

SCIENCE CENTRE NEWS LETTER

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SCIENCE CENTRE

Volume 2, Issue 9

WHAT'S NEW IN SCIENCE

Glowing crystals can detect, cleanse contaminated drinking water.

Researchers from Lawrence Berkeley National Laboratory have developed a specialized type of Luminescent Metal Organic Framework, or LMOF, that is designed to detect and remove heavy-metal toxins from water. At upper left of this picture, mercury (Hg) is taken in by the LMOF. The graph at lower left shows how the LMOF's fluorescence is turned off as it binds up the mercury. Its properties make this LMOF useful for both detecting and trapping heavy metal toxins.

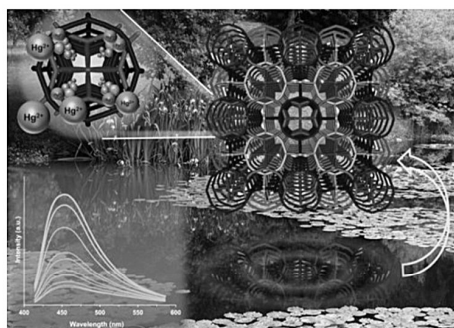
Tiny, glowing crystals designed to detect and capture heavy-metal toxins such as lead and mercury could prove to be a powerful new tool in locating and cleaning up contaminated water sources. The crystals function like miniature, reusable sensors and traps.

Top performer for detecting and trapping heavy metals:

One type of LMOF that the research team tested was found to selectively take up more than 99 percent of mercury from a test mixture of heavy and light metals within 30 minutes, according to recent results published in

Applied Materials and Interfaces. No other MOFs have performed as well in this dual role of detecting and capturing, or "adsorbing", toxic heavy metals, the team reported.

Simon Teat, a Berkeley Lab staff scientist studied individual LMOF crystals, each measuring about 100 microns (millionths of a meter), with X-rays at the lab's Advanced Light Source (ALS) using diffraction patterns produced



as the X-rays light struck the LMOF samples, Teat applied software tools to map their three-dimensional Structure with atomic resolution. What he found was a patterned, grid-like 3D Structure containing Carbon, Hydrogen, Oxygen, Nitrogen and Zinc atoms that framed large, open channels. These atomic-scale structural details are key to understanding how the LMOFs bind heavy metals and can also aid in designing more highly specialized Structures. In this case, the Structure allows heavy metals to enter these open channels and chemically bind to the MOFs. Their very open frame work gives the MOFs an abundant surface area relative to their size, which allows them to take in a large amount of contaminants. Courtesy: Shardayatan School, Piplod

Biman Bagchi

Biman Bagchi was born on January 1, 1954 at Kolkata in West Bengal. He did his B.Sc and M.Sc from Kolkata University in 1974 and 1976, respectively and his Ph.D. from Brown University, Rhode Island, U.S.A., in 1981.

Dr. Bagchi developed a microscopic theory of solvation and solvation dynamics of polar solutes in dipolar liquids, including for the first time, the molecularity of solute-solvent interaction, the contribution of the solvent translation modes, the internal and viscoelastic response of the liquid.



The theory was developed to describe collective orientational relaxation, frequency and wave-vector dependent dielectric dispersion and electron transfer reactions in dense liquids. He has to his credit over 50 research articles. Dr. Bagchi received the Young Scientist Medal in 1986, The Homi Bhabha Fellowship in 1989-91, The A.K.Bose Memorial Award in 1990 and The Shanti Swarup Bhatnagar Prize in 1991.

Courtesy: Shardayatan School, Piplod



Timings

Tuesday to Friday
9.30 am to 4.30 pm

Saturday - Sunday
& Public Holidays
11.00 am to 6.30 pm

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SCIENCE FACTS JANUARY 2017

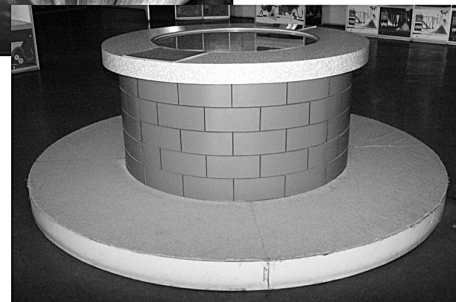
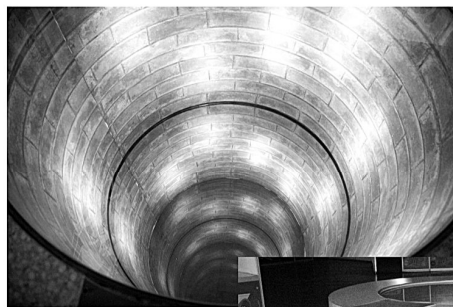
2 Jan 1822	German physicist Rudolph J. E. Clausius (Who researched Thermodynamics) was born on this day.
2 Jan 1959	Soviet Union launched first man made Satellite "Lunik - 1".
4 Jan 1643	Sir Isaac Newton, great physicist, mathematician and astronomer (who invented Newton's Law of Motion) was born on this day.
4 Jan 1797	German astronomer Wilhelm Beer (who made the first moon map) was born on this day.
4 Jan 1809	Louis Braille (inventor of a reading system for the blind) was born on this day.
5 Jan 1859	Dewitt B. Brace (inventor of the spectrophotometer) was born on this day.
5 Jan 1900	Dennis Gabor (inventor of holograph) was born on this day.
7 Jan 1610	Galileo observed first time Jupiter and its four moons with telescope.
8 Jan 1942	English physicist Stephen Hawking (who first revealed Black Holes and Baby Universes) was born on this day.
10 Jan 1877	Frederick Gardner Cottrell (who invented the electrostatic precipitator) was born on this day.
12 Jan 1899	Swiss chemist, Paul H. Muller (who perform the first open heart surgery) was born on this day.
15 Jan 1759	"The British Museum" world's oldest and biggest museum was opened for the people.
19 Jan 1736	James Watt (Inventor of Steam Engine) was born on this day.
21 Jan 1743	John Fitch (who invented steam boat) was born on this day.
21 Jan 1921	Barney Clark (who was the first person to receive a permanent heart) was born on this day.
21 Jan 1954	America launched its first Atomic power operated Submarine named "Nautilus".
24 Jan 1880	Elisabeth Achelis (who invented the world calendar) was born on this day.
25 Jan 1627	Robert Boyle (who wrote Boyle's Law of Ideal Gases) was born on this day.
27 Jan 1834	Dmitri Mendeleev (who invented the periodic table of the elements) was born on this day.

Quiz Answers: 1)A 2)D 3)B 4)B 5)C 6)B 7)C 8)D 9)B 10)A

KNOW THE EXHIBITS AT FUN SCIENCE GALLERY

INFINITY WELL

Lean forward and look down into the well. It appears to go down below the floor to an abysmal depth. The apparent depth of the well is due to an optical illusion. The cylindrical wall of the well is sandwiched between two parallel mirrors; one on the floor and the other on top of the well. The one on the top is a half mirror, that is light coming from inside is reflected backwards as well as transmitted outwards. Such a mirror behaves as a true mirror for the brightly illuminated side and as a see through glass for the less illuminated side. Here illumination inside is much brighter than it is outside and hence the image of the wall is reflected back and forth between the mirrors many times until its intensity diminishes due to transmission loss. We see this repetitive image and the well appears very deep.



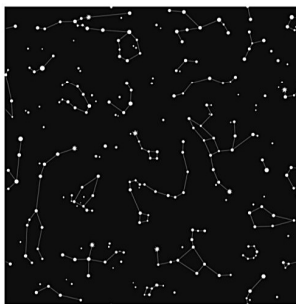
SCIENTIFIC QUESTION

Why are there 24 Hours in a Day?

In reality, the man just decided to have twenty four hours for the whole day. There is nothing in nature to call Hours, Minutes or Seconds. Nature provides us only with days and nights which are formed as a result of the rotation of the Earth on its axis from west to east. The completion of one rotation is done within a specific period of time and that is what we call a "day".

The ancient Egyptians divided the day into smaller parts, used duodecimal (base 12) and sexagesimal (base 60) numeral systems. But why base 12 and base 60? The reason is the number of finger joints on each hand (excluding the thumb) makes it possible to count to 12 by using the thumb. They divided the day into 10 hours with device

like shadow clocks (sundial) and then added one hour at each



end (one for twilight and one at the end of the day). Later, a T-shaped bar was made by Egyptians, which was calibrated to divide the time between sunrise and sunset into 12 parts but, how the night time division is calibrated? The night time division of time was based on the observation of the stars! In those ancient times, with no sophisticated technology to use, they instead choose 36 star groups (small constellations) called "Decans", which rose

consecutively on the horizon as the earth rotated. Each decan rose before sunrise and marked the beginning of the 10-day period. A Total 36 decans thus led to $36 \times 10 = 360$ days of the year. From one twilight to another, 18 of these decans were visible. However, each twilight period had 3 of these



decans assigned, leaving 12 for the period of complete darkness. Thus, the rise of each decan marked an hour, so we ended up with 12 hours in each night. So, there are 24 hours in a day.



Courtesy: Shardayatan School, Piplod

SCIENCE QUIZ

1) Which kind of waves are used to make and receive cell phone calls?

- a) Radio waves b) Visible light waves c) Sound waves d) Gravity waves

2) The loudness of a sound is determined by what property of a sound wave?

- a) Frequency b) Wavelength c) Velocity or rate of change d) Amplitude or height

3) Which of these elements is needed to make nuclear energy and nuclear weapons?

- a) Sodium chloride b) Uranium c) Nitrogen d) Carbon dioxide

4) Brass gets discoloured in air because of the presence of which of the following gases in air?

- a) Oxygen b) Hydrogen Sulphide c) Carbon dioxide d) Nitrogen

5) what is the Wavelength of visible spectrum?

- a) 8500-9800 angstrom b) 7800-8000 angstrom c) 3900-7600 angstrom d) 1300-3000 angstrom

(6) Fathom is the unit of

- a) Sound b) Depth c) Frequency d) Distance

(7) Moths are a member of what order?

- a) Leprosy b) Optica c) Lepidoptera d) Octagon

8) Who discovered Radio activity ?

- a) Kelvin b) Thomson C) Rutherford d) Bacquerel

9) what is the SI unit of charge ?

- a) Ampere b) Coulomb c) Ohm d) Volt

10) what is the Density of water ?

- a) 1 g/cm³ b) 1.5 g/cm³ c) 2 g/cm³ d) None of these

SCIENCE CENTRE

Science Centre forms the main part of the entire complex; it displays thematic galleries in the field of Science and Technology. The ground floor of Science Centre showcases 3D Theatre, Souvenir shop, Entry Plaza Exhibits and Park Exhibits. The first floor of Science Centre showcases Fun Science Exhibits and Power of Play Gallery. Second floor showcases Diamond Gallery, Gazebo is developed behind Maheshwari Bhavan which can be used for serving food. Gazebo is given on rental basis. Where as Entering into Space, Textile Gallery, Cosmos Gallery and Polar Science Gallery are under development.

Science Centre + Planetarium + Museum + Diamond Gallery	Planetarium				
	Tuesday to Friday		Saturday, Sunday & Public Holidays		
Above 18 Years	Rs. 100	09:30 to 10:20	English	11:30 to 12:20	Gujarati
3 Years to 18 Years	Rs. 65	10:30 to 11:20	Gujarati	12:30 to 01:20	English
		11:30 to 12:20	Gujarati	01:30 to 02:20	Hindi
		12:30 to 01:20	English	02:30 to 03:20	Hindi
		01:30 to 02:20	Hindi	03:30 to 04:20	Gujarati
		02:30 to 03:20	Hindi	04:30 to 05:20	English
		03:30 to 04:20	Gujarati	05:30 to 06:20	Gujarati
Planetarium					
Above 18 Years	Rs. 50				
3 Years to 18 Years	Rs. 40				