

VIPNET

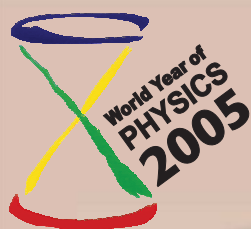


NEWS

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Sir Chandrasekhara Venkata Raman

The discovery that a photon could give all or part of its energy to an electron (photoelectric and Compton effect) had firmly established the quantum theory. The Raman Effect was an important step further. When monochromatic light was scattered by a transparent object, the scattered light was seen to possess, besides the original wavelength, both higher and lower wavelengths.

Why should light come out with increased energy? Because it can both give and take some energy from the molecule. Raman interpreted all aspects of this phenomenon. The molecules in an object can rotate around a fixed axis, and can also oscillate with respect to each other, that is, they have rotational and vibrational energy. The photon can both give and take from this energy, resulting in scattered light having lower or higher energy. An accurate measurement of these changes was now a powerful tool in the hands of physicists and chemists.



The Raman effect kept scientists of the next two generations busy. Many well-known scientists in India are his disciples. Raman also contributed substantially to acoustics and to the perception of colour by the human eye. He was awarded the Nobel Prize for Physics in 1930.

- Born on November 7, 1888 at Thirivanikkaval, Tamil Nadu, India.
- Studied in Presidency College in Madras and Passed BA examination in 1904 with Gold Medal in Physics.
- Completed MA from same college in 1907 with the highest distinction.
- Became the Honourary Secretary of the Indian Association for the Cultivation of Science in Calcutta in 1919.
- Accepted the offer of the Palit Chair of Physics at Calcutta University and served from 1917 to 1933.
- He was elected a Fellow of the Royal Society early in his career (1924), and was knighted in 1929.
- Founded and served as Editor of the Indian Journal of Physics in 1926.
- Awarded the Nobel Prize for Physics in 1930 for his work on the scattering of light and for the discovery of the effect named after him.
- Joined as Professor at the Indian Institute of Science, Bangalore in 1933 and served there till 1948.
- In 1948 opened the Raman Research Institute at Bangalore and served there as the Director.
- Awarded Bharat Ratna in 1954.
- Sponsored, established and served as the President of the Indian Academy of Sciences, Bangalore.
- Served as the President of the Current Science (India) journal of the Current Science Association, Bangalore.
- Died on November 21, 1970.



Natural Colours for Holi

Holi a festival of vibrant hues, heralds the advent of spring-literally as well as figuratively. Who has not noticed the riot of colours with which flowers bloom all about? Indeed, Holi is a festival of colours; joy and happiness. Nonetheless by using the artificial colours that are available in the markets,



this festival of colors may turn sour and spoil your health. Most of the holi colors sold in the market are oxidized metals or industrial dyes mixed with engine oil. E.g.: -The Green colour available in the market is usually made from Copper Sulphate, purple is chromium iodide and silver is aluminum bromide. These chemicals are toxic and can cause skin allergies, eye irritation, blindness and much more. The hazard increases when these are mixed with oil and applied to the skin. By doing so these chemicals sneak easily through the skin pores into the body system. Not only these colours affect our health but they harm our environment too. When washed, they enter the rivers and the soil and increase pollution.

Due to the harmful effects of artificial chemical colours; environmentalists are now strongly advocating the use of natural colors. In earlier times, the flower of Harsingar used to be soaked in water all night to get a sweet fragrance and a brilliant mustard colour. The use of traditional flowers has quite vanished, giving way to synthetic dyes, available in the form of pigments. These natural holi colors are perfectly safe and do not cause any harm to skin or to the face. These cause rather little trouble if accidentally fall into our eyes while playing Holi.

Some easy steps for preparing natural colours at your home.

Green

Dry: Use mehendi / henna powder (not mixed with amla) separately or mix with equal quantity of any flour to attain a lovely green shade. Dry mehendi will not leave color on your face as it can be easily brushed off. Only mehendi mixed in water might leave a slight color on your face. Many people like smearing other person's hair with colors. How about doing it with mehendi powder and saving a trip to the parlor..? Dry and finely powder the leaves of Gulmohur tree for a green colour. Crush the tender leaves of the Wheat plant to obtain a natural safe green Holi color.



Wet: Mix two teaspoons of mehendi in one litre of water. Stir well. Green color can also be obtained by mixing a fine paste of leaves like spinach / palak, coriander / dhaniya, mint / pudina, etc. in water.

Color	Chemical Composition	Effect on health
Black	Lead Oxide	Renal failure, Learning disability
Green	Copper Sulphate	Eye allurgy, Temporary blindness
Purple	Chromium Iodide	Bronchial astgnam akkergues
Silver	Aluminium Bromide	Carcinogenic
Red	Mercury Sulphite	Skin Cancer, Minamata, Mental retardation



Saffron

Wet: The Flame of the Forest (*Butea monosperma*), known as Tesu, Palash or Dhak in Indian languages, is the source of the wonderful, traditional color for Holi. The flowers are soaked overnight in water and can also be boiled to obtain a fragrant yellowish orange colored water. Legends say Lord Krishna used to play Holi with Tesu flowers. Boil flowers petals of Semul / Silk Cotton, (a red variety of *Bombax ceiba*) in water. Both Tesu and Semul bloom during February & March and are plenty during Holi. Collect and dry the stalks of Harashringar / Parijatak (*Nyctanthes arbontristis*) flowers during the early winter season. Soak them in water to get a pleasant orange color. Mix a pinch of sandalwood powder in 1 litre of water for an instant, beautiful and fragrant saffron color. Soak a few stalks of Saffron / Kesar in 2 table spoons of water. Leave for few hours and grind to make a fine paste. Dilute with water for desired color strength. Though expensive, it is excellent for the skin.

Red

Dry: Raktachandan or Lalchandan gives a beautiful red color. This can be used instead of Red gulal. After drying red hibiscus flowers in the shade powder it to make a lovely red color. To increase the bulk add any flour to it, in proportion to the vibrancy of the color you want to obtain. Sinduria (*Annato*) has a water chestnut shaped fruit, which contains lovely brick color red seeds. These yield both dry and wet colors.

Wet: Put two teaspoons of Red Sandalwood powder in five litres of water and boil. Dilute with 20 litres of water. Peels of Red Pomegranate boiled in water give red. Mix a pinch of lime powder (the one that we eat with our paan / betel leaves) in half a cup of water and add 2 table spoon of haldi (turmeric) powder in it. Mix it thoroughly. Use only after diluting with 10 litres of water. Buras (*Rhododentron arboreum*) known as Burans in the Garhwal hills and Brand in the Kumaon hills gives a lovely red color when soaked in water overnight. The Palita Madar / Pangri / Indian Coral tree (*Erythrina indica*), found commonly in coastal regions, has large red flowers. Soak the flowers in water overnight.

Boil wood of Madder Tree in water for a deep red. Red color can also be obtained from juice of tomatoes and carrots.

This can be diluted with sufficient quantity of water to remove the stickiness.

Yellow

Dry: Mix two teaspoons of haldi / turmeric powder with double the quantity of besan (gram flour). Haldi and besan are extremely healthy for our skin, and are also used widely as a ubtan while taking bath. You can use the ordinary haldi or "kasturi" haldi which is very fragrant and has enhanced therapeutic effects. Besan can be substituted by wheat / rice / arrowroot flour or talcum powder.

Flowers like Amaltas (*Cassia fistula*), Marigold / Gainda (*Tagetes erecta*), and Yellow Chrysanthemums yield different shades of yellow. Dry the petals of these flowers in shade and crush them to obtain a fine powder. Take appropriate quantity of the powder and mix it with besan or use separately.

Dry the rind of the Bael fruit (*Aegle marmelos*) and grind to obtain a yellow colored powder.

Wet: Add one teaspoon of haldi to two litres of water and stir well. This can be boiled to increase the concentration of color and further diluted. Soak 50 marigold flowers in 2 litres of water. Boil and leave overnight.

Magenta

Wet: Slice or grate one Beet root. Soak in 1 litre of water for a wonderful magenta. Leave overnight for a deeper shade. Dilute with water. Boil the peels of 10-15 onions in half litre of water for an orangish-pink color. Remove the peels before using to remove the smell.

Blue

Dry: Jacaranda flowers can be dried in the shade and ground to obtain a beautiful blue powder. The flowers bloom in summers. The blue Hibiscus (found in Kerala) can be dried and powdered.

Wet: Crush berries of the Indigo tree and add to water for desired color strength. In some Indigo species the leaves when boiled in water yield a rich blue.

Enjoy Holi safely yet with colours all around with your friends and family.

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The International Year of Physics 2005

The International Union of Pure and Applied Physics has declared the year 2005 as the “World Year of Physics”. The General Assembly of the United Nations also declared 2005 as the “International Year of Physics”.

The year 2005 coincides with the 100th anniversary of Albert Einstein’s “miraculous year” in which he published three important papers describing ideas that have influenced all of modern physics.

In 1905, Einstein wrote his three legendary papers on light quanta, Brownian motion and the special theory of relativity which provided the basis of three fundamental fields in physics. The first paper claimed that light must sometimes behave like a stream of particles with discrete energies, ‘quanta’. The second paper offered an experimental test for the theory of heat. The third paper addressed a central puzzle for physicists of the day – the Special Theory of Relativity.

The year 2005 also marks the century of the Golden Decade 1895 – 1905 in which momentous discoveries in physics were made, say, for example: X-rays in 1895, Radioactivity in 1896, the Electron in 1897, Quantum Theory in 1900 and explanation of photo electric effect and Relativity in 1905.

The World Year of Physics 2005 is a worldwide celebration of physics and its important in our everybody lives. Physics not only plays an important role in the development of science & technology but also has a tremendous impact on society. World Year of Physics aims to raise the worldwide awareness of physics and physical science.

Although physics has played a crucial and important role in our day-to-day activities, it is noted that the general public’s awareness of physics is decreasing. The number of physics students in high schools and university has dramatically declined over the past few years. One of the ways the public awareness of physics can be improved by publishing reviews of work that has taken place in the recent past in our labs and institutions. Currently, research activity in physics in our country cover a wide spectrum of topics; elementary particles physics, materials science, plasma research, solid state physics, fluid dynamics, nuclear physics, quantum phenomena and so on. The contributions of physics to other science would play a crucial role in solving global

problems such as energy production, environmental protection and public health.

Number of events, conferences, festivals would be organized world over to celebrate the World Year of Physics. Like many organisations in India, Vigyan Prasar has also initiated number of activities to mark the World Year of Physics in collaboration with NCSTC and other agencies. Vigyan Prasar would bring out variety of software- publications, films, radio programme, T V programmes, CD-ROM, poster sets, slide shows and many other resource materials.

You can too organise an event in your community. There are no limits to what you can do for World Year of Physics 2005. Every event would help to raise the awareness of physics in our society. Physics is all around us, not just hidden in school classroom.

The themes of activities could be :-

- Promotion of public understanding of physics and physical sciences.
- Physics in Education.
- Physics as the basis of many other disciplines and incubators for newly emerging science & technology fields.
- The great challenge of physics for the 21st century.
- Physics in developing countries and physics for development.
- Women in physics.
- The cultural heritage of physics, from the Egyptians and ancient Greek legacy to modern physics.

Ideas for activities:

- Exhibition on physics and its achievements
- Hold a physics day
- Physics Poster competition
- Touring lecture series
- Invite scientist in your area/school/club.
- Interaction with local industry, technology parks, research lab, science museums in your area.
- Science based programme on local TV channel
- Publication of physics news items in local newspapers, bulletin boards of schools, colleges, science clubs.

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Thermometer

Things you require

- Two white card board sheets, each (55x70cm).
- Meter Scale or Stick.
- Red crayon or colour pen/pencil chalk.
- Marking Pen.
- Transparent Tape.

Procedure

1. From one of the sheets of card board, cut a 35cm x 70cm strip and an 20cm x 70cm strip.
2. Colour the bulb on the large strip and one side of the narrower strip red. Figure
3. On the larger strip, draw a thermometer using the measurements shown in the diagram
4. Cut out and remove the 10cm x 55cm section above the thermometer bulb.
5. From the second sheet of card board, cut a 35cm x 70cm strip.
6. Cut a 25cm slit at 10 cm from the short edge of the strip. The slit should be centered horizontally.
7. Place the strip behind the thermometer and tape the edges of the two strips together.
8. Insert the narrow paper strip into the slit so that the red side shows through the cutout section of the thermometer.

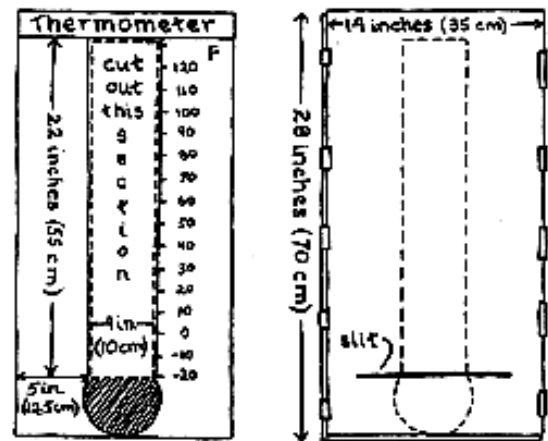
Holding the poster, slowly pull the red strip down and observe its height at each temperature mark.

Result

In this experiment you find that moving of the red-coloured strip up and down makes the temperature reading on the thermometer increase and decrease.

Why does it happen?

A thermometer is an instrument used to measure temperature, which is a very important part of the weather. Temperature measures how hot a material is, which equals the average kinetic energy (energy of motion) of the molecules in the material. The higher the temperature of a material, the faster its molecules are moving around.



As molecules move faster, they move farther apart.

In a real thermometer, as the material in the bulb gets hotter, it expands and moves up the tube. As the

To explore

1. Our skin can also sense changes in temperature. take 3 bowls, number them. Fill into them water at different temperatures : Bowl 1-little warm, Bowl 2-Cool, Bowl 3-Icy cold. Put a finger into Bowl 1 and ask your friend to put in Bowl 3. After 30 seconds immediately place both of your fingers in Bowl 2. What is the difference in temperature you both observe?

material cools, its molecules move slower and move closer together, and the material moves down the thermometer tube. There are two scales for measuring temperature- the Fahrenheit scale and the Celsius scale. Weather forecasters use maximum-and-minimum thermometers which record the highest and lowest temperature over a given period.

A thermometer is standardized. This means that the different heights along the tube are marked so that the distance from one mark to the next represents a change of the same number of degrees in the temperature of the material.

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क्या आप जानते हैं?

पृथ्वी में मनुष्य कब प्रकट हुआ?

माना जाता है कि लगभग 400 करोड़ साल पहले पृथ्वी में जीवन की उत्पत्ति हुई थी। शुरुआत में जीवन का उद्भव एकल-कोशिका जीव के रूप में हुआ था। मगर जैसे-जैसे समय बीतता गया एकल-कोशिका जीव बहु-कोशिका एवं जटिल प्राणियों में विकसित हुआ। मनुष्य का उद्भव बाद में संभव हुआ। मान लीजिए जीवन की शुरुआत से आज तक की अवधि को एक साल हुआ। आइए इस साल को जीवन साल कहा जाए। इस जीवन साल का एक दिन लगभग एक करोड़ सामान्य सालों के बराबर होगा। इस साल के अगस्त महीने में शैवाल जैसा जीव पैदा हुआ। सितंबर महीने के आखिर में नरम शरीर वाले प्राणियों का आगमन हुआ। इसी "जीवन साल" के नवंबर मास के बीच में पहले मछली का विकास हुआ। नवंबर महीने के आखिर में जमीन में रहने वाले पौधे और उभयचर प्राणियों का विकास हुआ। दिसम्बर के आरंभ में सरीसृप वर्ग या जमीन पर रेंगने वाले प्राणियों का उद्भव हुआ। पहला डायनोसोर दिसम्बर के बीच में प्रकट हुआ और इसी महीने के आखिरी सप्ताह शुरू होते ही सभी डायनोसोर पृथ्वी से विलुप्त हो गये। दिसम्बर के तीसरे सप्ताह के बीच में पहली बार पक्षी को उड़ते हुए देखा गया। बंदर जैसे प्राणी दिसम्बर के आखिरी सप्ताह के बीच में प्रकट हुए। मनुष्य "जीवन साल" के दिसम्बर की 31 तारीख को शाम को प्रकट हुए।

ब्रह्मांड में कितने मौलिक बल काम करते हैं?

ब्रह्मांड में हम चार किस्म के मौलिक बल काम करते हुए देखते हैं।

1. प्रबल नाभिकीय बल
2. विद्युत् चुम्बकीय बल
3. दुर्बल नाभिकीय बल
4. गुरुत्वीय बल

इसमें से दोनों गुरुत्वीय और विद्युत्-चुम्बकीय बल दीर्घ परास बल हैं। प्रबल और दुर्बल नाभिकीय बल निकट परास भार बल हैं।

यह गुरुत्वीय बल ही है जो सभी ग्रहों को सूर्य की कक्षा में रखता है। गुरुत्वीय बल ही तारों को एकत्र करके गैलेक्सी बनाता है। गुरुत्वीय बल उन सभी कणों के बीच काम करता है जिनमें भार होता है। चारों मौलिक बलों में से गुरुत्वीय बल सबसे कमजोर बल है।

विद्युत्-चुम्बकीय बल एक ठोस पदार्थ को अपने आप बिखरने से रोकता है। यह सभी कणों के बीच में काम करता है जिनमें विद्युत अथवा चुम्बकीय आवेश (चार्ज) हो। विद्युत्-चुम्बकीय बल, वह आकर्षण पैदा करता है जिसके द्वारा एक परमाणु में नाभिक के चारों ओर इलेक्ट्रॉन को पकड़े रखता है अर्थात् विद्युत चुम्बकीय बल न होता तो परमाणु का अस्तित्व नहीं होता। इसका मतलब कोई पदार्थ नहीं बनता।

प्रबल नाभिकीय बल केवल परमाणु के नाभिक के अन्दर काम करता। यह बल नाभिक के अन्दर प्रोटॉन और न्यूट्रॉन को एक साथ बांध के रखता है। दुर्बल नाभिकीय बल मूलकणों के बीच में काम करता है और कुछ नाभिकीय अभिक्रियाओं के लिए जिम्मेदार होता है। उदाहरण के तौर पर विटा 'क्षय' नामक एक विशेष रेडियोएक्टिव क्षय का कारण दुर्बल नाभिकीय बल होता

है। तारे में, जैसे कि सूर्य में कुछ नाभिकीय अभिक्रिया की दर को नियंत्रित भी करता है।

चारों मौलिक बलों की तुलना

गुरुत्वीय	विद्युत् चुम्बकीय	प्रबल नाभिकीय	दुर्बल नाभिकीय
क्षेत्र	अपरिमित	अपरिमित	10 ⁻¹⁵ मी.
आपेक्षिक शक्ति	10 ⁻³⁹	10 ⁻²	1
			10 ⁻⁵ मी.

सबसे छोटे तारे का भार क्या होगा?

किसी तारे का सबसे कम संभव भार सूर्य के भार का 8 प्रतिशत हो सकता है। सूर्य का भार है : 2×10^{30} किलोग्राम अर्थात् सबसे छोटे तारे का भार होता है : 1.6×10^{29} किलोग्राम। ये भार सबसे बड़े ग्रह बृहस्पति (जूपीटर) के भार से लगभग 80 गुना के बराबर होता है। जूपीटर का भार 1.9×10^{27} किलोग्राम है। इससे कम भार वाला पिंड धुंधला सा दिखाई देता है, चमकीला नहीं होता। इस तरह के पिंड को बादामी वामन (ब्राउन ड्वार्फ्स) कहा जाता है।

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गाथा मोटर कार की

आओ बच्चों तुम्हें सुनाए, गाथा मोटर कार की।
जग में पायी जाने वाली, कारों के संसार की॥
सबसे पहले फ्रांस देश ने, डेबिल कार बनायी।
और भाप के इंजन से थी, सड़कों पर दौड़ायी॥
फिर जर्मन के कार्लो बेन्ज ने, करतब एक दिखाया
पेट्रोल से चलने वाला, इंजन नया लगाया॥
अमरीका के फोर्ड हेनरी, ने फिर धूम मचायी।
छोटी-बड़ी सभी के मन की, कारें खूब बनायी।
इसके बाद बनी फिर कारें, विद्युत डीजल की।
कम्प्यूटर से युक्त हो गयीं, कारें बड़ी निराली॥
आज देश में धूम मची है, जापानी कारों की।
सेन्ट्रो रौनक बनी हुई है, सड़कों और बाजारों की॥
आओ बच्चों तुम्हें सुनाए, गाथा मोटर कार की...।

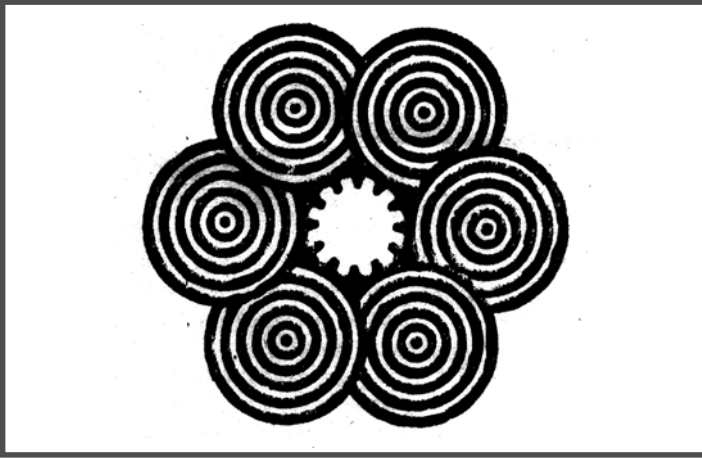
□ सुनीता मौर्या

सदस्य, यूनीफाइड साइंस क्लब,
प्रतापगढ़, उ.प्र.



जादुई वृत्त

दृष्टिभ्रम अर्थात् इल्यूजन की मदद से जादूगर हमें चकित कर देते हैं। आप भी चाहें, तो इसी दृष्टिभ्रम की मदद से अपने मित्रों को चकित कर सकते हैं। यहां दिए गए चित्र को काट कर एक मोटे गत्ते पर चिपका लें। अपनी नजरों को इन वृत्तों पर केन्द्रित करते हुए चित्र को एक छोटा-सा वृत्त बनाते हुए गोल-गोल घुमाएं। यदि आप चित्र को घड़ी के घूमने की दशा में घुमा रहे हैं, तो आपको बाहरी पांचो वृत्त इसी दिशा में घूमते हुए दिखाई देंगे। किन्तु जरा बीच के पहिए को तो देखें। वह इनसे विपरीत दिशा में घूमता दिखाई देगा।



अब इसे रोक कर चित्र को एण्टीक्लॉक दिशा में घुमाएं। सभी बाहरी गोले उसी प्रकार घूमने लगेंगे, किन्तु बीच का पहिया एक बार फिर से अपनी दिशा बदल लेगा और इस बार वह क्लाक वाइज अर्थात् घड़ी की दिशा में घूमता नजर आएगा। पहिए की आकृति भी वृत्ताकार है, शेष गोले भी वृत्ताकार है, किन्तु यह सिर्फ इनके डिजाइन और स्थिति का अंतर है कि दृष्टिभ्रम के कारण बीच वाला पहिया विपरीत दिशा में घूमता नजर आता है।

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प्रिय विपनेट सदस्यों,

हमें आपके विज्ञान क्लबों के समाचार नियमित मिलते रहे हैं और हम उन्हे विपनेट न्यूज़ में शामिल करते रहे हैं। हमें आप द्वारा समय-समय पर की गई विज्ञान गतिविधियों की जानकारी भी मिलती रही है। यदि आप अपनी गतिविधियों को प्रकाशन हेतु लेख के रूप में हमें उपलब्ध करावाएँ तो अन्य सदस्यों तक आपकी बात प्रभावी ढंग से पहुँच सकती है। आप विपनेट में प्रकाशनार्थ- विज्ञान, प्रौद्योगिकी, स्वास्थ्य, पर्यावरण, समुद्र, कृषि, अंतरिक्ष एवं अन्य विज्ञान से जुड़ी जानकारियाँ, निबन्ध, आलेख, विज्ञान कविता आदि भेज सकते हैं। यदि आपके गाँव या ज़िले में कोई नवीन वैज्ञानिक अनुसंधान चल रहा है, तो उसकी जानकारी भी अवश्य भेजें।

—सम्पादक

विपनेट प्रश्नावली श्रृंखला-104 के सही उत्तर

विपनेट न्यूज़ के अक्टूबर अंक में हमने आपसे दो प्रश्न पूछे थे: (1) ठण्डक में हम काँपते क्यों हैं? (2) सर्दियों के दिनों में, निःश्वसन द्वारा बाहर निकाली गई वायु, हमें दिखाई क्यों देती है? सही उत्तर भेजने वाले तीन विजेताओं को विज्ञान प्रसार की पुस्तकें पुरस्कार स्वरूप भेजी जा रही हैं। बधाइयाँ...!

विजेताओं के नाम इस तरह हैं:

1. देवेन्द्र कुमार पाण्डे, मोतीहारी, पूर्वी चम्पारण, बिहार
2. हिमांसु सेखर फतेसिंह, झरसूगुड़ा, उड़ीसा
3. राम किशोर शर्मा, बराँवकला, रोहतास, बिहार

ठण्डक में हम काँपते क्यों हैं?

शरीर में कंपन (फिजिकल थर्मोजेनेसिस) तब होता है जब हमारी कंकालीय माँसपेशियों में तनाव एक समीक्षात्मक स्तर से आगे बढ़ जाता है या 37.1 डिग्री सेंटीग्रेड (निर्धारित बिन्दु) के समीक्षात्मक स्तर से नीचे चला जाता है। वास्तव में शरीर का काँपना, माँसपेशियों का अनैच्छिक संकुचन है, जो कि ज्वर के समय या ठण्डक में शरीर के तापमान को स्थिर रखता है। इस दौरान दोलन कर रही माँसपेशियों में संकुचन 10 से 20 दोलन प्रति सेकेण्ड की दर से होता है। पहले यह कंपन गति अनियमित होती है, लेकिन कुछ ही समय में माँसपेशियों के छोटे-छोटे समूह अलग-अलग गति से कंपन करने लगते हैं। इस विषमकालिक गति के कंपन के दौरान, इससे जुड़े भागों में समान गतिशीलता नहीं रह पाती।

अध्ययनों में यह पाया गया है कि काँपने से 42.5 कैलोरी प्रति घण्टा उत्पन्न हो सकती है, जो कि कमरे के तापमान पर मनुष्य की सामान्य चय-अपचय क्रिया से लगभग सात गुना अधिक है।

सर्दियों के दिनों में, निःश्वसन द्वारा बाहर निकाली गई वायु, हमें दिखाई क्यों देती है?

सर्दियों के दिनों में निःश्वसन द्वारा बाहर निकाली गई वायु, ओस बनने के कारण हमें दिखाई देती है। फेफड़ों से बाहर निकली वायु में मुख्यतः जल वाष्प और कार्बन डाई ऑक्साइड होती है। इस वायु का तापमान 40° सेंटीग्रेड होता है, जबकि बाहरी वातावरण का तापमान 10° डिग्री सेंटीग्रेड या और कम होता है। ठण्डी वायु, गर्म के समान जल वाष्प को नहीं थाम सकती। ओस तब बनती है, जब वायु उस बिन्दु तक ठण्डी हो जाए, जहाँ यह जल वाष्प को न पकड़ सके, अतः जल वाष्प नमी के कारण सघन नन्ही जल बूँदों में बदल जाती है। वह तापमान, जिस पर वायु में नमी उसे संघनित कर देती है, ओस बिन्दु कहलाता है। यदि सापेक्ष आर्द्रता 100 प्रतिशत है, तो 'ओस बिन्दु' वातावरणीय तापमान के लगभग बराबर होगा। इस प्रकार ठण्डक के दिनों में निःश्वसन द्वारा बाहर निकली वायु 40° सेंटीग्रेड से 10 डिग्री सेंटीग्रेड या इससे कम तापमान तक ठण्डी हो जाती है, जो कि ओस बिन्दु से कम लेकिन हिमांक से अधिक है। अतः नन्हें-नन्हें जल कणों के वायु में तैरने से वायु हमें दिखाई पड़ती है।

□ विपनेट डेस्क

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Antioxidants: Natural Elixir of Healthy Life

Today every one of us wishes to remain young throughout the life and many of us spend a lot to maintain our body young and glamorous. This desire of human being attracted the researchers to discover chemicals and herbs which can at least delay aging and helps in maintaining shining wrinkle free skin with disease free healthy body and antioxidants proved to be the most effective anti-aging agent at present worldwide, which delays onset of aging to keep us young & healthy throughout the life.

At present antioxidants are of interest to both food scientists and health professionals, antioxidants are substances when present in food or in body at low concentration retards or prevents undesirable oxidation of substrates thus such compounds that inhibits unwanted oxidation of substance by free radicals are called Antioxidants, both natural and synthetic antioxidants are in a great demand as they are widely used in food, pharma, cosmetics and nutraceutical industries worldwide. At present about 600 chemicals are in the list of antioxidants and many more are under research. Today BHA, BHT, PG & TBHQ are most widely used as synthetic antioxidants whereas extracts of herbs like rosemary, Sage, Green Tea leaves & wheat grass are used as natural antioxidants. However, Tocopherol (Vitamin E), Ascorbic Acid (Vitamin C), Carotenoids, Flavonoids, Polyphenols & Tanins are also very popular GRAS (Generally Regarded as Safe) approved natural antioxidants whereas Butylated Hydroxy anisole (BHA) has been removed from the GRAS list due to its carcinogenic potential. Fresh fruits, vegetable oilseeds and spices are best natural sources of natural antioxidants.

Antioxidants & Food Industries

Antioxidants are widely used in fats/oil industries and allied food products containing lipids in considerable amount like potato chips, butter, fried foods, biscuits and other snack foods. Antioxidants application in fat/oil based food products delays or prevents onset of undesirable off rancid flavour in them that decreases food quality (rancidity). As we know fats and oils are triglycerides of saturated & unsaturated fatty acids and polyunsaturated fats are very prone to oxidation in presence of free oxygen, this self oxidation is termed as autoxidation of lipids (fats). The auto-oxidation of lipids is initiated by free radicals present in foods and free radical are also produced by

decomposition of hydroperoxides which is a byproduct of lipid oxidation reaction, thus this initiates a chain reaction to produce undesirable chemicals to develop off flavour in fats/oil and allied food products. Ascorbic acid, isoascorbic acid and citric acid are the substance which are used to enhance the activity of antioxidants and are called Synergists. Thus, role of antioxidants in fats & oil based food industries is remarkable. Today one cannot aspect for quality food products without antioxidants especially from fats & oil based industries.

Antioxidants also plays very important role in fruit & vegetable processing industries as they inactivate peroxidase and phenolase enzymes in fruit & vegetables to prevent them from browning when they are in direct contact with oxygen. Ascorbic acid, Citric acid and Ethylenediamine tetra acetic acid (EDTA) are major anti-browning antioxidants used in fruit/vegetables industries for quality processed fruit & vegetable products.

Antioxidants as Anti-aging

As we know oxygen burns carbohydrate (glucose molecule) in mitochondria of cell to release energy together with production of carbon dioxide & water as byproduct (respiration). This is the most significant mechanism of life process produces small amount of unstable oxygen molecules as intermediate product that leaks out of the mitochondria of cell instead of being converted into water and carbon dioxide. These unstable oxygen molecules are called free radicals e.g. super-oxide and hydrogen peroxide. These free radicals causes damage to cell membrane, proteins and nucleic acid along with alteration in intra and inter cellular environment which finally results in promoting aging, cardiovascular diseases, cancer, high blood pressure, impaired skin, memory loss etc. Free radicals induces change in polypeptide chain of proteins resulting in cross linkage to form insoluble polymers which is the root cause of aging and presence of antioxidants inhibits degenerative polymerization to delay aging and promote healthy wrinkle free glowing skin. Antioxidant Vitamin E & extract of Aloe-Vera are used by nearly all cosmetic industries in their almost all kinds of products for skin and hair care.

Free radicals also causes great damage to blood vessels causing cardiovascular diseases like Atherosclerosis

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विटामिन सी किन पदार्थों में है?

क्या लेना है?

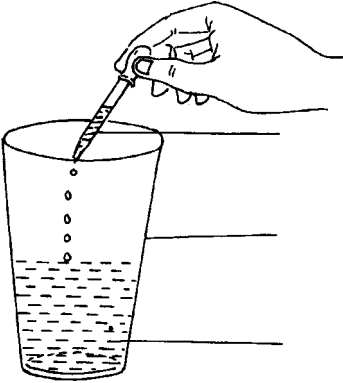
- कांच का गिलास, स्टार्च, टिंचर आयोडीन, नींबू अथवा संतरा।

क्या करना है?

- कांच के गिलास को आधा पानी से भरना है।
- उसमें थोड़ा चावल का मांड (स्टार्च) डालकर हिलाना है।
- अब टिंचर आयोडीन की कुछ बूंदें डालनी हैं।
- घोल का रंग नीला हो जाता है।
- अब उसमें संतरे अथवा नींबू का रस डालकर हिलाना है।

क्या बताना है?

- नीले रंग के घोल का कौन-सा रंग बना है?



क्या करण है?

? नींबू में उपस्थित विटामिन "सी" आयोडीन से क्रिया करके नीले घोल को रंगहीन कर देता है।

क्या याद रखना है?

- विटामिन "सी", आयोडीन से स्टार्च में बने नीले रंग को रंगहीन कर देता है।

□ स्रोत: गिलास से कुछ और खेल, प्रकाशक: विज्ञान प्रसार

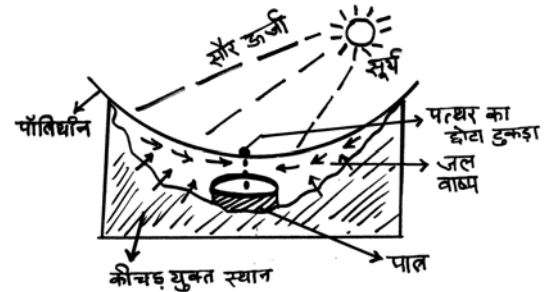
कीचड़ युक्त स्थान से पेय जल प्राप्त करना

प्रयुक्त सामग्री: एक पारदर्शी पॉलिथीन का टुकड़ा, चार-पाँच ईंटे या बड़े पत्थर के टुकड़े, एक छोटा पत्थर का टुकड़ा, एक पात्र पानी रखने हेतु

सिद्धान्त: सौर ऊर्जा द्वारा वाष्पीकरण विधि के आधार पर

विवरण एवं कार्यविधि

सर्वप्रथम कीचड़ युक्त स्थान पर गढ़वा कीजिए। गढ़वे में पात्र को रख दीजिए। गढ़वे को पॉलिथीन से ढक दीजिए। चारों तरफ से पॉलिथीन को ईंटों या बड़े पत्थरों से दबा दीजिए, जिससे पॉलिथीन उड़ने ना पाये। फिर पालीथीन के बीचों-बीच एक छोटा पत्थर का टुकड़ा रख दीजिए पॉलिथीन दबाव के कारण थोड़ा नीचे की ओर झुक जाए (चित्रानुसार)।



जब गढ़वे में सूरज की रोशनी पड़ेगी तो गढ़वा व उसके आस-पास का स्थान गर्म होने लगेगा। कीचड़ युक्त स्थान लगभग गाढ़े रंग का होता है, जिस कारण यह अपने अंदर ऊष्मा को अधिक देर तक शोषित करेगा। इसी कारण कीचड़ में प्रयुक्त जल का वाष्पीकरण होने लगेगा और जल वाष्प पॉलिथीन से टकरायेगी, चूँकि पॉलिथीन के बीच में छोटा पत्थर का टुकड़ा रखे होने की वजह पॉलिथीन में पत्थर के द्वारा बनाए केन्द्र पर वाष्प जल में बदलकर एकत्रित होने लगेगी फिर वह धीरे-धीरे नीचे हुए पात्र में गिरेगी। इस प्रकार जल में एकत्रित पानी पूर्णतः शुद्ध व साफ होगा, जो कि आपात-कालीन समय में पीने के काम आ सकता है।

□ अनामिका सिंह

सदस्य, साइंस रिसर्च क्लब, बांदा, उ.प्र.

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(hardening of blood vessel), high blood pressure, heart attack etc. The best way to avoid these cardiovascular diseases is to increase antioxidants in our diet which neutralizes harmful free radicals. Free radicals also attacks nucleic acids by modifying their structure & changing their genetic code causing mutagenic & carcinogenic disorders resulting cancer, thus antioxidants also works as anti-carcinogenic agents by scavenging free radicals to protect us from cancer.

Thus we have seen that by including natural antioxidants in our diet in adequate amount does not only delay aging but

also protect us from various diseases. Therefore, we should intake natural antioxidants for our longevity. Fresh green vegetables & fruits are the best sources of natural antioxidants; other natural antioxidant compounds are Ascorbic acid, Vitamin E (Tocopherols) & Betacarotene (Vitamin A) etc. Some herbs like Rosemary, Sage, Green tea leaves are very commonly used as herbal source of natural antioxidants, Zinc and Selenium minerals also promotes formation of free radicals to retard aging..

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H+/Po-Golagadia Kaptipada
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**Basudev Multi Purpose
Mahila Samiti**

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Chhtabara
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Orissa - 752054

**Talent Gali Razia Begum
Science Club**

Add-4083 Gali Razia
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Delhi - 110 006
P.O.- Hauz Quazi
Dist:- Sadar
Delhi - 110006

**Talent Kaliyan Science
Club**

Add-1893, Gali, Koliyan,
Suiwalan, Jama-Masjid
Delhi - 110006

**Pathani Samanta Science
Club**

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Orissa - 766110

**Kaushik Girls Inter
Collage**

Add- Mohamad Pur Lala,
Meerut Cantt.
Uttar Pradesh

K.V.U.& R. D. Society

Konnagar: P.O.-Ghatal
Dist: Paschim Medinipur
West Benga - 721212

Samanta Science Club

Place:- Block colony Kotpad
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Dist:-Kalahandi
Orissa - 766023

**Bighneswar Science Club
(CRDC-40)**

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Post Office-Chikana Via-
Birijharpur
Dist: Jaipur
Orissa

**Pathani Sanani Science
Club (CRDC-38)**

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P.O.- Tikabali
Dist: Phulbani (Kandhamal)
Orissa

**Biraja Science Club
(CRDC-39)**

Goudasahi, Mansada Via-
Biriarpur
P.O. Mansada,
Dist: Jaipur
Orissa

**Kalpana Chawala
Science Club**

769, Nanak Marg, Ghandhi
Kalony, Jaisalmer
Dist:- Jaisalmer
Rajasthan

Suneeta Science Club

Vill-Shivsinghpur
P.O. Sarvodaya Ashram
Dist:- Eta
Uttar Pradesh - 207001

Prabhakar Science Club

41/31-A, K.Ks Hostel
Tota Ka Tal, Loha Mandi
Agra-2
Uttar Pradesh

Jigyasa Science Club

41/31-A, K.K.S. Hostel
Tota Ka Tal, Loha Mandi
Agra-2
Uttar Pradesh

**New age Children
Science Club**

Place:- Sitamarhi, Bihar
P.O. Dumara
Dist:- Sitamarhi
Bihar - 843301

**Nankargaon High School
Science Club**

Village-Nankargaon
P.O.- Dhantola Bazar
Dist:-Bongaigaon
Assam - 783372

**Talent Gali Naal Bandan
Science Club**

Add. H.No. 3017
Gali Naal Bandan
Shahganj Chowk
Ajmeri Gate
Dist:- Sadar Pahadh Ganj
Delhi - 110006

Talent Happy Club

1586, Gali Badi Peepal Wali
Pahavi Bhojla
Baga ar0
Delhi - 110026

Talent children Zone Club

1427, Bazar Chitli Qabar
Jama Masjid
Delhi
110006

HT & CTC Talent Club

1381 IIRD floor, Pahari Imli
Jama-Masjid
Delhi
110006

Islamia Talent Club

Islamia Middle School,
Pahari Bhojla,
Bazar Chitli Qabar Jama
Masjid
Delhi
110006

**Talent-Orien Public
School Club**

Sarak Prem Narayan,
Chooriwalan
Delhi
110006

Talent-Ideal Science Club

2068, Gali Moulvi
Qutubuddin,
Kali Masjid
Delhi
110006

□ **VIPNET Desk**
nkapoor@vigyanprasara.com



Organic Holi : Holi Ke Rang Phoolon ke Sang

Holi is most colourful festival of our country, marks the farewell to winter and welcome to spring season. Holi matches the riot of colours of spring in full bloom and traditionally was played by making colours from the flowers blooming at that time and even herbs etc. The fragrant natural colours also had therapeutic value and were beneficial for our skin and health. The ingredients of Gulal were purposely chosen for their emollient qualities, which were far from today's toxic colours. In Vrindavan Holi was and is still played with actual flower petals chosen for their fragrance and colour such as Rajnigandha and rose. But nowadays, most of the holi colours sold in the market are oxidized metals or industrial dye mixed with engine oil. The green colour comes from



copper sulphate, purple is chromium iodide, silver is aluminium bromide, black is lead oxide and shiny colours are results of powdered glass being added to the colours. All these colour are toxic and can results in any thing from skin allergies to cancer, eye irritation to blindness.... and much more.

Development Alternatives, non profit organization are running a CLEAN (Community Led Environment Action Network programme)-India programme in over 40 cities in India along with NGO network partners and Schools on various issue of environment concerned. The school student under CLEAN India programme creates the pressure group on community to ignore the use of synthetic colour. We conduct the workshop in schools and trained students on household recipe of natural colour and Students conduct the rally, door to door campaign in market and colonies and distribute the pamphlets depicted the harmful effect of synthetic colour and benefits of natural colours.

VIPNET Questionnaire Series

विपनेट प्रश्नावली शृंखला

प्रिय साथियो,

यहां हम दो प्रश्न दे रहे हैं, जिनके उत्तर आपको 15 दिनों के अंदर देने हैं। पहली तीन सही प्रविष्टियों के विजेताओं के नाम के साथ सही जवाब प्रकाशित किये जाएंगे और पुरस्कार स्वरूप विज्ञान प्रसार की पुस्तकें भेजी जाएंगी। आप अपने उत्तर हिन्दी या अंग्रेजी में भेज सकते हैं।

प्रश्न 1 : सामान्य ज्वर आने का क्या कारण है?

Question 1 : What causes common fever?

प्रश्न 2 : चीटियाँ छुपी हुई मिठाइयों तक कैसे पहुँच जाती है?

Question 2 : How do ants find their way to hidden sweets ?

अपने जवाब इस पते पर भेजें:-

विपनेट क्विज 108

विज्ञान प्रसार

सी-24, कुतुब इंस्टीट्यूशनल एरिया, नई दिल्ली 110016

VIPNET Quiz 108

VIGYAN PRASAR

C-24, Qutab Institutional Area, New Delhi 110 016



The natural holi colour is not only eco friendly but create livelihood also. The women member of self Help Group of Tikamgarh district prepare the natural holi gulal and create the seasonal employment for themselves in TARAGram campus, Orchha. The packaging material of gulal is made of recycled hand made paper which is bind with Kalawa. The women prepare three types of herbal gulal such as Red from Red sandal, Tesu flower, Rose petal, Yellow from Termeric powder, Marigold petals and green from Mehndi leaves, Rajnigandha flower petals, harshringar, pudina etc.

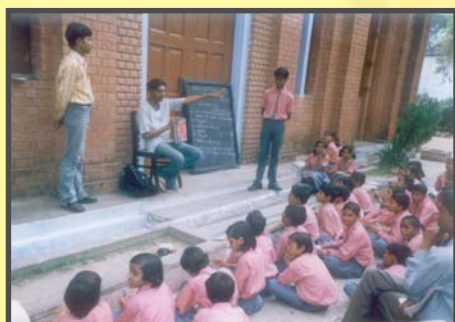
□ **Dr Anand Kumar Rai**



Members of Arya Bhatt Vigyan Club, Mauje, Ramgarwha, East Champaran, Bihar, collected donation for tsunami victims



Students of H.A.P.S., Hamirpur (H.P.) won prizes in 'Science Exhibition' organized by SCERT, Solan under the theme 'Recent trends in Science and Technology'



Science Research Club, Banda, U.P. organised a Science Model Training Workshop with rural school children



Eco Friendly Club, A.M.H.S. School, Thiruninravur, TN participated in Air Pollution Awareness Program and Tsunami rally-environmental procession



Nature Science Club, Nisarg Vigyan Mandal, Nagpur organised an Environmental Awareness Program-'Pradushan Mukta Maharashtra-2005' during December 2004



If you want to know more about Vigyan Prasar, its publications & software, besides the next moves of VIPNET Science Clubs, please write to us at the address given below :-

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