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VIPNET NEWS

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IYL 2015 INTERNATIONAL YEAR OF LIGHT

A Monthly Newsletter of Vigyan Prasar Network of Science Clubs - VIPNET

EDITORIAL

Dear **VIPNETIANS,**

Greetings from Vigyan Prasar,

By the time present issue reaches you, I assume schools would have reopened after the summer break. May I propose to consider solving and exercising VIPNET newsletter activities as part of your school calendar. Apart from these, it would be highly appreciated if the clubs perform activities to celebrate the international year of light and share the same with us. The present issue includes a special column on velocity of light. It explains the fact how the velocity of light is higher than the velocity of sound and it was discovered through various experiments and is known to mankind since last 1200 years. You will observe that the progress on finding the velocity of light was sluggish for first one and half millennium, but the experiments to accurately measure the speed of light increased in the modern era. Last century made a remarkable progress in this field not only in terms of accuracy but its origin and electromagnetic nature.

The article on bio-fuels is one of the attractions for this issue. Bio-fuels are known as agro fuels- the fuels which are mainly derived from the biomass or bio waste. They are designed to replace gasoline, diesel and coal which are called fossil fuels. We can easily say bio fuel grow on trees; though it will take some time to make its place in the commercial market. The variety and flavour of science can be appreciated through the constant column of *Exploring Science.* It talks about evaporation and conditions responsible for it. As per the feedback, pictorial depiction and exciting activities at the end of the article are special attractions for our young members. The regular club speak covers the quarterly, six monthly or annual reports of active clubs.

As you are aware, Vigyan Prasar always tries to fulfil the promise of organising capacity building and skill development programmes for our stakeholders. One of the training workshops named *Astronomical Telescope Making* is being organised at Pushpa Gujral Science City Kapurthala, Punjab. Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital, Inter University Centre for Astronomy and Astrophysics (IUCAA), Pune are the major collaborators for it. The workshop is planned in the month of October 2015. The workshop is open for all interested participants. We do understand that the club members may not be able to bear the cost of registration and further requirements, however, the stakeholders agreed to take care of monitory matters for extensive training programme. It is an appeal to find sponsors who can provide financial support to you. The training workshop includes grinding, polishing and tool making so that the participant can build his or her own telescope. The telescope can help to start the astronomical observations at your club. You can get more details through our website www.vigyanprasar.gov.in. Looking forward for an active participation.

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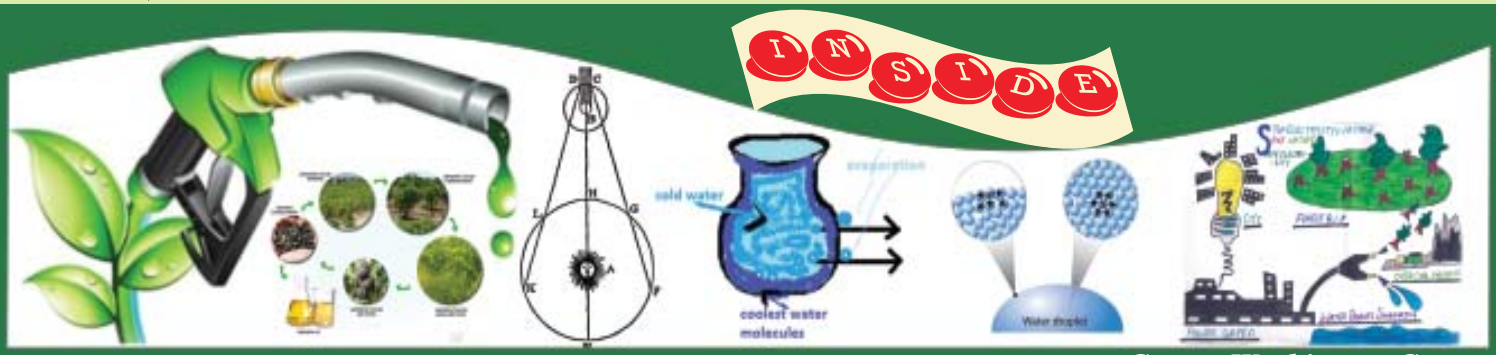
INSIDE



Education is the key to unlock the golden door of freedom. — *George Washington Carver*

सम्पादकीय

प्रिय विपनेट सदस्यों,

विज्ञान प्रसार की ओर से शुभकामनाएं!

गर्मी की छुट्टियों के बाद जब आपके स्कूल दुबारा खुलेंगे मैं उम्मीद करता हूँ कि यह अंक आप तक पहुंच जाएगा। मैं आपके स्कूल कैलेंडर के एक हिस्से के तौर पर विपनेट न्यूजलेटर की गतिविधियों को हल करने और अभ्यास करने का प्रस्ताव रखता हूँ। इसके अलावा अगर विपनेट क्लब अंतर्राष्ट्रीय प्रकाश वर्ष को मनाने के लिए गतिविधियां करते हैं और उनके बारे में हमें अपनी रिपोर्ट भेजते हैं तो यह बहुत सराहनीय कार्य होगा। इस अंक में प्रकाश पर एक विशेष स्तंभ को भी शामिल किया गया है। यह लेख इस तथ्य को विश्लेषण करता है कि प्रकाश का वेग ध्वनि के वेग से अधिक होता है और इसे अनेक प्रयोगों के माध्यम से खोजा गया है तथा मनुष्य इस तथ्य को पिछले 1200 वर्षो से जानता हैं। पिछली शताब्दी में इस क्षेत्र में एक उल्लेखनीय प्रगति हुई। यह प्रगति न सिर्फ सटीकता बल्कि प्रकाश की उत्पत्ति और विद्युत-चुंबकीय स्वभाव से संबंधित है।

जैव ईंधन पर प्रस्तुत लेख इस अंक का एक मुख्य आकर्षण है। जैव ईंधन कृषि ईंधन या जैव कचरे से व्युत्पन्न होते हैं। यह गैसोलीन, डीज़ल और कोयला; जो की जीवाश्म ईंधन है, के स्थान पर प्रयोग में लाया जायेगा। हम सहज कह सकते हैं कि जैव ईंधन पेड़ों से बनते हैं; हालांकि व्यावसायिक बाजार तक पहुंचने में कुछ समय अवश्य लगता है। ''एक्सप्लोरिंग साइंस'' नाम नियम स्तंभ के माध्यम से विज्ञान के प्रकार और सुंदरता की सराहना की जा सकती है। इसमें वाष्पीकरण और इसके लिए जिम्मेदार दशाओं पर चर्चा की गई है। हमें मिले सुझावों के अनुसार, लेखों के अंत में दिए गए सचित्र विवरण और रोचक गतिविधियां हमारे युवा सदस्यों को खास तौर पर पंसद आ रहे हैं। नियमित स्तंभ ''क्लब स्पीक'' में सक्रिय क्लबों के तिमाही, छमाही और वार्षिक रिपोर्ट को स्थान दिया जाता है।

जैसा कि आप जानते हैं कि विज्ञान प्रसार हमारे भागीदारों के लिए क्षमता कौशल निर्माण कार्यक्रमों को आयोजित करने के वायदे को पूरा करने के लिए हमेशा प्रयत्नशील रहता है। ऐसे ही ''खगोलीय दूरबीन निर्माण'' पर एक प्रशिक्षण कार्यशाला का आयोजन पुष्पा गुजराल साइंस सिटी, कपूरथला, पंजाब में किया जा रहा है। आर्यभट् प्रेक्षणात्मक विज्ञान अनुसंधान संस्थान (एरीज), नैनीताल और खगोलीकी एवम् खगोलभोतिकी अंतर-विश्वविद्यालय केन्द्र (आयुका), पुणे इस कार्यशाला में मुख्य सहयोगी हैं। यह कार्यशाला अक्टूबर 2015 में आयोजित किया जाना तय हुआ है। इस कार्यशाला में सभी इच्छुक प्रतिभागी हिस्सा ले सकते हैं। हम समझते हैं कि क्लब के सदस्य पंजीकरण शुल्क और अन्य जरूरतों को पूरा करने में असमर्थ हो सकते हैं। हालांकि हमारे साझीदार व्यापक प्रशिक्षण कार्यक्रम के आर्थिक मामलों को लेकर सहमत हैं। अस्तु हमारी अपील है कि आप ऐसे प्रायोजक ढूंढे जो आपको आर्थिक सहायता दे सकते हैं। इस प्रशिक्षण कार्यशाला में ग्राइंडिंग, पॉलिशिंग और टूल मेकिंग जैसे घटक शामिल हैं ताकि प्रतिभागी अपने दूरबीन स्वयं बना सकें। ये दूरबीन आपके क्ल्ब में खगोलीय प्रेक्षणों को आरंभ करने में सहायता कर सकते हैं। आप हमारे वेबसाईट www.vigyanprasar.gov.in. के माध्यम से अधिक जानकारी प्राप्त कर सकते हैं। आपके सक्रिय सहयोग की हमें अपेक्षा है।

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BIOFUELS : "When fuels grow on trees"

Garima Tewari
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Introduction

Bio-fuels, also known as agro fuels, are the fuels which are mainly derived from the biomass or bio waste. Biomass can be directly converted into liquid fuel called bio fuels. They are designed to replace "**fossil fuels".** The fuels like gasoline, diesel fuel and coal are called fossil fuels. These are obtained from the plants and animals that died millions of years ago in contrast to the bio-fuels which are obtained from the plants that have just been harvested.

A simplified classification of bio fuels is:

- Conventional bio-fuels, also called First Generation Biofuels.
- Advanced bio-fuels, also called Second Generation Biofuels.

CONVENTIONAL BIO FUELS

These are the **first generation bio-fuels**, which include sugar and starch based ethanol, oil crop based bio fuels and straight vegetables oil. The most conventional bio fuels that are largely used as transport fuels are ethanol and biodiesel; they are used in internal combustion engine either in their pure form or as an additive.

Ethanol:- Ethanol is commonly called ethyl alcohol or drinking alcohol which is the principle type of alcohol found in the beverages. Ethanol is produced by the fermentation of any biomass high in carbohydrate content. Ethanol is used in blending with gasoline to increase octane number and reduce the release of carbon monoxide and other smog causing emissions responsible for green house effect and global warming. In India majority of ethanol is produced via sugarcane- sugar-molasses route.

Biodiesel :- Biodiesel is domestically produced by combining alcohol with vegetable oil, recycled cooking grease. Biodiesel production in India is predominantly focussed on using Jatropha, non-edible tree borne oils such as pongamia, and karanja.

Jatropha :- Jatropha is a poisonous, semi- evergreen shrub which has high capability for growth in the arid regions. The seeds of jatropha have 20-40% oil that can be processed to produce a high quality biodiesel fuel.

The ex President of India, Dr. Abdul Kalam, is one of the strong advocators of Jatropha cultivation for production of bio-diesel. India is taking an initiative to provide land for the production of jatropha plant in order to meet 20% of the need of blending of biofuels both for ethanol and biodiesel. Large plots of waste land have been selected for Jatropha cultivation and will provide much needed employment to the rural poor of India. Planting of

Jatropha is now being seen as a good business opportunity.

Palm Oil : - Palm oil can also be used for the production of biodiesel. Palm is a humid crop which requires evenly distributed rainfall of 150mm/month or 2500-4000mm/ annum. Indonesia is the world's largest producer and exporter of palm oil in the world. Currently, 10 million hectares are under cultivation, producing 30 million barrels of crude palm oil a year, destined for China, India and Europe.

ADVANCED BIO FUELS:

They are the second and the third generation bio fuels, which include cellulosic ethanol, algae based bio fuel, conversion of sugar into diesel type bio fuel by using biological and chemical catalyst and production of bio fuel from conversion of agriculture residue.

RECENT DEVELOPMENTS

Coconut Oil :- Indian scientists from Kochi working at Institute of Bioscience and Biotechnology Research Development have used coconut oil for the production of biodiesel recently. They have already applied for a US patent and also approached the Union Ministry of Renewable Energy to take this biofuel to its logical conclusion by commercialising it.

Microalgae :- In USA, scientists have sequenced the genome of a microalgae species and provided hints at the roots of its ability to grow and produce oil at the same time. Microalgae are tiny photosynthetic organisms found in both ocean water and freshwater. They grow quickly in liquid culture and can produce high levels of oils. One such micro-algae, a species of diatom called Fistulifera solaris, is emerging as a promising organism for next-generation biofuel. Fistulifera solaris grows quickly and produces high levels of oils at the same time, unlike other oil producing microalgae. Biofuel production using photosynthetic organisms like microalgae is one of the most promising approaches to generating sustainable energy.

CONCLUSION:

Biofuels are vital in reducing our dependence on imported crude oil in order to enhance the country's energy security. The other reasons behind promotion of biofuels in India include climate change mitigation through reduced greenhouse gas (GHG) emission, environmentally sustainable development and generation of new employment opportunities. Hence, it is necessary to streamline our efforts and provide the necessary impetus to Biofuel applications so as to ensure a pure and sustainable environment available for the future generations to come.

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ACTIVITY-1

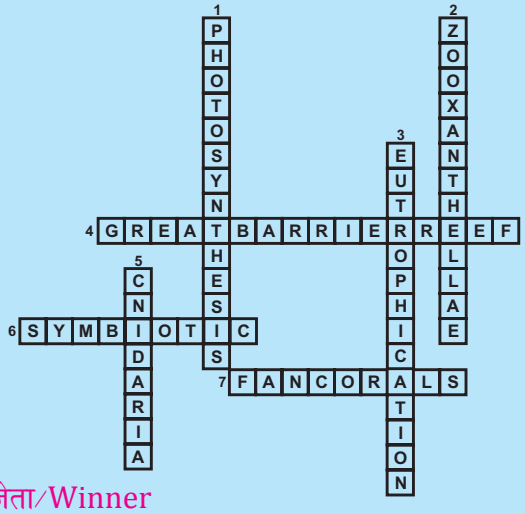
Grab a Book
Hello Star

1. Identify the region on map of India suitable for the cultivation of the following based on the climate requirement:
   a) Jatropha
   b) Palm Oil
   c) Sugarcane

2. Which states are the leading producers in each of the above mentioned crops?

Complete the activity and send the result at vipnet@vigyanprasar.gov.in with subject title 'Activity-1' (Month) OR Send the answer in an envelope entitled VIPNET 'Activity-1' (Month) to Vigyan Prasar,A-50, Institutional Area, Sector-62, Noida-201 309 (U.P.).

Answer - Activity-3 (February & March - 2015)



विजेता/Winner

1. Mohit Kumar Tripathi (Madhya Pradesh)
2. Rajneesh Kumar (Bihar)

VELOCITY OF LIGHT

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Whenever there is a thunder storm we see the lightning first and then a scary sound is heard. We know that light moves faster than sound and hence we see the light first and then hear the sound. No doubt the answer is correct! But have you ever wondered how fast can light travel? Is the speed of light finite or infinite? Who are the people who made the efforts to answer this question? Is there anything that can travel faster than light? Let us look at the events that helped us gather information related to these questions.

Many philosophers, thinkers, logicians and scientists have given various ideas about light. In the last issue of our newsletter, we understood that light is considered as particle as well as wave in nature. Looking into the history we find that light has been a matter of discussion since 4th century BC. Empedocles (490 BC–430 BC) a Greek pre-Socratic philosopher and a citizen of Agrigento (Italy) said that light is something in motion and takes some time to travel. He was the first to claim that light has a finite speed. On the contrary, Aristotle (384 BC-322 BC) another Greek philosopher and all time great scientist argued that light is there due to the presence of something and has no speed. In later years the word something was replaced by presence of ether all around. Afterwards, Euclid (300 BC) and Ptolemy (90 AD-168 AD) Greek Mathematician and philosopher respectively supported Empedocles with the emission theory of vision, wherein it is considered that light is emitted from our eyes and hence are able to see and light has finite speed. On the other hand, same theory was countered with the argument that the speed of light must be infinite because distant objects such as stars appear immediately on opening our eyes.

Major discussion on velocity of light appears in the 'Book of Optics' written by Islamic philosopher Alhazen (Ibn al-Haytham) published in year 1021. Therein, he condemned the emission theory of vision and said that light reflects from an object and enters our eyes. Moreover, he not only mentions that light has finite velocity but he goes ahead to make the bold claim that its speed varies from material to material. Subsequently, in 11th century, Abû Rayhân al-Bîrûnî established that light has a finite speed and performed experiments showing speed of light is much faster than the speed of sound! Therefore, the fact that the velocity of sound is much less than the velocity of light was established almost 1200 years before .For very long period of about 600 years the scientific discussion and development was dormant and not much evidences are found related to study of light. First well documented fact on the velocity of light appears through efforts of the Duch scientist, Issac Beekman in a year 1629. In an experiment, he placed mirrors at various distances and in multiple directions from the planned explosion and asked the observers to note the differences in time of flash that they see in the mirrors. And as obvious, the experiment was *inconclusive as none could notice the time difference. These experimental efforts kept the scientific community active. It is noticed that Galileo Galilee also made* passing reference on the velocity of light *in 1668.* His experiment involved placing two lanterns, instead of mirrors apart by few kilometres and observe if there was any noticeable lag between the two. But again, the results were inconclusive!

By this time, Galileo's heliocentric theory of solar system started gaining the trust from intellectuals and church. It made public curious to observe through telescope and understand the wonders of sky and its distances. Since the light was the only matter coming from these celestial objects, quest on finding the details of light were paramount. Subsequently, reference to serious experiments to find the velocity of light is dated back to 1676. The Danish Astronomer, Ole Römer tried to observe the eclipse on planet Jupiter by its moon IO. Römer, while studying the Jupiter's moon IO noticed that the time between eclipses would vary throughout the year. He was well aware of motion of Earth i.e. moving towards the Jupiter or away from Jupiter. Knowing this fact, Römer began taking careful notes about the time IO would come into view and how it correlated to the time it was usually expected. After a while, Römer noticed that as the Earth orbited the sun and in turn got further away from Jupiter, the time IO would come into view would lag behind the expected time. He took note of it in his observation table. Römer's logical understanding was, it will happen because the light reflected from IO will require travelling time especially when Earth is at farthest distance from Jupiter. He published his prediction stating IO's 9 November 1676 eclipse is going to be 10 minutes late, well in advance. Majority of Römer's colleagues and educationists expressed doubt in his theory. But to everyone's surprise, the movement of an entire celestial body behaved according to his prediction.

Regrettably, the exact calculations he used were lost in the Copenhagen Fire of 1728. But from news stories covering his discovery and from other scientists around that time who used Römer's numbers in their own work concluded that clever calculations involving the diameter of the Earth's and Jupiter's orbits Römer was able to estimate that light took around 22 minutes to cross the diameter of Earth's orbit around the Sun. He did not specify any number for the speed of light but later on Christiaan Huygens- an English physicist (1629-1695) converted this to more ordinary numbers of about 220,000 kilometres per second. Even today, his estimation of the speed of light is considered to be amazingly accurate, considering it was made 300 years before the existence of both lasers and internet ! Given the state of science and technology at that time, it was a remarkably impressive calculation.

Numerical value and accuracy of velocity of light was improving under the shadow of presence of ether all around. In the year 1727, English astronomer James Bradley while studying stellar parallax of star Draconius from constellation Draco discovered aberration of light. This finding led to improved qualitative and quantitative value of speed of light. To comprehend the experiment, let us understand what is aberration? Let us consider there is a star vertically above as shown in the figure 2a. If you try to see the star through the

steady telescope then you would not see the star! Because, Earth has moved by the time you see. If the motion of the Earth with respect to star is in the direction of the arrow as shown in figure 2b then telescope must be titled by an angle è from the vertical. It is analogous to tilting the umbrella when walking in the rain, even though rain drops are falling vertically. This effect is called aberration. è is called angle of aberration. It is as easy to understand that, if Earth would have moved in a straight line at constant speed we would not have known that there was an aberration. But since it is going around the Sun, Earth is changing its position and we are able to detect changes in the aberration.

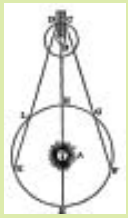

Figure 1: Illustration fromthe 1676 article on Rømer's measurement of speed if light. Rømer's compared the duration of Io's orbits as Earth moved towards Jupiter (F toG) and as Earth moved away from Jupiter (L to K).

In 1727, the astronomer Bradley when observing the star Draconius observed the aberration of the star light. It is similar to understand from figure 3, where star and four positions of Earth are shown. From this it is clear that the altitude of the star would be greatest when the Earth is in position 2 and least in position 4. But, it was found that it is highest in position 3 and 1. All this is due to speed of Earth in the orbit vis-a-vis aberration of light. By this theory and calculation aberration came out to be 20 arcs second and speed of light to about 2, 95,000 kilometres per second.

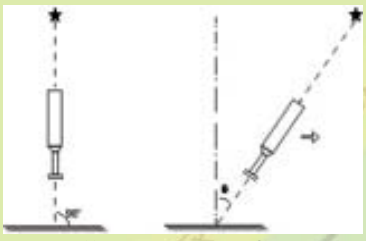

Figure 2(a) Position of star when Earth is not moving

Figure 2(b) Position of star when Earth is moving

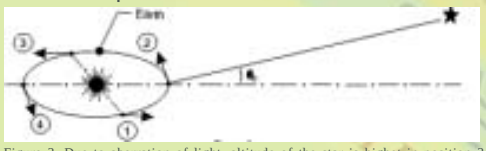

Figure 3. Due to aberration of light, altitude of the star is highet in position 3 and least in position 1, otherwise it would have been highest in position-2 and least in position 4.

After the invention of telescope and with supporting technology for accurate observations and data collection various theories and hypothesis started developing in the light of evidential proofs and calculations. By mid 19th century, James Maxwell developed the theory of electromagnetism through his famous equations and revolutionized understanding of light. His theory stated that, light is electromagnetic in nature 0. The credit for most authentic, reliable and genuine experiment for the velocity of light goes to experiment performed in last decade of 19th century. The experiment performed by duo American physicist Albert Abraham Michelson and Edward W. Morley in 1887 known as Michelson and Morley experiment is perhaps the first experiment with consistent negative results to the objective of the experiment proclaimed as a most successful experiment for finding of velocity of light. It also extended to the findings of precise value of velocity of light at that time. Let us understand the experiment.

The story of how Michelson thought of doing an experiment is an interesting one. Michelson was born Polish but shifted to United State at the age of four. He was intelligent throughout the schooling and college. He joined the US Naval Academy in Annapolis. While working he came across the correspondence of Mr Todd, a Nautical Almanac Officer, with Mr Maxwell. Wherein, Maxwell wished to measure the velocity of solar system through the ether by making certain observations on the eclipses of the moon of Jupiter. It is important to note that the existence of ether and its validity was still a prime concern for scientific community. This incident motivated him to try an experiment to detect motion through ether by an Earth bound or terrestrial experiment.

When Michelson was on study tour to Germany at Berlin he started experimenting on motion of light through ether and its interpretations. After repeated trial he wrote “The interpretation of these results is that there is no displacement of the interference bands. The result of the hypothesis of stationary ether is thus shown to be incorrect.” This experiment is known in the history as Potsdam experiment – Potsdam is a suburb of Berlin where the experiment was conducted.

After returning from Europe he come across another professor from Cleveland (US) named Edward Morley in 1885 working on the optics. Both started experimenting again and came to the conclusion that there is scope of instrumental error for interference bands. In between, they have come across a paper written by Hendrik Lorentz commenting on Michelson’s Potsdam experiment. He mentioned that the fringe shift must be half of what was calculated by Michelson. In the response Michelson did not hesitate to write to him “I have never been fully satisfied with the result of my Potsdam experiment....” Hence the duo started improving the experimental setup for its accuracy. The objective of the experiment was to test the existence of ether as a medium of propagation of light and that it travels with the same velocity in all directions.

Morley's new apparatus was set up at the University of Cleveland. Installed in the basement of the laboratory building where temperature did not vary much on account of the massive stone walls, the apparatus was mounted on a big slab of granite which rested on the circular wooden plate. This plate was fitted into a cast iron trough containing mercury. The iron trough was itself mounted on a brick pier resting on a special concrete base as shown in figure 4, the set up was later known as Michelson interferometer. Precise movement of mirrors and path of light rays with respect to the moving frame of earth and ether was under the consideration and every time result was negative verifying nonexistence of ether. It improved valuesof velocity of light to an large extent which later on become a supporting experiment for the special theory of light established by Albert Einstein in 1905. One can concretely say that the ether was replaced by the concept of space time!

Figure 4 Sketch of the apparatus used by Michelson and Morley

It is important to note that, by the time above experiment was performed the theory of electromagnetism was established by James Maxwell wherein light was proved to be an electromagnetic radiations. Indeed, it has been said that Albert Einstein was inspired by the same theory to establish the theory of relativity.

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EXPLORING SCIENCE: Evaporation

Puneeta Malhotra
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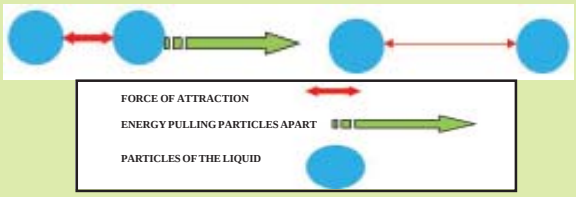
Sea salt is harvested from sea water. It is also called solar salt or bay salt. This salt is used in cooking. How can we obtain salt from sea water?

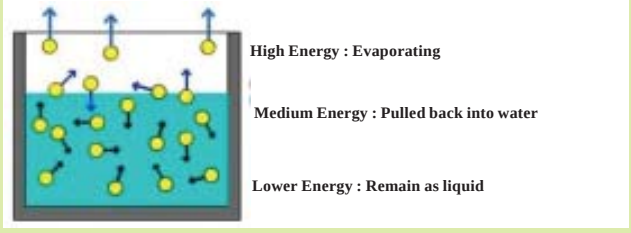
Summers have arrived and the temperature is soaring high. During summers we use earthen pots (MATKA) to get cold water to drink. How does the water inside the matka become cool, however if we place water in a steel container is remains hot? What is special about the earthen pot (mitti ka matka)?

On a hot day, we feel better when we sweat as our sweat disappears and we feel cooler. If it is a hot and humid day, we feel uncomfortable and the sweat does not disappear.

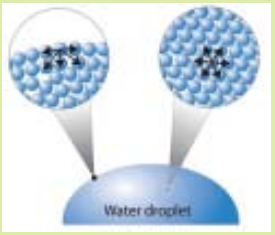
How does the sweat disappear? Why does it make us feel cool? Why sweat does not disappear on a humid day?

Evaporation is process that explains all the above cases. Evaporation is a process of conversion of a liquid to its vapour (gaseous) state. The particles of liquids attract each other. If a liquid has to change to its vapours, it has to overcome (break away from) these forces of attraction. To do so the particles of liquid require energy. All the particles in the liquid are in motion but they are moving at different speeds. Therefore some particles have more energy than other particles. The particles that have enough energy to overcome force of attraction of the liquid change into gaseous state.





Consider a drop of water, the molecules of water on the surface experience less force than molecules inside the water drop. Some of the surface molecules can easily overcome force of attraction and change to vapours. New molecules are then exposed to the surface and they can change to vapours, thus when water spills on the floor, all the water disappears after some time. It has evaporated.



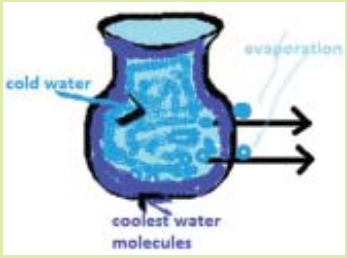
The molecules at the surface change to vapour, therefore if we increase the surface area evaporation becomes faster. Water disappears from a plate quickly as compared to a glass.

Other factors that affect rate of evaporation are wind speed, humidity, temperature and nature of liquid.

On hot days, when we sweat our sweat evaporates. The molecules of water take heat from the body and evaporate making us feel cooler. However, if the humidity is high, it means air is saturated with water vapours, so its tendency to take up more water vapours decreases. This decreases the rate of evaporation. That is why our sweat is not evaporated during humid days.

You must have observed that clothes dry faster on a windy day. The wind blows and takes the water vapours away making the air dry again or less humid again therefore facilitating evaporation.

During Dandi March, Gandhiji obtained salt from sea water as the water evaporated leaving behind salt. If you take saline water and leave it undisturbed in a plate, you will observe salt in the plate after all water disappears due to evaporation.
Evaporation also helps water cool down in a matka. The matka has small pores; these pores allow the gaseous water molecules to escape. The high energy molecules escape making water cool.



Background

Evaporation is change of state of a liquid to a gas. If the force of attraction between the molecules of a liquid is weaker, the liquid will evaporate faster.

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ACTIVITY-2

In this project you'll investigate which liquid has stronger inter molecular force of attraction.
Goal: - Our goal is to arrange the liquids according to increasing order of the strength of their intermolecular forces of attraction

Grab a Book
Mangroves

Materials and Equipment

To do this experiment you will need the following materials and equipment:

➤ Water ➤ Nail polish remover ➤ Spirit ➤ Kerosene ➤ Vegetable oil ➤ Measuring cylinder

(You can choose liquids according to availability, you can add more to the list)

Experimental Procedure

1. Take 5 identical plates.
2. Mark the plates 1,2,3,4 and 5.
3. Place the plates together at the same place.
4. Measure 20 ML of each liquid and place the liquids in different plates.
5. Wait till one of the liquid disappears completely and then measure the volume of liquids left behind.(alternatively you can use the stop watch to note the time taken for the different liquids to disappear)

Observation Table: **Liquid that disappears first is :** _____ **Time taken for it to disappear t :** _____ **sec**

S. No.	Liquid in the plate	Initial Volume	Volume after t sec
1	Water	20 ML	
2	Nail Polish Remover	20 ML	
3	Spirit	20 ML	
4	Kerosene	20 ML	
5	Vegetable Oil	20 ML	

Conclusion and Explanation:

_____

_____

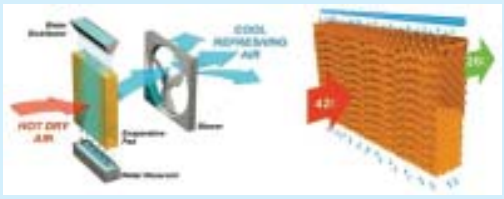
_____

Design your own experiments to study effect of temperature, humidity and wind speed on evaporation.

Applications of evaporation

How does a desert cooler work?

A desert cooler is a simple device which works on the principle of evaporation. The dry and hot air from the surroundings comes in contact with a wet surface (evaporative pad), the water gets evaporated using the heat from the hot air thereby converting it to cool moist air.



Using the concept of evaporation, design a low cost cooler using jute rags (bori) or other material, that will help keep your house cool in summers.

Dogs hold their tongue out during summers

Dogs stick out their tongue especially during summers and after running. Dog's body does not have sweat glands like our body. The tongue acts as a heat regulator. When a dog pants, the dog's entire body is cooled off through evaporation. (Panting in dogs means the heavy and quick breathing with their tongues held out.)

Complete the activity and send the result at vipnet@vigyanprasar.gov.in with subject title Activity-2' (Month) OR send the answer in an envelop entitled VIPNET 'Activity-2' (Month) to Vigyan Prasar, A-50, Institutional Area, Sector-62, Noida-201 309 (U.P.).

iadk'k dk oxZ

Dr. Arvind C Ranade
rac@vigyanprasar.gov.in

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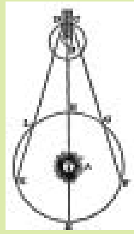

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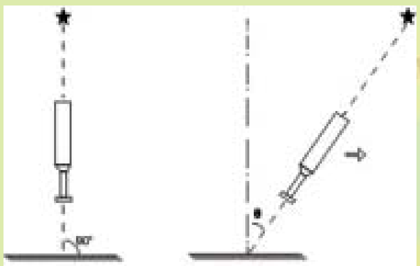

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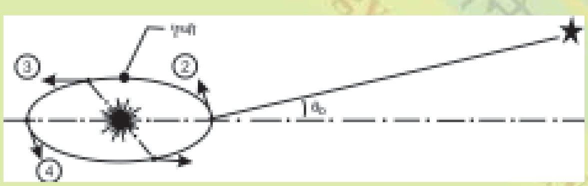

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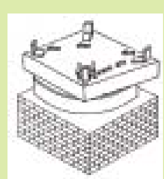

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ASTRONOMICAL TELESCOPE MAKING WORKSHOP

05 - 16 October 2015

An excellent opportunity to learn telescope making and initiate observational astronomy:

1. The workshop is primarily aimed to attract professionals, amateurs and enthusiasts who would like to gain a first hand experience in the nitty-gritty of telescope making under expert supervision under one roof.
2. Successfully enrolled participants will be trained to make their own five inch (5") Dobsonian Telescope primarily from locally available material.
3. There is a provision for just 25 teams on a first come first serve basis. Each team should consist of maximum two members. Out of them one should be above the age of 18 years.
4. The last date of registration is 15th August, 2015.

Workshop Attractions: Participants will.....

I. Grind, polish glass blanks, test their own-hand-made mirrors and fabricate the Dobsonian Telescope. This is to impart and enhance skills to secure precise curvature, focal length and the reflecting surface.

II. Learn through night sky observations, practical sessions on how to use telescope, lectures on elementary astronomy, tips on astrophotography, interactions with eminent astronomers from various research institutions and many more.

III. Become part of a country-wide network. They will receive regular e-mail updates on astronomy activities, night sky events, and other special events including seminars/ workshops/ training sessions.

Registration Details:

a. Each participant will have to pay a fee of Rs. 10,000/-.

b. If a team of two members comes together, the team has to remit a sum of Rs. 12,000/-. The members of the team should mutually agree to share the telescope for use.

c. Payments have to be made through a Demand Draft of any nationalized bank. The draft of required amount has to be made in favor of 'Pushpa Gujral Science City', payable at Kapurthala, Punjab.

d. This fee amount is meant to cover the cost of materials that will be used to make the telescopes and a working lunch over the days of the workshop.

e. Participants will have to meet their own travel, lodging & boarding expenses. However, assistance may be provided to locate a suitable accommodation depending on the requirement and the budget of the participants.

f. Only online registration is allowed at www.vigyanprasar.gov.in. List of selected participants will be displayed after the deposit of registration amount.

Last date of registration 15 August 2015

Contact us

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Memories

(First Telescope Making Workshop)

Venue

Pushpa Gujral Science City
Kapurthala, Punjab

Organised by

खगोलीय दूरबीन निर्माण कार्यशाला

05 – 16 अक्टूबर 2015

दूरबीन बनाना सीखने और प्रेक्षणात्मक खगोलिकी की शुरूआत करने का एक उत्कृष्ट अवसर

1.) कार्यशाला का प्राथमिक उद्देश्य उन पेशेवर, शौकिया तथा उत्साही लोगों को आकर्षित करना है जो दूरबीन निर्माण की बारीकियों का साक्षात अनुभव एक स्थान पर ही विशेषज्ञों की देख–रेख में करना चाहते हैं।

2.) सफलतापूर्वक पंजीकृत प्रतिभागियों को प्राथमिक रूप से उपलब्ध स्थानीय पदार्थों का उपयोग करके अपनी स्वयं की (5 इंच) डॉब्सोनियन दूरबीन बनाने के लिए प्रशिक्षित किया जाएगा।

3.) पहले आओ पहले पाओ आधार पर केवल 25 दलों के लिए प्रावधान किया गया है। प्रत्येक दल में अधिक से अधिक दो सदस्य रहेंगे। जिनमें से एक की उम्र 18 वर्ष से अधिक होनी चाहिए।

4.) पंजीकरण की आखिरी तारीख 15 अगस्त, 2015 है।

कार्यशाला के आकर्षण: प्रतिभागी .....

(i) घिसना, पॉलिश करना, दर्पणों की जांच, परिवर्तनीय–विन्यास आरोहण की दृढ़ व विकास डॉब्सोनी व्यवस्था की संरचना करना सीखेंगे। यह स्टीक यकता, फोकल दूरी और परावर्तक सतह सुनिश्चित करने और कौशल बढ़ाने के लिए है।

(ii) रात्रि आकाश दर्शन द्वारा ज्ञान प्राप्त करना, दूरबीन के उपयोग संबंधी व्यावहारिक पाठ, प्राथमिक खगोलिकी पर व्याख्यान, खगोलिकी फोटोग्राफी संबंधी सुझाव, विभिन्न अनुसंधान केंद्रों के प्रमुख खगोलज्ञों से मुलाकात और भी बहुत कुछ करना सीखेंगे।

(i) विज्ञान प्रसार द्वारा पोषित एक देशव्यापी नेटवर्क के सदस्य बन जाएंगे। वे अद्यतन खगोलिकी गतिविधियों, महत्वपूर्ण खगोलीय तथा अन्य संबद्ध सूचनाओं संबंधी नियमित ई–मेल प्राप्त करेंगे।

पंजीकरण विवरण :

क) एक सदस्य प्रतिभागी दल के लिए पंजीकरण शुल्क 10,000 रु. है।

ख) दो सदस्य प्रतिभागी दल को पंजीकरण के लिए 12,000 रु. शुल्क के रूप में देने होंगे। दल के दोनों सदस्यों में दूरबीन का साझा उपयोग करने के लिए सहमति होनी चाहिए।

ग) पंजीकरण शुल्क, बैंक ड्राफ्ट के माध्यम से 'पुष्पा गुजराल साइंस सिटी', कपूरथला, पंजाब के नाम देय है।

घ) पंजीकरण शुल्क में कार्यशाला के दौरान प्रतिभागियों द्वारा प्रयुक्त कच्चे माल तथा सभी दिनों में साधारण दोपहर–भोजन का मूल्य शामिल है।

ङ.) बाहरी प्रतिभागियों को यात्रा, आवास और भोजन की व्यवस्था पर अलग से खर्च करना होगा। प्रतिभागियों के बजट और आवश्यकताओं के अनुसार उपयुक्त आवास व्यवस्था ढूंढने में सहयोग उपलब्ध रहेगा।

च) संपूर्ण पंजीकरण विधि ऑन–लाइन www.vigyanprasar.gov.in पर उपलब्ध है। पंजीकरण शुल्क प्राप्त हो जाने के बाद पंजीकृत प्रतिभागियों के नाम वेबसाइट पर प्रदर्शित किए जाएंगे।

अंतिम तारीख 15 अगस्त 2015

संपर्क करें

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ई–मेल: atm@vigyanprasar.gov.in

यादें

(पहली दूरबीन निर्माण कार्यशाला)

कार्यशाला स्थल

पुष्पा गुजराल साइंस सिटी
कपूरथला, पंजाब

आयोजक

CLUB SPEAK

ANNUAL REPORT

Raman Science Club (V2431001), Budaguda conducted several activities during 2014. Students participated in variours programs like Mass Plantation, Rally on safe drinking water & sanitation, Awareness Campaign on Malaria, Cleanliness drive under Swacha Bharat Abhiyan etc.

ANNUAL REPORT

In the year 2014-15, Kim Educational Society Rational Science Club (V1122004), Surat Conducted district level Science Exhibition; Plantation program; Rally to fight addiction- Alcohol, Smoking tobacco; Dance, Drama & Fancy Dress Competition on different occassions.

ANNUAL REPORT

Dr. S. Radhakrishnan Science Forum (VP-MN0001), Tuibuong had done many programs during 2014-15. During this period students of the club participated in many Drawing & Painting Competitions, National Science Olympiad, District Level Science Seminar & Quiz Competition. Club also organized Painting Competition, Mathematics & General knowledge competition, Essay & stamp design competition for their students on regular basis.

WORLD EVIRONMENT DAY

VIPNET Club of Jubaraj Nagar Col. Girls HS School (V30002018), Tripura Organized a two day program on World Environment day in June 2014. In the program they have arranged a seminar cum interaction with students on the topic 'Raise your voice, not the sea level' & Global Warming effects. Club also organized Science Model Exhibition, Environment Fair, Educational Tours etc. for their students time to time.

ANNUAL REPORT

In the year 2014-15, J.C. Bose Science Club, Karnataka, incorporated many programs like a Yogasana & Pranayama Demonstration Pogramme; discussion on World's Conservation Day on topics like Convervation of Energy,Bio-energy; Students - Scientists Talk; Celebration of Naional Science day etc.

QUARTERLY REPORT

During January to March 2015, VIPNET Club of Kalyan Regional Community Science Centre (V1106605), Bhavnagar conducted many activities on different topics like 17 programme on Joy of Science, Superstition Awareness Programme, Chart Exhibitions, Energy Conservation workshop and may more. Club also celebrated World Wetland Day, World Water Day and World Forestry Day during this period.

ANNUAL REPORT

VIPNET Club of Vivekodayam Vidyamandir (V1604002), Annamanada conducted many programs during 2014.

Club organised a session for their students on the topic "Adolescent; Celebrated World Environmet Day by Planting trees, Lessons on Organic Farming & how to make kitchen garden etc. Club also arranged educational tours for thier students to medicinal farms, science centre etc.

v/kokf"kd fjiksV

विश्वनाथ विज्ञान क्लब (V3105001), उत्तर प्रदेश द्वारा गत् अगस्त 2014 से जनवरी 2015 के दौरान कई गतिविधियों का आयोजन किया गया। इसमें मुख्य रूप से विज्ञान जागरूकता कार्यक्रम का आयोजन किया गया जिसके अंतर्गत बच्चों को साफ–सफाई तथा अंधविश्वास सम्बंधी विषयों से अवगत कराया गया।

CLUB SPEAK

v/kokf"kd fjiksVZ

जुलाई 2014 से नवम्बर 2014 के दौरान राजकीय उच्च मा. वि., सिवाना के विज्ञान क्लब (V2705006), द्वारा विभिन्न प्रकार की गतिविधियों का आयोजन किया गया। इस अवधि में क्लब द्वारा

वृक्षारोपण कार्यक्रम, परमाणु दिवस पर संगोष्ठी, डेंगू प्रिवेंशन डे पर जागरूकता कार्यक्रम, विश्व साक्षरता दिवस पर प्रश्नोत्तरी प्रतियोगिता इत्यादि अनेक कार्यक्रमों का समय–समय पर आयोजन किया गया।

v/kokf"kd fjiksVZ

चन्द्रशेखर आजाद ग्राम विकास प्रस्फुटन सोसायटी (V8132005), मध्य प्रदेश द्वारा गत फरवरी 2014 से नवम्बर 2014 के बीच खेल प्रतियोगिता, विज्ञान शाला, जागरूकता कार्यक्रम इत्यादि कई कार्यशालाओं का आयोजन किया गया जिसमें हर आयु वर्ग के बच्चों ने भाग लिया।

xfrfof/k fjiksVZ

कल्पना चावला साईंस क्लब (V0532001), बिहार द्वारा वर्ष 2014 के दौरान कई गतिविधियों का आयोजन किया गया। इसमें मुख्य रूप से कल्पना चावला जयंति पर पुत्री दिवस का आयोजन, पृथ्वी दिवस पर संगोष्ठी, अग्निशमन सेवा सप्ताह पर जन जागरूकता हेतू परिचर्या, पोस्टर प्रर्दशनी, विश्व पर्यावरण दिवस पर संगोष्ठी इत्यादि कई कार्यक्रम शामिल रहें।

=ekfld fjiksVZ

फरवरी 2015 से मई 2015 के दौरान 'द नेचर साईंस एण्ड इको क्लब (VP-UP0040), हापुड़ द्वारा 6 कार्यक्रमों का आयोजन किया गया। इसमें विज्ञान दिवस, जल दिवस और मौसम दिवस पर जागरूकता कार्यक्रम, चन्द्रग्रहण के सम्बंध में जानकारी, पर्यावरण जागरूकता मार्च, चित्रकला प्रतियोगिता, पोस्टर प्रदर्शनी कार्यक्रम शामिल रहें।

jk"Vªh; foKku fnol

रेय आफ साईंस क्लब (V3137010), उत्तर प्रदेश द्वारा विज्ञान दिवस के अवसर पर विज्ञान गतिविधियो एवं विज्ञान प्रदर्शनी का आयोजन किया गया। इसके अतिरिक्त इस अवसर पर क्लब द्वारा निबन्ध प्रतियोगिता और पोस्टर मेकिंग प्रतियोगिता का भी आयोजन किया गया तथा विजयी बच्चों को पुरस्कृत किया गया।

okf"kZd fjiksVZ

भास्कर एस्ट्रो एसोसिएशन (V3413003), लोहरदगा ने गत् वर्ष 2014 में अनेक प्रकार के कार्यक्रर्मो का संयोजन किया। इसमें मुख्य रूप से राष्ट्रीय विज्ञान दिवस पे संगोष्ठी, एस्ट्रोनोमिकल क्वीज़, शरद संपात दिवस, विज्ञान प्रदर्शनी, आकाश दर्शन इत्यादि कई कार्यक्रम शामिल रहें।

foKku fnol

विज्ञान दिवस के अवसर पर सी.वी. रमण विज्ञान क्लब (VP-BR0013), सारण द्वारा विज्ञान जागरूकता सप्ताह का आयोजन किया गया। इस दौरान क्लब द्वारा वृक्षारोपण कार्यक्रम, विभिन्न विषयों पर संगोष्ठी, अधंविश्वास के प्रति जागरूकता रैली और स्वास्थ्य जागरूकता कार्यक्रम का आयोजन किया गया।

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