SCIENCE CENTRE NEWS LETTER

March 2018
Issue 35

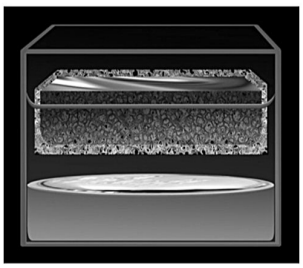
SCIENCE CENTRE

Volume 3, Issue 11

WHAT'S NEW IN SCIENCE

A new approach to rechargeable batteries.

A type of battery first invented nearly five decades ago could catapult to the forefront of energy storage technologies, thanks to a new finding by researchers at MIT (Massachusetts Institute of technology) and other institutions. The battery, based on electrodes made of sodium and nickel chloride and using a new type of metal mesh membrane, could be used for grid-scale installations to make intermittent power sources such as wind and solar capable of delivering reliable baseload electricity. The findings were being reported on 22nd January, 2018 in the Journal Nature Energy by a team led by MIT Professor Donald Sadoway, Postdocs Huayi Yin and Brice Chung and four others. Although the basic battery chemistry the team used, based on a liquid sodium electrode material was first described in 1968, the concept never caught on as a practical approach because of one significant drawback: It required the use of a thin membrane to separated its molten components, and the only known material with the needed properties for that membrane were a brittle and fragile ceramic. These paper thin membranes made the batteries too easily damaged in real world operating conditions, so the system has never been widely implemented. But Sadoway and his team took a different approach, realizing that the functions of that membrane could instead be performed by a specially coated metal mesh, a much stronger and more flexible material that could stand up to the rigors of use in industrial scale storage systems. As Sadoway and his team explored various options for the different components in a molten-metal-based battery, they were surprised by the results of one of their tests using lead compounds. "We opened the cell and found droplets" inside the test chamber, which "would have to have been droplets of molten lead" he says. But instead of acting as a membrane as expected, the compound material "was acting as an electrode", actively taking part in the battery's electrochemical reaction. In the end, the team found that an ordinary steel mesh coated with a solution of titanium nitride could perform all the functions of the previously used ceramic membranes. The results could make possible a whole family of inexpensive and durable materials practical for large scale rechargeable batteries. 'The use of the new type of membrane can be applied to a wide variety of molten electrode battery chemistries. The work could lead to inexpensive batteries large enough to make intermittent, renewable power sources practical for grid-scale storage', Sadoway says.



Courtesy :
'Shri Kunj Vihari Mehta Nagar Prathmic School No.5'

SCIENTIST OF THE MONTH

Kalpana Chawla

Kalpana Chawla was born on 17 March 1962 in Karnal, Punjab (now in Haryana). After getting a Bachelor of Engineering degree in Aeronautical Engineering from Punjab Engineering College, Chandigarh, she moved to the United States in 1982.

In 1988, she began working at NASA, where she did computational fluid dynamics (CFD) research on vertical and/or short take-off and landing (V/STOL) concepts. After becoming a U.S Citizen in April 1991, she was selected for her first flight in 1996 in NASA. Her first space mission began on November 19, 1997, as part of the six Astronaut crew that flew the Space Shuttle Columbia flight STS-87. In 2000, she was selected for her second flight as part of the crew of STS-107. During the launch of STS-107, Columbia's 28th mission, a piece of foam insulation broke off and struck the left wing of the orbiter. When Columbia re-entered the atmosphere of Earth, the damage allowed hot atmospheric gases to penetrate and destroy the internal wing structure, which caused the spacecraft to become unstable and break apart. Chawla died in this Columbia disaster which occurred on February 1, 2003.

On February 5,2003, the Prime Minister of India announced that the meteorological series of satellites, MetSat, was to be renamed "Kalpana".

Courtesy :
'Shri Kunj Vihari Mehta Nagar Prathmic School No.5'

Published by
M. Thennarasan
I.A.S.
Municipal Commissioner

Editor
A. G. Khatiwala
Add. City Engineer (Civil)

Sub Editor
Bhamini Mahida
Chief Curator
Divyesh Gameti
Curator (Science)

Co-ordinator
Dr. Pruthul Desai
Principal
P. T. Science College

SCIENCE CENTRE
SCS
SURAT

Timings

Tuesday to Friday
9.30 am to 4.30 pm

Saturday - Sunday
& Public Holidays
11.00 am to 6.30 pm

Address

Science Centre
City Light Road,
Surat - 395 007

Contact

0261 - 2255947
+91 97277 40807

Fax No.
91-261-2255946

E mail
sciencecentre@suratmunicipal.org

Web Site
www.suratmunicipal.gov.in

सूरत महानगर पालिका
बहुजनहिताय बहुजनसुखाय

SCIENCE FACTS MARCH 2018

1 March	Self Injury Awareness Day.
3 March 1838	American Astronomer, George W. Hill (who plotted the Moon's Orbit) was born.
3 March 1847	Mr. Alexander Graham Bell (Inventor of Telephone) was born.
3 March 1969	India's first Rajdhani Express train having speed of 140 km/h traveled for first time between Delhi and Hawrah.
4 March 1754	Benjamin Waterhouse (inventor of Smallpox vaccine) was born.
6 March 1937	Valentina Tereskowa (Lady Astronaut who was the first lady to enter into the space) was born.
8 March	International Women's Day (by UN).
8 March 1879	German physicist and chemist, Otto Hahn (Discoverer of radiothorium and actinium) was born.
9 March 1934	Uri Gagarin (world's first Astronaut) was born.
10 March 1876	Mr. Alexander Grehambel experimented for the first time to talk on telephone with his assistant Botish.
13 March 1781	Planet "Uranus" was discovered by well-known Astronomer Herschel.
14 March 1879	Sir Albert Einstein (discoverer of Theory of Relativity) was born.
16 March 1789	George Simon Ohm (discoverer of Ohm's Law) was born.
18 March 1858	German engineer, Rudolf Diesel (inventor of diesel motor) was born.
21 March 2016	It is the day when Day and Night time becomes equal.(Vernal Equinox)
21 March	World Down Syndrome Day.
22 March	World Day for Water.
23 March	World Meteorological Day. (WMO)
24 March 1854	Start of Telegram era in India by delivering first telegram from Kolkata to Agra.
27 March 1845	Wilhelm Conrad Rontgen (Noble prize winner & inventor of invisible 'X' rays) was born.
29 March 1967	Making of world's biggest submarine "9 Redoubtable (S611)" by France, which is having weight of 7780 ton and length of 419 feet.
U. N. : United Nations UNESCO United Nations Educational Scientific & Cultural Organization	

Answers: 1. A 2. C 3.C 4. A 5. D

KNOW THE EXHIBIT AT FUN SCIENCE GALLERY

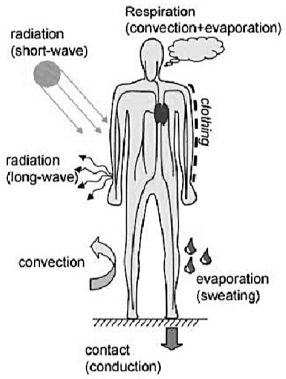
Does the wheel rotate?

Observe that the discs inside are rotating fast, and the patterns printed on them are not identifiable. Now press the switch and turn the regulator knob slowly until one of the discs appears stationary. You can now identify figure printed on it. Turn the knob further to similarly freest the motions of the other discs and see the images printed on them. Here, the spinning discs are normally illuminated by a continuously lit filament lamp which enables you to see them spinning at the beginning. As soon as you press the switch this lamp is put off and a pulsed beam of light from a hidden stroboscope falls on the discs. Turning the knob helps you adjust the pulse rate of this light to match it with the rotational frequency of the discs. For a correct match they appear stationary although still spinning rapidly. This is an illusion.

SCIENTIFIC QUESTION

How is our body temperature maintained?

The food, which we take, produces energy in our body through the process of combustion. The result of this combustion is a mild, exactly regulated warmth. The body maintains an average temperature of 98.6 degrees Fahrenheit (37 degrees Centigrade) and it is always maintained. Our body temperature is controlled by a centre in the brain, known as the temperature centre. There are actually three divisions of this temperature centre, a control centre regulates the temperature of the blood, another part raises the temperature of the blood when it drops and the third division cools the blood when the temperature is too high. When the blood temperature drops down, a part of the nervous system is stimulated into



action. Some glands send out enzymes to increase oxidation in the muscles and liver, and the internal temperature rises. The blood vessels of the skin contract, so that less heat is lost by radiation. Further, as the blood temperature drops too low, we feel shivering. The heating centre of the brain makes us shiver in order to produce heat. On the other hand, when the blood temperature rises, the cooling centre goes to work. It opens up the blood vessels of the skin so that the excessive heat can be eliminated by radiation. Perspiration is a quick method of cooling off for the body. Thus, by these methods the body temperature is always kept regulated and balanced.

Courtesy :
'Shri Kunj Vihari Mehta Nagar Prathmic School No.5'

SCIENCE PROJECT

Surat Municipal Corporation in collaboration with Surat Smart city Development Ltd. had organized "Science Fair" at ground floor of Art Gallery, Science Centre, Surat from 21st to 22nd July 2017. 'Shri Kunj Vihari Mehta Nagar Prathmic School No.5' presented their project on 'Hard water convert into soft water'. The Hardness of water in whole North Gujarat is found more. so, people in this area suffer from the stone and disease in Urethra. In this project the Hardness of water can be remove by ion transfer Principle.

In this project Sodium carbonate, Borex power, Activated Carbon, Plastic bottle, etc materials were used. In this project, firstly the water is passed through the activated Carbon filters. So that Bacteria, color, ordor were absord. After that, this water is free from the biological impurities, so the water can be pass through the cation exchange rasin filter. In this filter the Salinity of Calcium and Magnesium is removed. Cation rasin has a specialty of ions replacement, which equation is as follows:-

$$2R\text{-}Na^{+} + Ca^{++} = 2R\text{-}Ca + 2Na^{+}$$

$$2R\text{-}Na^{+} + Mg^{++} = 2R^{-}Mg + 2Na^{+}$$

The usefulness of this project is as follows:-

Hard water is convert into Soft water. This Soft water is use for drinking, to cook, in houses. The saltility of this water being decrease so that the usage of shop and detergent can be minimized. We can stop the Urethra disease such as stone.

Courtesy :
'Shri Kunj Vihari Mehta Nagar Prathmic School No.5'

SCIENCE QUIZ

1. What is the Scientific name of pure acetic acid?

A) Glacial acetic acid B) Cellulose acetate C) Polyvinyl acetate D) Ethyl acetate

2. What is the SI unit of power lenses?

A) Meter B) Ampere C) Dioptre D) Kelvin

3. The person sitting in a moving car posses which type of energy?

A) Kinetic energy B) Potential energy C) Both Kinetic and Potential energy D) Gravitational potential energy

4. Who proposed theory of natural selection?

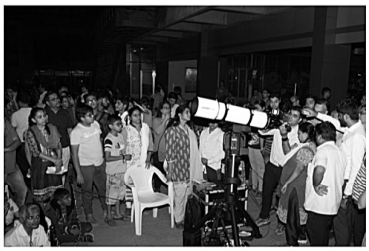
A) Charles Darwin B) Jean Baptise Lamarck C) Gregor Johann Mendel D) Hugo de vries

5. Which tissue transports nutrients down from the leaves to the rest of the plant?

A) Meristem B) Cambium C) Xylem D) Phloem

LUNAR ECLIPSE

Surat Municipal Corporation organized astronomical phenomena lunar eclipse through the telescope for Surat's citizens on 31/01/2018 from 6:40 pm to 8:40 pm. Earth is rotating around the sun and moon is rotating around the Earth. In such motion, sometimes Sun, Earth and Moon are come in a straight line. So that Solar eclipse and lunar eclipse occurs. After 10/12/2011, the first lunar eclipse occurred on 30/01/2018 and seen from whole India. The public took advantage of it.



SCIENCE LECTURE

Surat Municipal Corporation organized Science Lecture on 28th February 2018 to celebrate **'National Science Day'.** Dr. Pruthul Desai, Principal of Sir P.T. Sarvajainik college of Science had delivered lecture on "Waves in Nature" to Students of Std. 8 to 10 at Auditorium, Science Centre Surat. Chairman of Cultural Committee of Surat Municipal Corporation Smt. Rupalben Shah was present in this event. Total 170 students and teachers from 7 Schools of Surat have attended this lecture. Dr. Pruthul Desai has given information about types of waves, particle and wave nature of Light. After the lecture there were question answer session in which students and teachers actively took part.