Antheia

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World Biofuel Day

WORLD BIOFUEL DAY is observed on 10th August to raise awareness on the importance of the non-fossil fuels as a substitute for conventional fossil fuels. This day is observed in the honour of Sir Rudolf Diesel. He invented the diesel engine and was the first to predict the possibilty of vegetable oil replacing fossil fuels.
Biofuel's programme is also in synergy with Government of India's initiative of ATMANIRBHAR BHARAT. Hence, is also celebrated by the Indian Ministry of petroleum and Natural gas since 2015.

Foundation Stone Laying Ceremony for Bargarh 2G Bio-Ethanol Refinery Project

"What's inside

Biofuel and its types

BIOFUEL is a type of fuel whose energy is derived from biological carbon fixation. It is derived from biomass i.e. plant or algae material or animal waste. Biofuel is considered to be a source of renewable energy. It is cost-effective and alternative to petroleum and other fossil fuels. Biofuels have been used to replace carbon based fossil fuels due to the effect of pollution on the atmosphere and global warming.

1.WOOD-This is the most basic form of fuel that is derived from organic matter. It is used in the form of sawdust , firewood , chips , charcoal , and pellets. Hence , wood is one of the most common forms of fuel used in all corners of the globe.

2.BIOGAS-This is the gaseous form of biofuels. It is mainly composed of methane gas. Most agricultural firms use biogas and the fuel is currently packaged in gas cylinders for household use.

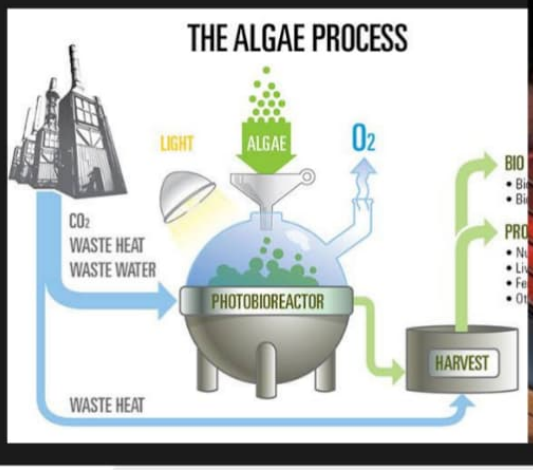
3.BIODIESEL-This biofuel is liquid in nature. It mainly focuses on plants with high energy content in order to attain pure biodiesel. It is made through combination of fat and oil from animals and plants respectively.

4.ETHANOL-This biofuel is also liquid in nature and is produced from biomass of both plants and animals but mostly plants. It is made through the process of fermentation of high carbon content biomass mainly sugars and cellulose. Sugarcane is among the plants preferred. It is used in vehicles as fuel.

5.METHANOL-This is also an alcohol like ethanol. It is mainly used as clean fuel to power vehicle engines, especially racing cars.

6.BUTANOL-This is liquid biofuel that has higher energy per unit content than ethanol and methanol. It's chemical structure and efficiency is similar to gasoline but the problem is that it is very difficult to produce.
The common organic material used to create biofuel includes - animalfat , sugarcane , rice , beet , wood, chippings , canola oil , corn oil , palm oil. The most important non-edible oil plants - jatropha , karanja , tobacco ,mahua , neem , rubber , sea mango ,castor , cotton. Of these feedstocks , jatropha , moringa and castor oils are the most often used in biodiesel production.

Past, Present and the Future



Non - availability is not an issue with them. They burn more efficiently than fossil fuels. Biofuels are not new to the world they are being used since ancient times. Wood was discovered as first biofuel & slow pyrolysis of wood turns it into charcoal which is marked as first man made biofuel. Today it is best known as barbeque briquette.

Straight Vegetable Oil (SVO) as fuel for pottery lamps is natural liquid biofuel used for first time in history. Ethanol being the first man made liquid biofuel. Biogas , flammable gas coming off from decomposing biomass matter was discovered earlier but it's utility as fuel was harnessed pretty late in 20th century due to technical advancement.

Biofuel from animals was first extracted from whale in the form of oil , which is popularly known as whale oil in London, Paris , other great cities of Europe used to light up the streets from whale oil . Rudolph diesel designed an engine to run on SVO- peanut oil, which later became popular by the name biodiesel. Henry ford's model T car was also designed to run on hemp derived Biofuel.

It was in 1940s that algae was described to be used as biofuel, now many species of algae are known to produce biodiesel, biobutanol , biogasoline, ethanol & green diesel. Today biofuel yields are higher per acre while input costs are comparatively low in environmentally scarce tropical areas , where it's production is naturally more profitable. Future roles of biofuel depends on profitability & new technologies. In micro algae areas the forefront of ongoing global energy advancements due to their ecological and economical factors.

Biofuels have their ecological and economical benefits which made them stand out against conventional fossil fuel to be more profitable & environment friendly. Some of these benefits includes - lessens the dependence on fossil fuel , enable more diverse geographic supply of fuel which restricted to oil drills in case of fossil fuels. Major role in reducing global greenhouse gases, employment generation in agricultural area , industries involved in generating biofuel & in research & development further leading to Rural development. Better waste utilization, reduction in local pollution in cropland ecosystem. Biofuel are non - toxic & biodegradable.

BIOFUEL A MULTIDISCIPLINARY SCIENCE

Design and analysis of biodiesel production from algae grown through carbon sequestration.

By Grace et.al. 2009

They used the integrated system for the production of biodiesel from algal oil produced via the sequestration of carbon dioxide from the flue gas of a power plant. The proposed system provides an efficient way to the reduction in greenhouse gas emissions and yields algae as a potential alternative to edible oils currently used for biodiesel production. Algae can be processed into algal oil by various pathways. The algal oil produced can then be used to produce biodiesel.

Biodiesel from microbial oil .

By Luis et.al. 2012

Oleaginous microorganisms can be an alternative to plant oils and can be best used as biodiesel because they can accumulate high levels of lipids and do not require arable land. Particularly, heterotrophic microorganisms(bacteria, fungi and yeasts) can be grown on waste or low-grade biomass as a carbon and energy source. After biomass production, biodiesel can be produced by transformation of extracted microbial lipids or direct transformation of dry microbial biomass.

Fractionation of fatty acid methyl esters via urea inclusion and its application to improve the low-temperature performance of biodiesel.

By Junli Liu et.al. 2022

Biodiesel is viewed as the alternative to petroleum diesel, but its poor low-temperature performance constrains its utilization. Cloud point (CP), the onset temperature of thermal crystallization, appropriately shows the low-temperature performance. The effective way to reduce CP is to remove saturated fatty acid, methyl esters (FAMEs). Compared to current methods, this work describes an extraordinary approach to fractionating FAMEs by forming solid Urea Inclusion Compounds (UICs). Urea Inclusion Fractionation reduces the CPs by removing high melting-point linear saturated FAME components.

A novel and robust recombinant *Pichia pastoris* yeast whole cell biocatalyst with intracellular overexpression of a *Thermomyces lanuginosus* lipase: Preparation, characterization and application in biodiesel production.

By Jinyong Yan , Xianliang Zheng, Shengying Li, 2014

A novel and robust recombinant *Pichia pastoris* yeast whole cell catalyst (WCC) with functional intracellular expression of *Thermomyces lanuginosus* lipase (Tll) was constructed and characterized for biodiesel production from waste cooking oils. This permeabilized WCC was able to convert waste cooking oils to biodiesel with 82% yield within 84 hours at 6% dosage whole cells.

WORLD WATER WEEK

World Water Week is the meeting place for everyone who wants to understand how water can help us address the world's greatest challenges. Started in 1991, this event is now the leading annual conference on global water issues. The week attracts a diverse mix of participants from many professional backgrounds and every corner of the world.

Together they develop solutions to the planet's greatest water-related challenges, such as poverty, the climate crisis, and biodiversity loss. World Water Week is held during last week of August every year and was initially part of a public water festival in the Swedish capital, Stockholm.

SIWI is the organizer of World Water Week and curates all the content, but most of the sessions are co-created by leading international organizations. The Week attracts an unusually diverse group of people from more than 130 countries. Here you meet scientists, UN experts, activists, young entrepreneurs, top politicians, students, business representatives, and many others. What they have in common is a strong commitment to addressing major challenges such as the climate crisis, poverty, and biodiversity loss.

Each week has its own thematic scope and the programme is filled with hundreds of sessions covering a broad range of topics. At World Water Week you can explore water aspects of challenges like the climate crisis, food security, energy and many other topics.

World Water Week is a truly global event that brings the international community together to work towards a more water-wise world. In 2021, it was the first time World Water Week happened totally online.

"We are thrilled to finally be able to welcome everyone back to Stockholm in 2022 while still maintaining our online presence. Our new format draws on all our learnings of being online for the past two years. We continue the strive to reach more audiences, wanting to involve everyone in taking care of humankind's most precious resource: water", says Henrika Thomasson, Director World Water Week.

Many of the world's most urgent water challenges are invisible to the naked eye: the availability and state of our groundwater, the global streams of so-called virtual water, and the impact water has on people, nature, and economies. World Water Week 2022 is built on a global need to not only see, but to understand, and – more importantly – value water.

This overarching theme is captured in three main perspectives:

- The value of water for people and development.
- The value of water for nature and climate change.
- The financial and economic value of water.

World Water Week is where academia meets decision-makers, where experience meets young perspectives, where national institutions meet non-governmental organizations. It is where knowledge is shared and solutions take shape, during seminars, workshops, case studies, masterclasses, expos, and networking. Only by collaborative efforts we can address the water challenges and create lasting change.

DID YOU KNOW?

- Biofuel is Green, renewable and sustainable energy.
- Biodiesel can serve as a cost effective alternative to fossil based diesel.
- Require high investment and land resource.
- Scalable and flexible energy source.
- Biodiesel is not toxic or flammable and is biodegradable.
- Regular use of biofuels not only protect the environment by reducing the emissions from vehicles but also improve engine life of the vehicles.
- Biodiesel has the highest energy balance of any fuel.
- Most gasoline and diesel fuels in North America and Europe are blended with biofuel.
- On average, 20 to 22 billion gallons of ethanol fuel is produced every year by the United States and hence it is considered as the world's largest bioethanol producer.
- India's biodiesel production is more than 100 million gallons per year.

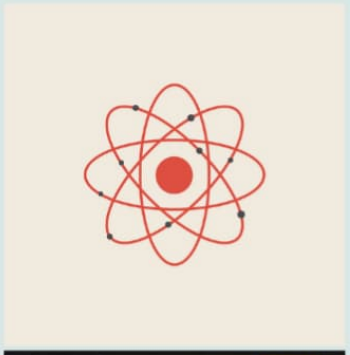
RIDDLES

National Sports Day is celebrated every year in India on 29 August. This is celebrated to commemorate the birth anniversary of Indian hockey legend, Major Dhyan Chand. Let's play this small riddle game and check our knowledge on sports.

- **I have diamonds and not the ones you wear on your hand. Who am I?**
- **It can be won when the most unimportant player kicks the ball through the upright.**
- **I begin with a T and not a letter.**
- **In this sport, there are hat tricks, but they aren't magicians.**
- **This sport has a maximum time limit but can end at any second.**
- **In this sport, you compete on four legs.**

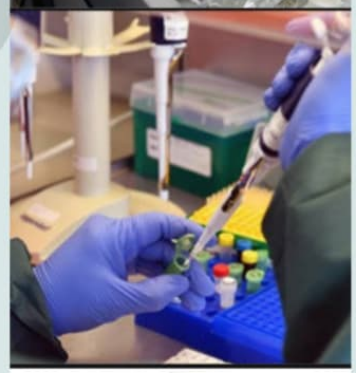
NUCLEAR SCIENCES AT THE SERVICE OF MANKIND

For a common person the term nuclear sciences might either conjure up with vivid images of horrific nuclear bomb or nuclear power plants. However nuclear Sciences offer more than just destruction or an often misunderstood source of energy. Nuclear science and technology play a key role in helping improve global access to a safe, secure, and high-quality food supply. Scientists and farmers are continually developing new ways to cultivate crops and raise livestock using nuclear technologies—technologies which have been proven safe and effective.



Nuclear Sciences in Food and Agriculture: Commonly heard application is food irradiation, the application of ionizing radiation to food to make food safer for consumers and extends the self life of food by reducing or eliminating microorganisms and insects.

Mankind benefits from using nuclear techniques in understanding plant physiological functions, examples such as studying carbon dioxide uptake by leaves, transport of photosynthesis towards plant roots as well as studying nitrogen fixation in plant roots.



Nuclear Sciences also used in tracer studies of the behaviour of agrochemicals. It also involves an eco-friendly method in mass rearing and sterilisation using radiations to target pests.

Nuclear sciences in environmental protection: Nuclear methods such as neutron activation and radiometric analysis are used in analysis of heavy elements, industrial pollutants and long lived radioactivity. Nuclear power is a clean source of energy producing large amounts of energy while releasing negligible levels of carbon dioxide.

Health and Medicine: Radioactivity has become an integral part of medicine (nuclear medicine). The application of external radiation therapy delivers high energy X rays or electron beams to a patient's tumors. This method destroys cancer cells while sparing surrounding normal tissues.

Nuclear charged particle therapy is a form of cancer radiotherapy based on charged nuclear particles for treatment of early and advanced tumors.

Meanwhile endo-radiotherapy is for the treatment of the internal radiation therapy in which the radioactive substances ingested by or injected into a patient. It is used to destroy small groups of cancer cells and multiple locations.

I conclude by saying that Nuclear technologies present huge opportunities to help us meet present and future global challenges. Nuclear science and technology can play a key role in providing humanity with safer, higher quality, and more bountiful food.

Feedback form

https://forms.gle/EDnvBPC4seQpGaV79

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