

CHEMISTRY

A students' Wall Magazine

Of

Dept. Of Chemistry

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Chief Editor – Jasjeet Kaur

The Valentine Issue

Chhapte Chhapte : ALCHEMY OF LOVE

Ghalib , the poet described **LOVE** as

“ Ishq Par Zor Nahi....Hai Yeh Vo Aatish Ghalib Jo Lagaye Na lage... Jo Bhujaye Na bujhe “

But then Ghalib lived and loved in an era different from ours. Modern day scientists are convinced that it is Chemistry and not love which makes the world goes round . Two American neurobiologists , Dr. Tony Walsh and Dr. Jim Fallon have claimed that scientists can now predict and even control the phenomenon called **LOVE** – once considered uncontrollable. The scientists now say that the pill can work as Cupid's darts and that soon brain chemical nasal sprays will be on hand to enhance desire and love between a couple . The chemists say this is not just happy talk but but something which could be marketed by 2010 in an year or so . Dr. Walsh is already the author of a bestseller “ **The Science Of Love : Understanding Love & Its Effects on Mind and Body** ”.It is Dr. Walsh belief that soon a pill will be on the way which if both man and woman swallow , will induce Love and persuade the two to marry .Hence forth people may never have to suffer Rejection as Lovers , bonding difficulties , mismatches and attachment disorders.

Source: (Times Of India , Archive , Editorial).

EDITOR'S CHOICE

CHEMISTRY : Breaking the Billion- Hertz Barriers

“At present Researchers are satisfied with 300 , 400 , 600 NMR but 1.2 GH NMR is on the way ”

- Crystallography can resolve protein structure quickly- in hours or day but only after crystal of the protein have been grown. NMR-provides advantage over this, as this can tell important information about the structure, including those which are difficult to crystallize.
- Charles Sanders , a biochemist at Vandeurbilt University in Nashville and his collaborates, used an 800-Mhz machine, to determine the structure of diacyglycerol pinase, which is one of largest membrane protein, solved by NMR spectroscopy to date. (W.D. vanhoen et al. science 324,1726-1729;2009)
- A technique developed in late 1990s so called transverse relaxation optimized spectroscopy(TROSY), has allowed NMR spectroscopy to deduce the structure of large molecules by labeling the protein with different isotopes (K. Pervushin et al.Proc. natl Acad. Sci. USA 94,12366-12371;19974).
- **TROSY** gives the sharpest possible peaks at fields of upto **1.2 GHz**.
- These high field strengths has helped the researchers to generate chemical 'Finger prints' of body fluids such as urine , plasma or tissue, which are analyzed to see the effect of drugs, disease or environmental changes on the metabolism. Higher field strength helps to differentiate the thousand of different metabolites.
- “You just need two experiments and You have a beautiful signal.” - Benjamin Blaise.

Sources : <http://www.nature.com/news/2010/nature 463,605-606>(Feb, 2010)

CHEMSTORY : The wonders of polyester

“ It was Polyester that helped Neil Armstrong to land on moon ”

- Polyester was the world's first truly synthetic fiber. Credit for its discovery goes to Wallace Carothers and his assistant. Knowing that alcohols and carboxylic acids formed compounds called “esters”, he used molecules that had alcohol and acid functions on both ends to create “polyesters”.
- Polyesters could not only be drawn into fibers but one of the humankind's greatest technological achievements as **Neil Armstrong** guided the lunar **LANDER** to a successful touch down on the moon. It can be recalled that the Lander was wrapped in the lustrous gold material. That material was **MYLAR**, a sheet of polyester coated with a thin layer of gold, designed to protect the **LANDER** from the powerful rays of the sun. Hence it could be concluded that polyester could not only be drawn into threads but also melted into super strong flexible sheets. This same material can be used in the form of emergency blankets that fold up into a pocket-sized pack and have a remarkable ability for retaining heat. The same polyester material is used as the basis of audio and videotapes.
- Large ubiquitous pop bottles are also made up of polyester. Large soda bottles made of glass can act like bombs. But, if the bottle is dropped, shards can fly all over the place, but this doesn't happen with polyester.
- Recycling is one of the great advantages of polyester bottles. They can be melted down and extruded into fibers that are far superior to that made up of the leisure suits of the 1970's. Today's microfibre is silky and can be made into fluce that is not only warm and cozy but attractive as well. Infact, our favorite sweaters are also made of recycled polyester bottles. Wearing it, not only represents neat bit of chemistry but also shows a stinky movie that introduced the wonders of polyester.

Source: Book - “ The Fly in the ointment”

CHEM-WEB-WISE – “Applications Of Artificial Intelligence in Chemistry”

- Artificial Intelligence is the computers ability to mimic or duplicate the functions of human brain. It is an attempt to reproduce intelligent reasoning using machines . The intelligent behavior of the computers to solve computationally interactable problems that may be hard to solve but not difficult to understand is acquired by training and experience . To solve the artificial intelligence problems , Artificial intelligence programs have to be developed . These AI programs learn by a 2-way conversation with the user by being told what is true , by being shown examples of what they are required to interpret , such as mass spectral fragmentation patterns or infrared spectra , by hit and trial method or intelligent observation and by logical reasoning from what they already know . The branches of AI includes Expert Systems , Neural Networks and Genetic Algorithms. ANN's are computer programs based on simplified model of brain . An Expert System is a computerized clone of an human expert. Genetic Algorithm is an optimization technique based on evolutionary principles .
- The Artificial Intelligence programs has many applications in various fields . These are being used to undertake variety of tasks , have ability to deal with new situations and ability to cope with fuzzy data . The various applications are in automated chemical synthesis , jet engine design , assistance to scientists in space ,human genome project , drug designing , selection of optimum parameters for instrumental analysis , Image analysis , dispersal studies of pollutant ,Protein stereochemistry , design of synthetic routes in chemistry , predict details of thermodynamic properties of small molecules , description of identity and position of components of a spectrometer , interpretation of mass spectral fragmentation patterns or infrared spectra , to distinguish between a cyclic and acyclic compound , to identify coding sequences in DNA , to predict secondary structure of proteins. To analyse patterns of nerve impulses , to monitor heartbeat of patients , to pattern detectors of magnetic resonance brain images , virus detection , monitoring gas samples for presence of pollutants by infrared absorption spectroscopy and to diagnose diseases based on symptoms.
- So , these AI programs can provide expertise at a no. of locations at the same time or in a hostile environment that is dangerous to human health . These provide expertise that is inexpensive or rare and develop a solution faster than human experts can!!!!!!

Source: Applications of Artificial Intelligence in Chemistry (Royal Society Of Chemistry)

Alchemy

“The January Issue highlighted the Alchemy 4000 B.C -2000 B.C. This Issue highlights the Alchemy of 2500 B.C -1800 B.C”

A prehistoric settlement of different types from those of the more or less self contained little peasant communities of Baluchistan and the neighbouring regions of Sind developed itself since 2500 B.C. on the flood plains of the Indus (Sind) and its five tributaries (the Punjab).

- The pottery specimens, as well as the copper and bronze objects found here resemble closely those of the Harappan culture. Findings of the excavations demonstrate a surprising uniformity in the construction and technique of its pottery vessels.
- An idea of the knowledge of the chemistry, acquired by the Indus valley people, can be obtained from the consideration of the pottery vessels, articles of faience, beads, metallic objects etc. that have been brought to light as a result of excavations.
- The commonest wares manufactured on large scale were bricks, water pots, vessels and jars. The pottery wares, both plain and decorated, were made up of a good variety of clay that burned pink or light red in color.
- The tempering materials used with clay were mica, sand and lime. The prevailing colors of the brick, pottery and miscellaneous terracotta objects found in such abundance at the Indus valley sites are light red or salmon. The mortars used by Indus valley people were made of mud.
- The urban civilization of the Indus valley belongs formally to the Bronze Age, since copper and bronze were the only metals that were used for making tools and weapons.
- Finally it might be mentioned that evidence has been obtained that the Indus valley people were acquainted with the art of dyeing cotton with the red coloring matter of the madder root.

Source: “History of Hindu Chemistry ” - P.C. Ray

MOLECULE OF MONTH - Liquid Nitrogen (Ice Cream)

“ Strawberry Icecream can be prepared with liquid N₂ , which makes a nice cryogenics or demonstration of phase change.”

Time Required : Minutes

What You Need:

- 5 or more litres of liquid nitrogen
- gloves and goggles recommended
- large plastic or stainless steel punch bowl or salad bowl
- 4 cups heavy cream (whipping cream)
- 1-3/4 cups sugar
- 1 quart mashed fresh strawberries or thawed frozen berries
- wooden spoon
- wire whisk

RECIPE :

1. This recipe makes a half gallon of strawberry ice cream. First , mix the cream , half-and-half, and sugar in the bowl using the wire whisk. Continue mixing until the sugar has dissolved.
2. If you are making vanilla or chocolate ice cream, whisk in vanilla or chocolate syrup now. Add any other liquid flavorings you might want.
3. Put on your gloves and goggles. Pour a small amount of liquid nitrogen directly into the bowl with the ice cream ingredients. Continue to stir the ice cream, while slowly adding more liquid nitrogen. As soon as the cream base starts to thicken, add the mashed strawberries. Stir vigorously.
4. When the ice cream becomes too thick for the whisk, switch to the wooden spoon. As it hardens more, remove the spoon and just pour the remaining liquid nitrogen onto the ice cream to fully harden it. Allow the excess liquid nitrogen to boil off before serving the ice cream.

CHEMIST OF THE MONTH

Prof.C.N.R. Rao (Chintamani Nagesa Ramachandra Rao)

Place and Date of Birth - Bangalore, India, June 30, 1934

Education (Degrees)

- B.Sc (Mysore University), 1951
- M.Sc (Banaras Hindu University), 1953
- Ph.D (Purdue University, USA), 1958
- D.Sc (Mysore University), 1961



Important Academic Positions held by Prof.C.N.R. Rao

- a. Professor of Chemistry, Indian Institute of Technology, Kanpur, India (Head of Department and later Dean of Research of the Institute) (1963-76).
- b. Visiting Professor, Purdue University, 1967-68; 1982 (in part).
- c. Commonwealth Visiting Professor, University of Oxford and Fellow, St. Catherine's College, Oxford (1974-75).
- d. Jawaharlal Nehru Professor, University of Cambridge and Professorial Fellow, King's College, Cambridge (1983-84).
- e. Director, Indian Institute of Science (1984-94).
- f. Visiting Professor, Universite Joseph Fourier, Grenoble, France (1990).
- g. Albert Einstein Research Professor (1995-1999).
- h. Honorary Professor, Indian Institute of Science (1994-).
- i. Distinguished Visiting Professor of Materials, University of California, Santa Barbara, CA (1995-).
- j. Adjunct Professor of Chemistry, Purdue University (2004-).
- k. Visiting Professor, University of Southampton (2007-).
- l. Distinguished Research Fellow, University of Cambridge and Member of Sidney Sussex College (2007 -).
- m. Distinguished Visiting Professor, University of California, Berkeley (2008-).

Honoris Causa Doctorate Degrees - Prof. Rao has received 48 honoris causa doctorate degrees from various universities around the world.

Membership of Academies-Prof. Rao is a fellow of 25 science academies. He has the unique honour of being a Fellow/Member of all the major academies of the world including The Royal Society London, National Academy of Sciences, USA, Russian Academy of Sciences, Pontifical Academy of Sciences, French Academy of Sciences and Japan Academy. Prof. Rao has received many International, National & other awards and recognitions. The latest one's among them are **-FIRST LAUREATE OF THE 21ST KHWARIZMI INTERNATIONAL SCIENCE AWARD** by the Iranian Research Organization for Science & Technology(2008).

-THE FIRST INTERNATIONAL PRIZE FOR MATERIALS SCIENCE by MRSI (India) (2009).

“Chemistry Chimes wishes him a long life and much more feathers in his cap.”

CHEMQUIZ

Q.1 a) Name the Country that consumes maximum energy?

b) Experts are of the Opinion that Oxygen of the atmosphere would be used up if we obtain energy by burning the fossil fuels . What do you say ?

Answer to last issue's question is " Element – Gallium "

CHEMHUMOUR



"Didn't you get my e-mail?"

CHEMYCAL RXNS

-Launching of Wall Magazine by the Dept. Of Chemistry and its quality in itself exhibits the excellence existing in the Department. (Dr. B.S Kaith , HOD , Chem . Dept.)

-It's a good effort . It should continue forever with the same standard . There should be an addition of a column that includes the reference of the International and National conferences in India and Abroad. (Dr. N.C Kothiyal, Chem . Dept.)

-It's a very good initiative on behalf of Chemistry Department. It will help students to open their minds to know where the chemistry around the world is going. (M.Sc –II ,students.)

- I believe that this initiative will help our students realize their vision and mission which will turn their dreams into reality. And of course, they have fun along the way. (Dr. Harleen Dahiya- Prof. M.Sc Physics)

LOVE IS A REVERSIBLE RXN:

In a Garden ,

- Bee gathers honey of the flower
The flower yields honey to the bee.
- Both get pleasure .
- For the bee , a flower is a fountain of Life
To the flower a bee is a messenger of Love
- And to both bee and flower

The giving and the receiving of pleasure is a need and ecstasy.

___ Kahlil Gibran