source of energy. It can be produced again and again and of course, hydrogen as a fuel or an energy source can reduce the effects of global warming considerably. ●



THE HYDROGEN PROMISE

Shon Mathew and Devadath Jayakumar

St Berchmans College, Changanacherry

➢ ABSTRACT

Hydrogen is the most abundant chemical substance in the universe constituting roughly 75% of all normal matter. High abundance of hydrogen in nature makes it a preferable fuel.Commercially available hydrogen is classified mainly into four categories: Brown hydrogen, Grey hydrogen, Blue hydrogen &Green hydrogen.All commercial hydrogens except green hydrogen cause greenhouse gas emissions during their manufacturing process.

There are different Methods for energy harvesting from hydrogen fuel. Hydrogen fuel cells, hydrogen combustion engines and by nuclear fusion are some of the possible methods. But thereare advantages and disadvantages concerning energy harvesting from hydrogen fuel,for most of which roams around the storage of the fuel.Nevertheless, there are tonsof Possibilities and applicationsfor hydrogen fuel including usage of green hydrogen in fleet vehicles. Hydrogen is relevant since there is a need for an alternate source to exist for thermal-mechanical energy conversion and the concept of internet of energy is under progress and theories such as Cold fusion doesn't show a consistent result. Controversies and endless possibilities roaming around it might decentralise the energy distribution and can make our energy, an absolute zero emission energy in future.

➢ INTRODUCTION

Due to our reliability on fossil fuels, its exhaustion poses the threat to our society. As for the case of innovative energy source for the world, none made enough promises as hydrogen did. Predictions made by scientists years ago holds hydrogen as the fuel of the future. But before our eyes, we can witness the roads been overtaken by the EV culture. Sustainable energy is better preferred with more efficiency as energy vector transition of hydrogen fuel poses many questions.

➢ HYDROGEN AS A FUEL

Hydrogen was discovered by English physicist Henry Cavendish in 1766. It was Antoine Lavoisier who named the element. The first fuel cells were invented by Sir William Grove in 1838. Hydrogen is considered an alternate fuel under energy policy of 1992. The interest in hydrogen as an alternative transportation fuel stems from its ability to power fuel cells in zero emission vehicles. It is also the fuel with highest energy density of approximately 120 MJ/kg, but it also has a low volumetric energy density which means hydrogen requires three times more space than natural gas to match it's energy.

- **Fuel cell**-It is the method of generating electricity using hydrogen to react with oxygen to produce electricity with water as its residue. They have 38% energy efficiency.
- **Hydrogen Combustion Engine**-They convert the thermal energy generated from the combustion of hydrogen into mechanical energy. They have 20-25% energy efficiency.
- **Nuclear Fusion**-Two hydrogen nuclei merge to form helium. The fusion emits thermal energy which then can be harvested as electricity. Nuclear fusion is still under development.

➢ COLD FUSION & THE GREAT POTENTIAL IT OFFERS

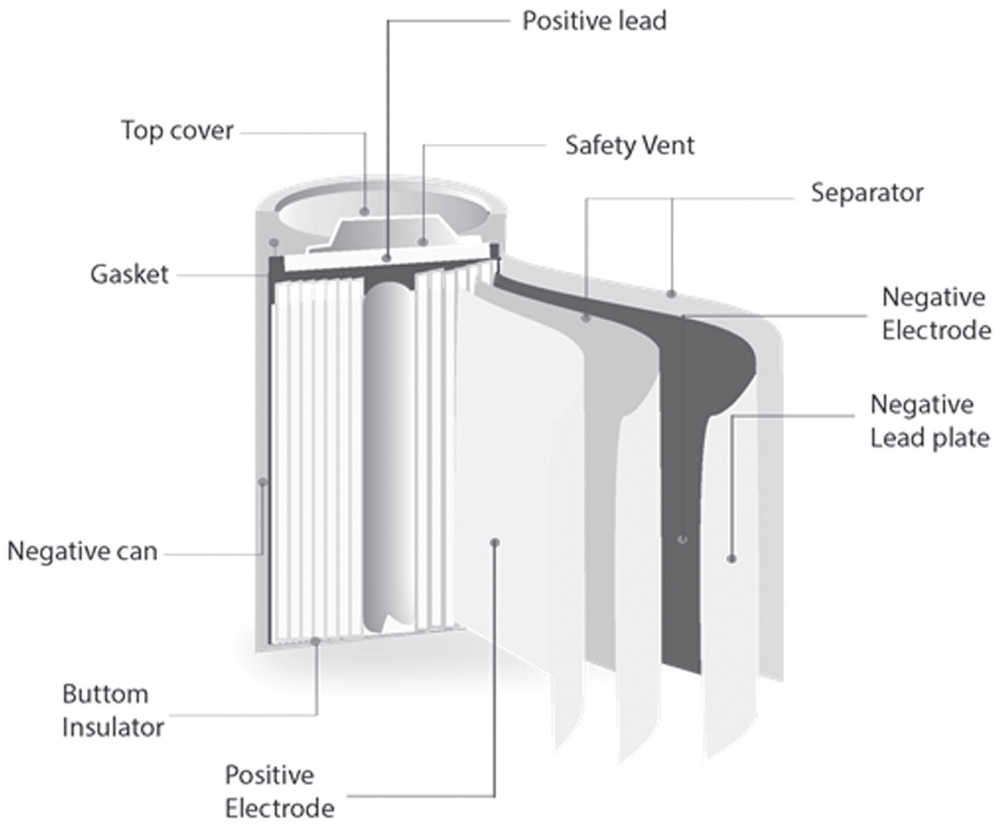
Cold fusion is a controversial territory visited by only a few. It uses deuterium oxide under electrolysis (The Fleishmann & Pons experiment) using palladium for cathode where fusion is believed to be occurred.It basically theorises a phenomenon as an alternative method of nuclear fusion occurring at standard room temperature.The result shows the production of excess heat. Developments on this phenomenon is not only carrying a great potential of energy but can explore a bit more in to its nature which defies the laws of nuclear physics.

➢ CONCLUSION

Hydrogen has its pros and cons. According to statistics, about 20% of worlds' energy by 2050 will be based on hydrogen which strongly depends on this decade's choice. We should begin by promotinghydrogen fleet vehicles and with further developments in nuclear fusion methods.Hydrogen truly holds the potential to be relied on as a great energy source.

●

The Lithuim Ion Battery - The Future of Automobiles



A Literature Review on Hydrogen an Alternative Energy Source

Ananthakrishnan M. J. and Sarath R. Dev
St. Thomas College Palai

ABSTRACT

This literature review provides an insight to the feasibility of adopting hydrogen as a key energy carrier and fuel source in the near future. It is shown that hydrogen has several advantages, as well as few drawbacks in using for the above purposes.The production at distributed level has also been discussed. The paper also presents the levels of risk in production, storage and distribution stages and proposes possible techniques to address safety issues. It is shown that the storage in small to medium scale containers is much economical compared to doing the same at large-scale containers.

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CARBON FOOT PRINT

A carbon footprint refers to the total amount of greenhouse gases, primarily carbon dioxide (CO_2), and other carbon compounds emitted directly or indirectly by an individual, organization, event, product, or process. These emissions are typically measured in units of carbon dioxide equivalents (CO_2) and are associated with activities such as energy consumption, transportation, manufacturing, and more.

Here are some key points related to carbon footprints:

1. **Measurement**: Calculating a carbon footprint involves identifying and quantifying the emissions associated with various activities or processes. It includes both direct emissions (e.g., burning fossil fuels for heating) and indirect emissions (e.g., emissions from the production of goods and services).
2. **Sources**: The main sources of carbon emissions include the use of fossil fuels like coal, oil, and natural gas for energy generation, transportation, industrial processes, and deforestation.
3. **Individual Carbon Footprint**: An individual's carbon footprint can vary widely based on their lifestyle, energy use, transportation choices, diet, and other factors. It is usually measured in terms of CO_2 per year.
4. **Corporate and Organizational Carbon Footprint**: Businesses and organizations can calculate their carbon footprints to assess the environmental impact of their operations and supply chains. This can help them identify areas where emissions can be reduced.
5. **Mitigation**: To address climate change and reduce carbon footprints, individuals, organizations, and governments can take various measures. These may include using renewable energy sources, improving energy efficiency, adopting sustainable transportation options, and promoting conservation efforts.
6. **Carbon Offsetting**: Some entities choose to offset their emissions by investing in projects that remove or reduce an equivalent amount of greenhouse gases from the atmosphere. These projects might involve reforestation, renewable energy installations, or methane capture from landfills.
7. **Global Impact**: Aggregating individual and collective carbon footprints at regional, national, and global levels is essential for understanding and addressing climate change. International agreements like the Paris Agreement aim to limit global warming by collectively reducing carbon emissions.

Reducing carbon footprints is a critical part of global efforts to mitigate climate change and limit the rise in global temperatures. Many governments, businesses, and individuals are increasingly taking steps to reduce their carbon emissions through various means, including transitioning to cleaner energy sources, improving energy efficiency, and adopting sustainable practices.

A writer only begins a book.
A reader finishes it.

Samuel Johnson

A Collection of Abstracts of our Department Libray Books

Aiswarya S.

PRINCIPLES OF PHYSICAL CHEMISTRY

Puri & Sharma

Physical Chemistry is considered as the philosophy of chemistry. Not only inorganic and organic chemistry but also the new developing branch of biochemistry and a number of other disciplines demand a considerable previous knowledge. Physical chemistry has already come to its own and types of reactions are sought to be explained on the concepts of classical and modern physical chemistry.

The book "principles of physical chemistry" by **Puri & Sharma** implies mainly with an outline of the important fundamentals of physical chemistry at an introductory level keeping in view the requirements for students of various Indian Universities. This edition would ensure an adequate and intelligent revision of the subject with previous University question papers and numerical problems. Molecular symmetry and group theory with its applications are added to the volume. This book inturn satisfies all the upcoming doubts regarding physical chemistry.

CHEMISTRY OF ORGANIC NATURAL PRODUCTS Vol.1

O.P. Agarwal

The book "Chemistry of Organic Natural Products" by **Om Prakash Agrawal** who is an Indian Conservationist and the founder member of several organizations related to cultural,heritage and conservation has been written in two volumes to fulfil the needs of students of various universities on the subject.

The present book deals mainly with the structure and synthesis of some important natural products. The book consists of general introduction and explanation about organic natural products like carbohydrates,amino acids, alkaloids,terpenoids etc.Stereochemistry of carbohydrates, alkaloids and terpenoids has been added. This books helps in understanding and improving the knowledge about orangic natural products for students of various universities.

SPECTROSCOPY

(Atomic and Molecular)

Gurdeep Chatwal & Sham Anand

Spectroscopy and its applications form a significant part of modern chemistry and physics. From its derivation the word spectroscopy appears to mean the watching of images, but the modern subjects covers the interaction of electromagnetic radiations with matter.

The book spectroscopy by Gurdeep Chatwal, M.Sc., Ph.D & Sham Anand, M.Sc., Ph.D. the professors of Department of Chemistry of Dyal Singh College University of Delhi gives an idea about various types of spectroscopy and its applications to students of different universities. The present edition gives an explanation about flourimetry, phosphorimetey,errors, accuracy and precision which enlighten the students giving more knowledge about spectroscopy.

Aiswarya S.

ORGANIC SPECTROSCOPY

Dr. Jag Mohan

Rapid developments in analytical techniques and advanced topics in organic analysis such as spectroscopic methods are being introduced and inserted various aspects of qualitative and quantitative organic analysis.

The book" organic spectroscopy "by Dr.Jag Mohan the professor department of chemistry Maharshi Dayanad university Rohtak involved the content are general introduction to various spectroscopy such as infrared spectroscopy, ultraviolet spectroscopy, nuclear magnetic resonance spectroscopy, mass spectrometry, optical rotatory dispersion and circular dichroism etc.

This book is written primarily to stimulate the interest of students of organic chemistry and pharmaceutical sciences in organic analytical chemistry.This book will be of great value to graduate and postgraduate students, teachers and researchers in the field of organic chemistry and pharmaceutical sciences. Through the book students can get the knowledge about spectroscopic techniques and its applications.

Devika S.

PRINCIPLES OF PHYSICAL CHEMISTRY

Puri & Sharma

The book 'Principles of Physical Chemistry' by **Puri and Sharma** is concerned mainly with an outline of the important fundamentals of Physical Chemistry. Physical Chemistry is the 'philosophy of chemistry'. Physical-Organic chemistry has already come to its own and type of reactions and sought to be explained on the concepts of classical and modern physical chemistry.

The book make the concepts of physical chemistry as clear as possible even to an average student. At the end of each chapter a number of review questions including questions selected from various university examination have been added. This would ensure an adequate and intelligent revision of each chapter. Through this book students can get the knowledge about Physical Chemistry and it's applications.

ADVANCED ENVIRONMENTAL CHEMISTRY

V. K. Ahluwalia

Environmental Chemistry deals with the study of reactions occurring in the environment. The book 'Advanced Environmental Chemistry' by **V. K Ahluwalia** is divided into six parts. Environmental chemistry is becoming increasingly crucial in understanding important issues that range from climate change to local pollution problems. It studies the effect of chemicals on ecosystems, animals and human health.

The book provides an in depth introduction to the chemical composition of the atmosphere and water. The author also thoroughly explores important concept such as soil pollution, radioactive pollution, and environmental toxicology. This book will be of great help to all students of chemistry at various levels.

Devika S.

ORGANIC SPECTROSCOPY

Dr. Jag Mohan.

The book" organic spectroscopy "by**Dr.Jag Mohan** the professor department of chemistry Maharshi Dayanad university Rohtak involved the content are general introduction to various spectroscopy such as infrared spectroscopy, ultraviolet spectroscopy, nuclear magnetic resonance spectroscopy, mass spectrometry, optical rotatory dispersion and circular dichroism etc.

Advanced topics in spectroscopy pertaining to infrared (IR), ultraviolet (UV), nuclear magnetic resonance (NMR), and mass spectroscopy are increasingly being introduced. Rapid development in analytical techniques such as spectroscopic methods are being introduced and inserted various aspects of qualitative and quantitative organic analysis.

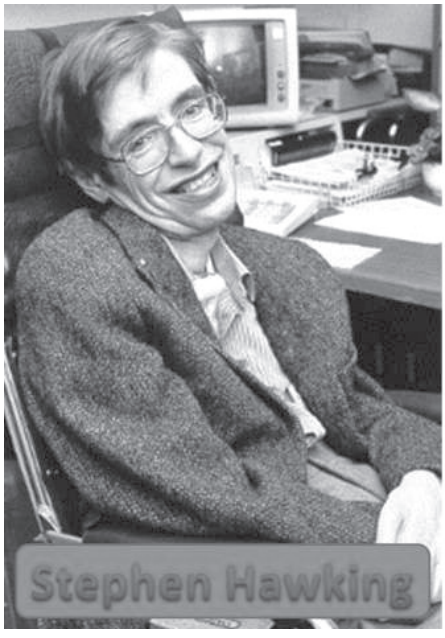
This book is written primarily to stimulate the interest of students in spectroscopy. This book will be of great value in the field of organic chemistry and pharmaceutical science. This book in turn satisfies all the upcoming doubts regarding spectroscopy and it's applications.

CHEMISTRY OF ORGANIC NATURAL PRODUCTS Vol. 1

O.P.Agarwal

The book entitled Chemistry of Organic Natural Products by **O. P Agarwal** has be written in two volumes to fulfil the needs of students of various universities on the subject. The book deals mainly with the structure and synthesis of some important natural products.

O. P Agrawal who is an Indian Conservationist and the founder member of several organizations. The book consists of general introduction and explanation about organic natural products like carbohydrates, amino acids, alkaloids,terpenoids etc. The present edition gives an explanation about some organic natural products.



"We are just an advanced breed of monkeys on a minor planet of a very average star. But we can understand the Universe. That makes us something very special."

THERMODYNAMICS FOR STUDENTS OF CHEMISTRY

Classical Statistical and Irreversible

Kuriacose & Rajaram

This book entitled "THERMODYNAMICS FOR STUDENTS OF CHEMISTRY by Drs. J. Rajaram and J.C. Kuriacose, very senior and experienced teachers from the Chemistry Department of Indian Institute of Technology. Madras has been gone through by me at the typescript stage in great detail. Many authors Indian and foreign have written text books on Thermodynamics for chemists and there is a lot of variation in their content as well as manner of presentation. Indian students and teachers have always found some lacunae or other in every one of these text books.

The subject matter on chemical thermodynamics has been nicely arranged in 12 chapters and 3 appendices in this book starting from the fundamentals and going upto the most up-dated knowledge which is highly useful both for the students at the under-graduate as well as postgraduate levels, researchers and teachers actively engaged in disseminating the knowledge of thermodynamics to chemists. One of the welcome things in this book is that a number of typical problems in each chapter have been worked out so that the reading and understanding of the subject becomes much easier. Another welcome departure I have found in the treatment is that immediately, after discussing three laws of thermodynamics and their applications, matter dealing with statistical thermodynamics and various applications of statistical mechanics to chemical problems have been introduced.

The concepts of partial molar properties and their applications, fugacity and activity and their applications have been dealt with very lucidity and in detail. In the last three chapters applications of thermodynamics to derivations of phase rule and law of mass action have been dealt with and the principles have been illustrated with a good number of problems which have been worked out. The concluding and last chapter on the application of thermodynamics to aqueous solutions of electrolytes makes fascinating reading.

In fine the subject matter and the manner of presentation thereof is excellent and the authors really deserve congratulations from the students as well as the teachers. It is hoped that this book will be widely read and prove to be highly popular. I congratulates the authors for their venture which I consider is a big success.

Since the second edition of this book was published the use of SI units has become common. We felt we can leave out the use of the C.G.S. units. In the present edition the numericals are all worked out only in SI units and the data in Tables are provided also only in SI units.

The book has been thoroughly revised taking into consideration the suggestions of all those who have been kind enough to point out improvements. Wherever additional explanation is in order we have provided them. A large number of numericals have been added to enhance clarity and facilitate understanding and application.

Scope and limitations of thermodynamics. Thermodynamics (Gk: heat power) also called energetics is essentially the study of (i) the relationship between heat and other forms of energy, (i) the interconversion of one form of energy into another and (m) the efficiency of and the work obtainable from such conversions. It is based on a few fundamental generalisations. The zeroth, first and second laws of thermodynamics are the result of a number of experiments and observations by engineers, physicists, chemists and others over many years. Yet another law, the third law of thermodynamics can be considered to be an extension of the second law. engineer may be interested in the combustion of a fuel and energy derived from this process. The chemist is interested in knowing whether a given reaction can proceed or not. The laws of thermodynamics, which are useful in obtaining these and other information have been accepted as axiomatic since nothing contradicting these laws has been found. The conclusions drawn from the quantitative expression of these laws are quite sound.

The first law, the principle of conservation of energy, is mainly con- cerned with energy changes and not with the direction of such energy changes. The second law specifies the direction of such changes. The first law enables one to calculate the heat changes accompanying chemical reactions such as combustion, maximum temperature reached in flames etc. The second law enables one to predict whether a reaction is feasible or not and if feasible, the maximum yield of a product under a variety of conditions of temperature and pressure.

MODERN APPROACH TO PHYSICAL CHEMISTRY II

Structure and Chemical Dynamics

In fact, these intentions are reduced to a reorganization of concepts and equations that is difficult to understand, and that does not advance the study of physical chemistry.

The book begins with a nominal World of Atoms and Molecules, a chapter that is not easy to assimilate because a large proportion of pages are dedicated to defining and studying the concept of configurations (which are only applied 10 chapters later). This subject could be put in an appendix, because it is limited to a set of mathematical developments of doubtful utility. Note that this solution has been applied to other concepts of equal or lesser difficulty.

This text has been designed and written especially for use in a one-year, two-course sequence in introductory physical chemistry.... The text is organized in a way that minimizes extraneous material unnecessary to understand the fundamental concepts while focusing on a strong molecular approach to the subject.

In fact, these intentions are reduced to a reorganization (or disorganization) of concepts and equations that is difficult to understand, and that does not advance the study of physical chemistry.

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a set of mathematical developments of doubtful utility. Note that this solution has been applied to other concepts of equal or lesser difficulty.

With that limited background, the book continues with the study of gases, beginning with the ideal gas law . The text mixes macroscopic and microscopic behavior, with consequent problems for students. It is only in Chapter 3 that the true physical chemistry really begins with the study of thermodynamics. But again, it is not easy to separate the fundamental concepts (which is the great problem when we teach thermodynamics!) that are hidden after a confusing set of partial derivatives and unnecessary equations. Chapter 4 describes equilibrium as an application of thermodynamic concepts. Here the description is incomplete and almost erroneous. For example, it is suggested that the plot of the phase diagram for water is a typical example, but it is in fact an exception. The authors try to explain the slope predicted by the Clapeyron equation by means of impossible pairs of ÄH/ÄV values because in their framework ÄH can never be negative . This chapter is not easy to follow without a deep knowledge of equilibrium, which it is doubtful that students have at this point of the book.

The study of solutions and chemical equilibrium are mixed. The phase diagram of water is used again to explain the lowering of the fusion point, and again it is not valid for all systems. Kinetic chemistry is described next in Chapter 6, before other equilibrium examples, and the chapter starts with a triple micro macro microscopic feature that does not serve as a description of the (critically important) processes that are time-dependent. As part of this chapter, only electrochemical reactions that are time-independent, such as the Nernst equation, are studied, without any mention of other time-dependent processes such as Butler–Volmer and Tafel mechanisms , which are quite important examples of electrochemical kinetics.

The study of the microscopic world begins with the description of the classic vibrational behavior of particle systems, before the introduction of quantum mechanics postulates. Other chapters are dedicated to the machinery of the quantum mechanics (avoiding examples such as the two-dimensional particle in the box system, which is useful to explain the degeneration of states). Of the two important systems, atoms and molecules, there are only two pages devoted to molecules in a physical chemistry book of more than 400 pages. At this point vibrational–rotational spectroscopy is explained, followed by a description of atomic and molecular systems, and electronic spectroscopy. The relationship between the macroscopic and microscopic world is treated in Chapter 11, which is titled Statistical Mechanics, but should be titled statistical thermodynamics. The authors join the terms “state variables” and “state functions” in one category. The final chapters are dedicated to radiation–matter interaction examples magnetic resonance, but no X-ray or neutron diffraction, and the chemistry of surfaces.

Throughout the text there are inconsistencies and errors that should be revised: “Since ln C is dimensionless, then entropy has units of energy per unit of temperature” when entropy, and consequently, its units, were defined by the second law before introducing the Boltzmann equation; the phase rule is defined .

It is certain that new, more pedagogical visions of physical chemistry are needed. “Instead, students should see that physical chemistry provides a coherent framework for chemical knowledge, from the molecular level to the macroscopic level”, the author writes in the preface. I agree with this statement, but Physical Chemistry: A Modern Introduction, 2nd ed. has not succeeded, and an important opportunity has been lost.

Anjlu Thomas

Abstract 1

Organic reactions and their mechanisms is the second edition by p.s kalsi . It give a strong idea about organic reactions and its mechanism from a basic level.

It include fundamental principles of organic reactions, chemical bonding in organic compounds, organic reaction and mechanism , aliphatic nucleophilic substitution , reagents in organic synthesis,electrophilic aromatic substitution ,aromatic nucleophilic substitution ,photochemistry , elimination reaction , oxidation and reduction methods as well as pericyclic reactions.

It gives the idea to write a mechanism after knowing the reaction. It is a helpful book in organic chemistry to write mechanism and their understanding.

Abstract 2

The organic nomenclature is a book by Ajaykumar G who is a member of MG University Kottayam in school of chemical science.

The book an organic nomenclature carefully compiled the latest recommendations of Iupac in naming of various organic compounds. It doesn't include naming of complexes like polycyclic , annulenes ,crown ether and coordination compounds. But it has nomenclature of polyfunctional , aromatic and alicyclic , aromatic compounds with deep understanding. The end of the book contains additional review and practice. The entire subject is broken down into different chapters and make it crystal clear to every student. It gives the up to date comprehensive and lucid text that uses the most effective techniques of presentation and review.

Abstract 3

Reaction mechanism in organic chemistry is a collaboration done by S.M Mukherji and S P Singh.

It include organic reaction ,reagents ,reaction intermediates ,elimination reaction, substitution reaction,reduction and oxidation reactions The book is a third edition which give broad idea about reactions the easiest way to learn organic chemistry is to by solving problems and it is included at the end of the each chapters. S.M Mukherji has about 100 research papers to his credit and S. P Singh obtained his PhD from Lucknow University in1964.

This book gave ideas about the basis of organic reactions.The book is a bridge between the elementary treatment and masterly treaties.

Abstract 4

Spectroscopy (atomic and molecular)written by the collaboration of Gurdeep chatwal and Sham Anand tells about different types of spectroscopy.In the introduction it tells about electromagnetic spectrum and give a brief and open you into the world of spectroscopy.

The book tells about microwave spectroscopy,infrared spectroscopy,ramen spectroscopy,visible spectroscopy, ultraviolet spectroscopy,nuclear spectroscopy,X ray spectroscopy,Electronic spectroscopy etc..it defines various terms about spectroscopy.

It give a great idea about spectroscopy,8ts techniques and different kinds of spectroscopy it's need in human life and application.

Abstract 5

Textbook of cosmetics is a book by Rajesh Kumar nema ,Kamal Singh Rathor ,Balkrishan Dubey .

As Alexander pope" beauty without virtue is like a rose without scent ".The book give information about cosmetic formulation and uses of cosmetics. The book contain ideas about cosmetic products of skin, hair, eye,lip etc and their biology .The cosmetics science field is rapidly changing field and facing number of challenges .The book contain vast idea about pharmacological doses .The book give idea about herbal cosmetic because it a part of our daily life .

Prof.Nema is an eminent professor of pharmacology chemistry as well as PhD holder.Kamal Singh Rathor as a research study about ocular drug delivary system cosmetics etc..Balakrishana Dubey area of interest are novel drug delivery system herbal cosmetics etc…

Jesvin P. Boban

THERMODYNAMICS FOR STUDENTS OF CHEMISTRY

Drs. J. Rajaram & J.C. Kuriakose

The book 'Thermodynamics for Students of Chemistry' by **Dr. J Rajaram and Dr. J. C Kuriakose** is concerned mainly with an outline of the important fundamentals of Thermodynamics. The subject matter on chemical thermodynamics has been nicely arranged in 12 chapters and 3 appendices in this book starting from the fundamentals and going up to the most up-dated knowledge which is highly useful for the students.

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Environmental Chemistry deals with the study of reactions occurring in the environment.The author also thoroughly explores important concept such as soil pollution, radioactive pollution, and environmental toxicology. The book provides an in depth introduction to the chemical composition of the atmosphere and water.

Jesvin P. Boban

QUANTUM CHEMISTRY

Donald A. McQuarrie

The book Quantum Chemistry by **Donald A McQuarrie** is a part of Physical Chemistry. The first chapter is a discussion of the historical development of quantum mechanics. This text book introduces some elementary differential equation and the method of separation of variables. The concepts of standing waves,traveling waves, normal modes and the superposition of normal modes are developed. The book concludes with a fairly detailed discussion of the Born-Oppenheimer Approximation, time-dependent perturbation theory and the derivation of selection rules.

One of the pedogogical features of the text is the inclusion of many worked examples in each chapters. Many people have contributed to the writing of this book.

POLYMER CHEMISTRY

G. S. Misra

A polymer may be defined as a macromolecule formed by the chemical combination of identical units called monomers. The process by which polymers are formed is known as polymerisation. Polymer Chemistry is now taught as an independent subject in a number of Indian Universities and Engineering institutes.The text book discuss about the morphology and molecular weight determinations of polymers.

A special feature of the book is the incorporation of questions in the text followed by answers at the end of the chapters. The book introductory Polymer Chemistry by **G. S. Misra** provides an in depth introduction to the composition of polymer and it's applications.

Parvathy V. A.

QUANTUM CHEMISTRY

R. K. Prasad

Today quantum mechanics is accepted as a legitimate tool for the study of almost all chemical phenomena as well as molecular and atomic properties. It is a branch of chemistry that applies the principles and equations of quantum mechanics to the study of molecules.

This is an excellent book for undergraduate and postgraduate chemistry students. This book contains the basics of quantum mechanics. The material present in the book is divided into four parts consisting of thirteen chapters.

Part one begin with developments leading to formulation of Quantum theory. This then follows quantum mechanical laws. In part two applicability of principals to simple systems are described. Part three includes approximation methods of finding wave functions and energies. Part four of the book comprising of three chapters deals mainly with theories of chemical bond.

ORGANIC SPECTROSCOPY

Dr. Jag Mohan

Organic Spectroscopy is used to determine the structure and functional groups in organic compounds. The book organic spectroscopy by Dr Jag Mohan has been organised in six chapters. The book begins with the general introduction to electromagnetic radiation and molecular spectroscopy. Other topics involved are infrared spectroscopy, ultraviolet spectroscopy, nuclear magnetic resonance spectroscopy and mass spectroscopy. It gives a detailed account of optical rotatory dispersion and circular dichroism. Through the book the students will get various knowledge about spetroscopic techniques and its applications.

THEORETICAL CHEMISTRY

Y. R. Sharma

The book is written in simple language to make it more understanding to students. Many new concepts have been used in this book to make the subject matter upto date. The book is divided into two papers. The first paper includes detailed explanation about atomic structure and chemical bonding.It includes various topics like Bohr's theory, quantum numbers, orbitals,different types of bonds like ionic bond,covalent bond and metallic bonding.

In the second paper different oraganic reaction mechanisms are described.Stereochemistry of carbon compounds are also discussed.The last portion of the book deals with nuclear chemistry which consists of the concept of radioactivity.

PRINCIPLES OF PHYSICAL CHEMISTRY

Puri & Sharma

Physical chemistry is the branch of chemistry devoted to the study of the behavior of matter at an atomic or molecular level. It also involves the study of the properties of substances at different scales, from the macroscopic scale which includes particles that are visible to the naked eye, to the subatomic scale involving extremely small subatomic particles such as electrons.

The present volume is concerned mainly with an outline of the important fundamentals of physical chemistry at an introductory level. The subjects are presented in a systematic manner and in a simple style to make it easy for the students to understand. Important topics like radioactivity, chemical kinetics, thermodynamics, spectroscopy, wave mechanics are described in it. Also molecular spectroscopy and group theory are added in this edition.Applications of group theory have been discussed at appropriate level.

Abin Joseph

SPECTROSCOPY

(Atomic and Molecular)

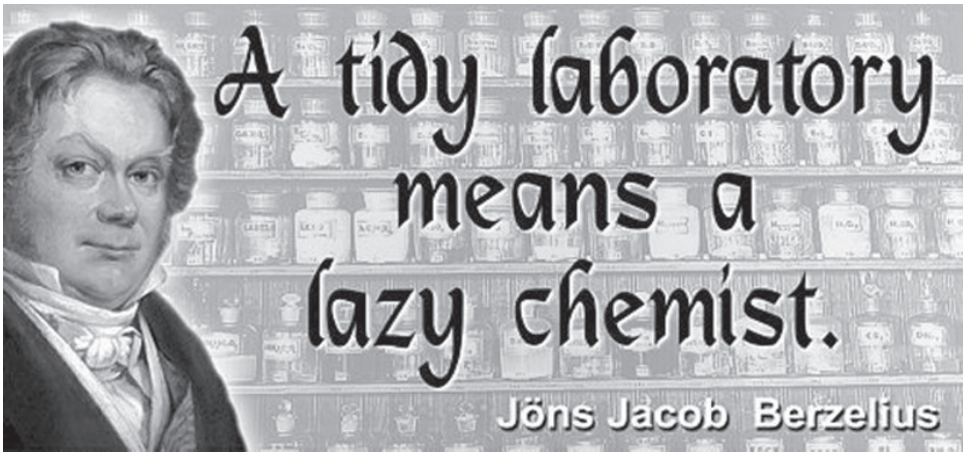
Abstract :"Spectroscopy: Atomic and Molecular Analysis" is a comprehensive book that explores the principles and applications of spectroscopy in the field of atomic and molecular analysis. Spectroscopy plays a vital role in understanding the properties, behaviour, and interactions of atoms and molecules, and it has become an indispensable tool in various scientific disciplines.

The book begins by providing a solid foundation in the fundamental concepts of spectroscopy, including the electromagnetic spectrum, energy levels, and the interaction of light with matter. It covers various spectroscopic techniques, including absorption spectroscopy, emission spectroscopy, and scattering techniques, along with their theoretical underpinnings and experimental methodologies.

The book emphasises the application of spectroscopy in the analysis of atomic and molecular systems. It explores how spectroscopic techniques can be used to determine the composition, structure, and dynamics of atoms and molecules. Topics covered include electronic spectroscopy, vibrational and rotational spectroscopy, magnetic resonance spectroscopy, and laser spectroscopy.

The book also delves into advanced topics such as time-resolved spectroscopy, nonlinear spectroscopy, and spectroscopic imaging techniques. Throughout the book, practical examples and case studies are provided to illustrate the real-world applications of spectroscopy in areas such as chemistry, physics, materials science, biochemistry, and environmental science. The book also discusses the latest advancements in spectroscopic instrumentation and data analysis techniques, ensuring that readers are up to date with the current state of the field.

"Spectroscopy: Atomic and Molecular Analysis" serves as a valuable resource for students, researchers, and professionals in the fields of physical and analytical chemistry, physics, and related disciplines. It equips readers with the knowledge and skills needed to understand and utilise spectroscopic techniques for atomic and molecular analysis, fostering a deeper appreciation for the role of spectroscopy in advancing scientific understanding and technological innovation.



INTRODUCTION TO POLYMER - CHEMISTRY

G. S. Mishra

The Book Introduction To Polymer Chemistry by G.S Mishra Former Professor & Head Department of Chemistry, Universities of Jabalpur and Jammu and Ex-Director, Indian Lac Research Institute Namkum, Ranchi

The first four chapters use a synthetic approach, with some elementary physical chemistry necessary for the understanding of the mechanisms and theoretical principles involved. This is followed by an account of morphology and molecular weight determinations of polymers. The following five chapters are devoted to the technological aspects of elastomers, fiber forming materials and plastics. A description of the characterization of polymers, especially by spectroscopy and thermal analysis, is followed by a discussion of important polymer reactions and polymer reactants. The last two chapters are concerned with solubility and flow properties of polymers. Each chapter contains questions with answers and ten specimen laboratory exercises have also been provided.

Text Would, Therefore, Be Useful To Those Students Who Wish To Be Initiated In The Subject At The Grass-Root Level. For This End In View, Special Feature Of The Book Is The Introduction Of Elementary Questions In The Text Based On The Previously Discussed Matter And Furnishing Their Answers At The End Of The Chapter.In Order To Add To The Usefulness Of The Book,

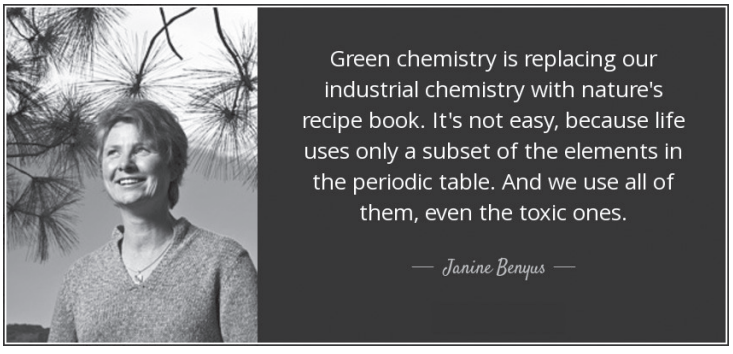
PRINCIPLES OF PHYSICAL CHEMISTRY

Puri, Sharma & Pathania

Physical chemistry is the study of macroscopic and microscopic phenomena in chemical systems in terms of the principles, practices, and concepts of physics such as motion, energy, force, time, thermodynamics, quantum chemistry, statistical mechanics, analytical dynamics and chemical equilibria

The Book ‘Principles Of Physical Chemistry´ by Puri Sharma Pathania Involves the Contents of Spectroscopy,Thermodynamics,Quantum Mechanics,Chemical Kienetics,States Of Matter(Solid, Liquid, Gas),Chemical Equilibria,Ionic Equilibria,Phase equillibria, Electro Chemistry, Photochemistry, Solution….

This Book Cover almost every area of Physical Chemistry.This book, with a large number of worked examples and problems that give ample insight into the topic concerned,



Aswin Sajan

ORGANIC SPECTROSCOPY

Dr. Jag Mohan

The speedy development of spectroscopic strategies over the last decades, each in Instrumentation and interpretation, has revolutionzed the technique to structure dedication problems.

The book Organic Spectroscopy by Dr.Jag Mohan the professor and head of the department of chemistry Maharshi Dayanad college Rohtak India. The book written primarily to stimulate the interest of students in spectroscopy and make them aware of the latest developments in this field,book begins with a general introduction to electromagnetic radiation and molecular spectroscopy. In addition to the usual topics on IR, UV, NMR and Mass spectrometry, it includes substantial material on the currently useful techniques such as FT-IR, FT-NMR 13C-NMR, 2D-NMR, GC/MS, FAB/MS, Tendem and Negative Ion Mass Spectrometry for students engaged in advanced studies.

This book also included are a number of sample and study problems at the end of each chapter to illustrate the approach to problem solving that involve translations of sets of spectra into chemical structures.

THERMODYAMICS FOR STUDENTS OF CHEMISTRY

Drs. J. Rajaram & J.C. Kuriakose

The book 'Thermodynamics for Students of Chemistry' by Dr. J. Rajaram and Dr. J. C. Kuriakose is concerned mainly with an outline of the important fundamentals of Thermodynamics.

The book aimed at providing undergraduate and postgraduate students with an understanding of this subject, the book brings out the thermodynamic interrelationships by explaining its essential elements. It begins with the fundamentals and progresses to advanced concepts to enable students to appreciate the application of thermodynamics in different areas of chemistry. Chemical Thermodynamics is written in a simple and lucid language, the discussion and explanations being interspersed with appropriate worked-out examples. Every chapter is accompanied by adequate end-of-chapter exercises.

Rupa K. Vinod

OPTICS AND SPECTROSCOPY

R. Murugeshan

Optics and Spectroscopy written by R. Murugeshan is a book that deals with the concepts of physics like optics, waves, and lasers. This book deals with all the concepts in a very simple manner. Fringes, diffraction, refraction, laser applications, superposition of waves, standing waves, etc., and a lot of concepts are given in the book. This is a nice book. This book was published by S Chand and Company LTD.

Rupa K. Vinod

CONCISE COORDINATION CHEMISTRY

R. Gopalan & V. Ramalingam

Concise coordination chemistry is a book of inorganic chemistry written by R. Gopalan and V. Ramalingam. It deals with the principles of coordination chemistry that have been presented simply. It renders an easy understanding of the subject. The introduction, nomenclature, theories, and spectral and magnetic characteristics given in the book are easy to comprehend. This book was published by Vikas publishing house PVT LTD. This book consists of line drawings, solved problems and a glossary that helps us in a clear understanding of the concept. This book is so simple and comprehensive.

PRINCIPLES OF PHYSICAL CHEMISTRY

Puri, Sharma & Pathania

Principles of Physical Chemistry written by B.R Puri, L.R Sharma, and Madan S. Pathania is a very useful book for students studying physical chemistry. All the topics have been dealt with in an easily understandable manner. Along with decoding the concepts, the inclusion of solved examples can equip a student to have elucidation about the concepts the book has dealt with. This book is so admiring as it helps us to go in touch with physical chemistry aspects without any fear. This book is extraordinarily good.

A NEW COURSE IN CHEMISTRY- THEORETICAL CHEMISTRY

Y.R. Sharma

A new course in chemistry – theoretical chemistry, First edition, written by Y. R. Sharma brings out the contents in a simplified way. Numerical problems - solved and unsolved given in the book and diagrams help readers to get a clear picture of what they have learned in that book. This book deals with aromaticity, stereochemistry, nuclear chemistry, atomic structure, chemical bonding and organic reaction mechanisms in simple language. Important generalizations and principles are given in bold letters. This book was published by Kalyani Publishers. This is a good book.

Rugma K. Vinod

CONCISE COORDINATION CHEMISTRY

Dr. R Gopalan, retired Head of the department of chemistry at Madras Christian College, Chennai, and V. Ramalingam, Senior faculty of chemistry, MCC are illustrating Coordination chemistry in concise terms as the title of the book suggests. This book is student-friendly. The explanation was very simple and easily understood. Since Coordination chemistry is an integral element of chemistry and opens new scope, this book helps the reader to figure out more about Coordination complexes. There is a clear drawing for ease of comprehension. This is a remarkably good book.

A TEXT BOOK OF ORGANIC CHEMISTRY

Arun Bhal, M.S.(Boston)

Ph.D (Edinburgh), Chem FRSC (London), FAIC(USA) Professor in Organic Chemistry, Panjab University, Chandigarh and B. S. BAHL, Formerly Principal and Head of the Postgraduate Department of Chemistry, DAV College, Jalandhar is the two personalities who helped a lot of students having a chemistry background, especially organic chemistry through their great work "A TEXTBOOK OF ORGANIC CHEMISTRY". It has been a National Best- Seller for more than 50 years. This book has a unique combination of three Essentials: Simplicity, Brevity and Accuracy. This book as the name suggests deals with organic chemistry starting from a brief description, its purification, composition, structure, naming, isomerism, spectroscopy and handling of different organic compounds accordingly. This book is blessed with lots of problems like Road-Map problems, MCQ, and Multistep synthesis are entirely new ways of thinking, that will ensure success in the examination. This is user-friendly as the language is simple, explanations are clear and the presentation very systematic. The concept that usually confuses the learners are explained in a step-by-step manner. It is as helpful as a tutor. Five star book!!

PRINCIPLES OF PHYSICAL CHEMISTRY

B.R.Puri
M.Sc. PhD, F.R.I.C., F.N.A.

Professor of Physical Chemistry, Punjab University, CHANDIGARH, L.R.SHARMA, M.Sc., Ph D., F.R.I.C.(London) Formerly Professor of Physical Chemistry, Department of Chemical Engineering & Technology, Punjab University, CHANDIGARH and MADAN S. PATHANIA, M.Sc., PhD(West Virginia University, U.S.A.) Professor of Physical Chemistry, Punjab University, CHANDIGARH are those who take the helm of this book which is supportive for many students. Every aspect of physical chemistry is dealt with in the book very pleasingly and agreeably. In order to make the concepts of physical chemistry as clear as possible even to an average student, every effort has been made to present the subject matter systematically and in a lucid style using simple and clear language. A good deal of space has been devoted to solved numerical problems which form the touchstone for real understanding of the subject. This is absolutely a "magnum opus".

INTRODUCTORY: COLLOID, SURFACE AND POLYMER CHEMISTRY

Dr. J. N. Gurtu

Dr. J. N. Gurtu (M.Sc. PhD, Reader, Department of Chemistry, Meerut College, MEERUT) and Er. Amir Gurtu those who portray the volume. As the title reveals it is about colloids, surface chemistry and polymer in a detailed and thorough manner. Those who specialise in these areas can approach the book confidentially. For Post Graduate students, aspirants of Civil Services and Net examination this book is beneficial. Each module is ended with exercises. A very supportive book.

PHYSICAL CHEMISTRY

R.C. Mukherjee

In this book we studyunderlying principle that govern the properties and behaviors on chemical system. This book also useful to preparing for comprehensive examination in chemistry is one of the subject. The text is divided into two volumes. First volume deals with Properties of bulk matter from the view point of thermodynamics. Equilibrium contains both physical and mechanical changes. Second volume deals with Structure of atom and molecule, and chemical dynamics.

PHYSICAL CHEMISTRY

D.K. Chakrabarty

This book is intended for Bsc chemistry as main subject. This can also followed by Indian institution for the first chemistry course. It become nessecessary to discard some material from existing text toaccommodate new information. The book discuss the phenomenon builds model and bring out various qualitative relation inform of mathematical equations.

COORDINATION CHEMISTRY

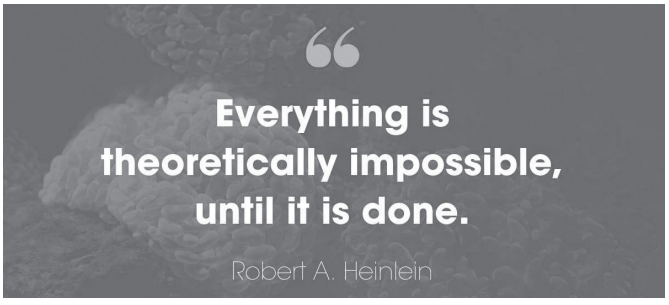
R. Gopalan

This book was published for study coordination chemistry. Coordination chemistry important section of chemistry. The scope of further development of such applications is extensive. The principal of coordination chemistry given in the seventeenth chapter.The unique features of the book is inclusion of a chapter on several spectral problems of coordination chemistry. The glossaryin the end of the chapter provided the students a bird's eye by means of clear and simple definition of term used in the chapters.

OPTICS AND SPECTROSCOPY

R. Murugeshan

This book was published for students of physics of various Indian universities. SI unit are throughout the book. A large number of questions and problems are given in the chapter. Student should attend to tackle them properly for better insight and understanding the subject. All available standard books on subjects have been consulted for the preparation of this book.



COLLOID SURFACE AND POLYMER CHEMISTRY

The book colloid surface & polymer chemistry introduced by Gurtu & Gurtu. The book is being presented again after a long time in the present format & has been thoroughly revised and rewritten.

The book is primarily meant for students especially interested in detailed study of the topic. They have tried to incorporate all the modern concepts of the chapters dealt with in this book. The book will prove to be pf immense important for students appearing in the post graduated civil services and NET examination. The book colloid surface and polymer chemistry included the contents are colloidal chemistry, surface chemistry, donnan membrane equilibrium, polymer chemistry etc.

ORGANIC SPECTROSCOPY

Principle & Application

Dr. Jag Mohan

The rapid development of spectroscopic techniques during the last two decades, both in Instrumentation and interpretation, has revolutionzed the approach to structure determination problems.

The book organic spectroscopy by Dr.Jag Mohan the professor and head of the department of chemistry Maharshi Dayanad university Rohtak -124001,India. In this book involved the content are general introduction to electromagnetic spectrum and molecular spectroscopy, infrared spectroscopy, ultraviolet spectroscopy, nuclear magnetic resonance spectroscopy, mass spectrometry, optical rotatory dispersion and circular dichroism etc.

This book, with a large number of worked examples and problems that give ample insight into the topic concerned, will be of great value to the graduate and postgraduate students, teachers and researches, particularly organic chemistry .

THEORETICAL CHEMISTRY

The book theoretical chemistry by Y. R Sharma. Presenting the book “A new course in chemistry” for first year chemistry students of MG university. The book helped to an attempt has been made to bring out a simplified test book.

The main features of the test book are,

1. The test book is written in a simple language and lucid style.
2. A large number of numerical problems solved as well as unsolved have been included in the chapter on nuclear chemistry
3. New concept have been used to make the subject matter upto date
4. special care has been used to be make the subject matter upto date
5. New diagrams are self explanatory and easily reproducible
6. Question set in MG university upto 2003 have been added at appropriate places.

In this book including the syllabus are atomic bonding, chemical bonding, organic reaction mechanism, aromaticity, stereochemistry of carbon compounds, nuclear chemistry etc.

SOLAR MISSION

"Solar mission" can refer to different space missions and projects aimed at studying the Sun or harnessing solar energy. Here are a few notable examples:

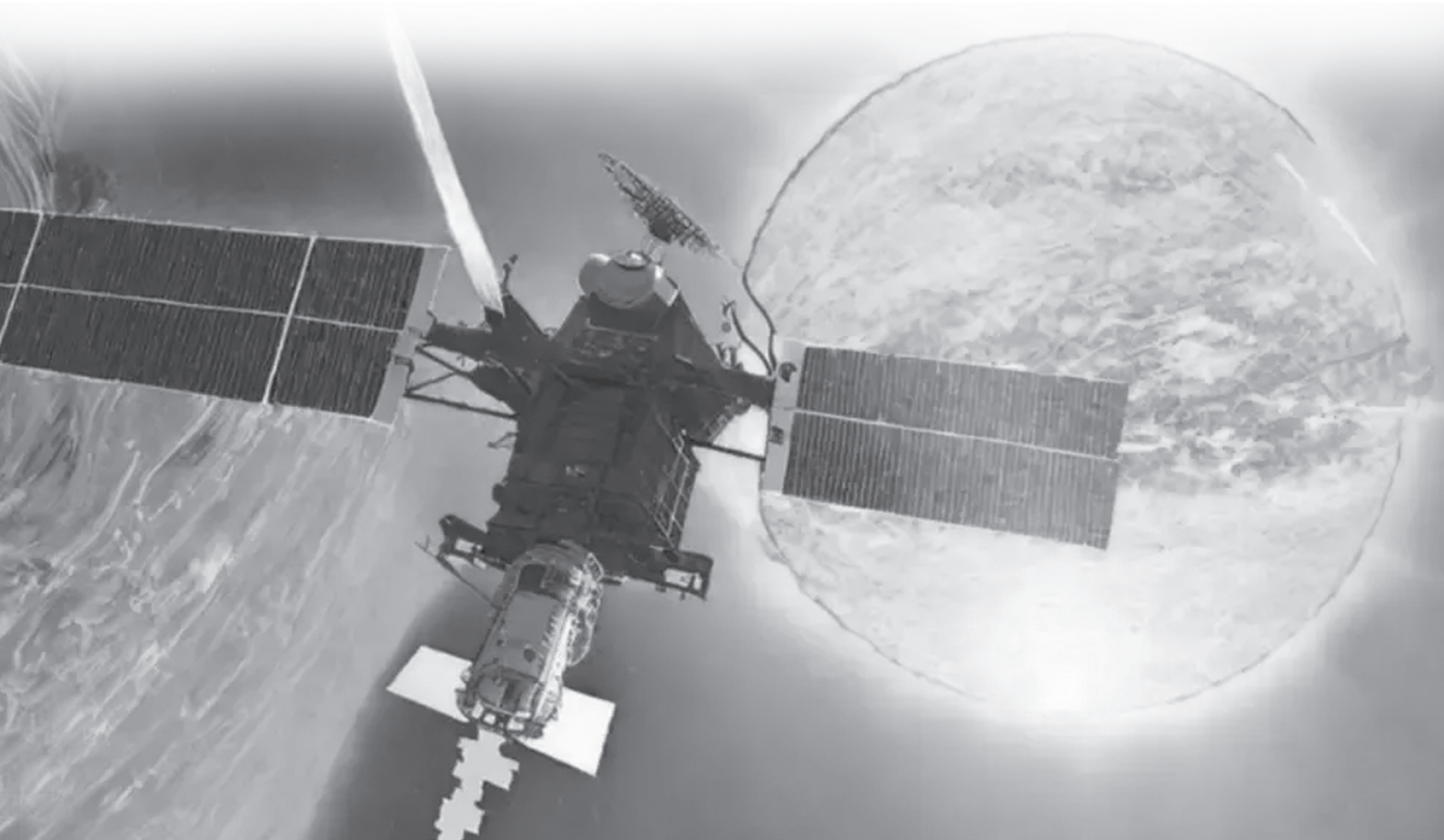
1. **Solar Orbiter (ESA/NASA)**: The Solar Orbiter is a joint mission between the European Space Agency (ESA) and NASA. Launched in February 2020, its primary goal is to study the Sun and its outer atmosphere, known as the solar corona. It's equipped with a suite of scientific instruments to observe the Sun up close and gather data about its magnetic fields, solar wind, and other phenomena.
2. **Parker Solar Probe (NASA)**: Launched in August 2018, the Parker Solar Probe is a NASA mission designed to study the outermost part of the Sun's atmosphere, called the corona. It's been providing valuable insights into the solar wind, magnetic fields, and other aspects of solar activity.
3. **Solar Energy Missions**: In the context of harnessing solar energy on Earth, "solar missions" can refer to government initiatives, research projects, or commercial ventures aimed at developing and promoting solar energy technologies. These missions often include the installation of solar panels, research into more efficient solar cells, and efforts to increase the use of solar power for electricity generation.
4. **International Solar Alliance (ISA)**: The International Solar Alliance is an alliance of over 120 countries, initiated by India and France, with the goal of promoting solar energy and reducing the use of fossil fuels. Its mission is to facilitate collaboration on solar projects and the adoption of solar technologies.
5. **Artemis Solar Power Missions**: The Artemis program, led by NASA, aims to return humans to the Moon and eventually establish a sustainable human presence there. Part of this mission involves developing solar power systems on the lunar surface to provide electricity for future lunar habitats and scientific experiments.
6. **Aditya L1**-Indian Solar Mission Aditya L1 shall be the first space based Indianmission to study the Sun. Thes pace crafts hall be placed in a halo orbit around the Lagrangian point 1 (L1) of the Sun-Earth system a tadistance of about 1.5 million km from the Earth. As a tellite placed in the halo orbit around the L1 poin thas the major advantage of continuously viewing the Sun without any occultation/ eclipses.

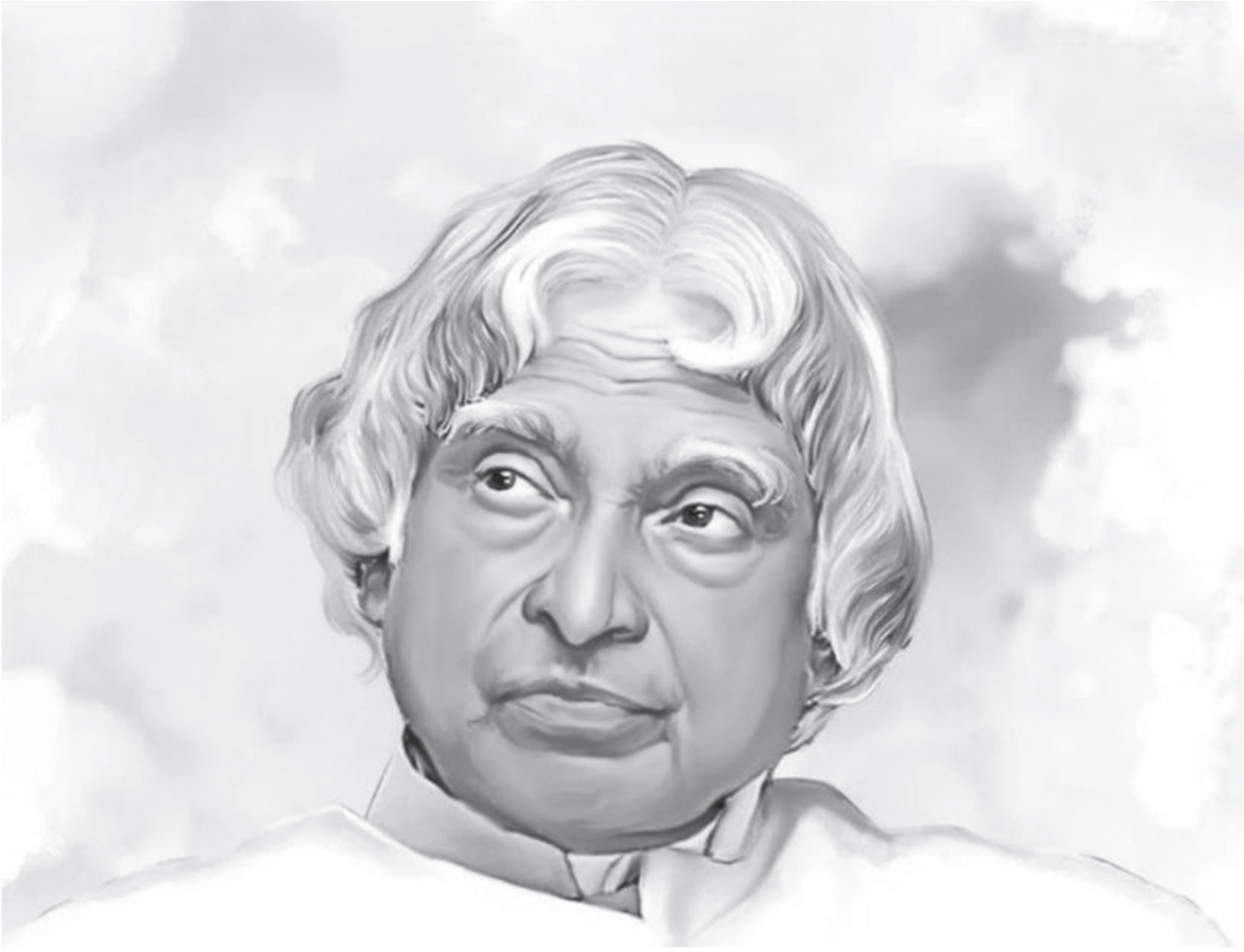
As the space craft will bed irectly placed in between the Sun and the earth, It will also provide crucial information in understanding the impact of solar activitie son near Earth space weather.

Major science objectives: Understanding the Coronal Heating and Solar Wind Acceleration. Understanding initiation of Coronal Mass Ejection (CME), flares and nearearth space weather. Coupling and Dynamics of the Solar Atmosphere. Solar wind distribution and temperature anisotropy.

Uniqueness First time spatially resolved solar disk in the NUV band. CME dynamics close to the disk (1.05 Rsun) and thereby providing information in the acceleration regime of CME which is not observed consistently. On-board intelligence to detect CMEs and Flares for optimized observations and data volume.

The Aditya-L1 is the first space-based solar observatory of the Indian Space Research Organization (ISRO). The spacecraft will carry seven payloads providing uninterrupted observations of the Sun from the first Lagrangian point. Aditya-L1 comprises four remote sensing instruments, a coronagraph observing in visible and infrared, a full disk imager in Near Ultra-Violet (NUV), and two full-sun integrated spectrometers in soft X-ray and hard X-ray. In addition, there are three instruments for in-situ measurements, including a magnetometer, to study the magnetic field variations during energetic events. Aditya-L1 is truly a mission for multi-messenger solar astronomy from space that will provide comprehensive observations of the Sun across the electromagnetic spectrum and in-situ measurements in a broad range of energy, including magnetic field measurements at L1.





Science is a beautiful gift to
humanity; we should not distort it.

Dr. A. P. J. Abdul Kalam