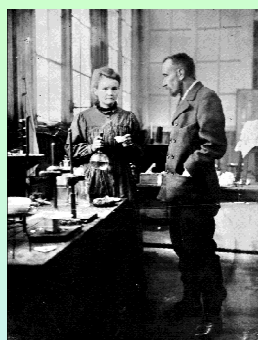
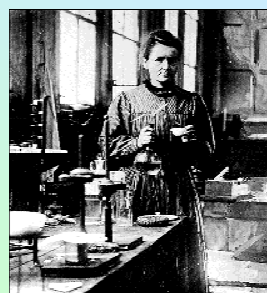


International Year of
CHEMISTRY
2011

Chemistry – our life, our future



October 9

Emil Fischer born 1852: synthesis of sugars (Fischer projections), uric acid, caffeine, and other organic compounds; Nobel Prize, 1902

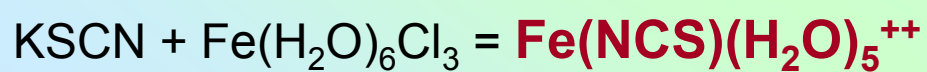
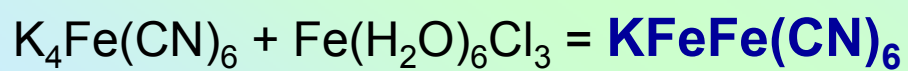
Max von Laue born 1879: X-rays and crystal structure (Laue method); Nobel prize (Physics), 1914



**Playing Games with
Molecules!**

maitrau@gmail.com

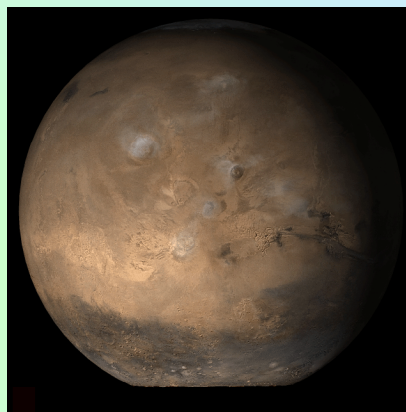
NCL Pune, 9th October 2011



Water is important for life!



Apollo 17
December 7, 1972



Mars: May 2, 2006

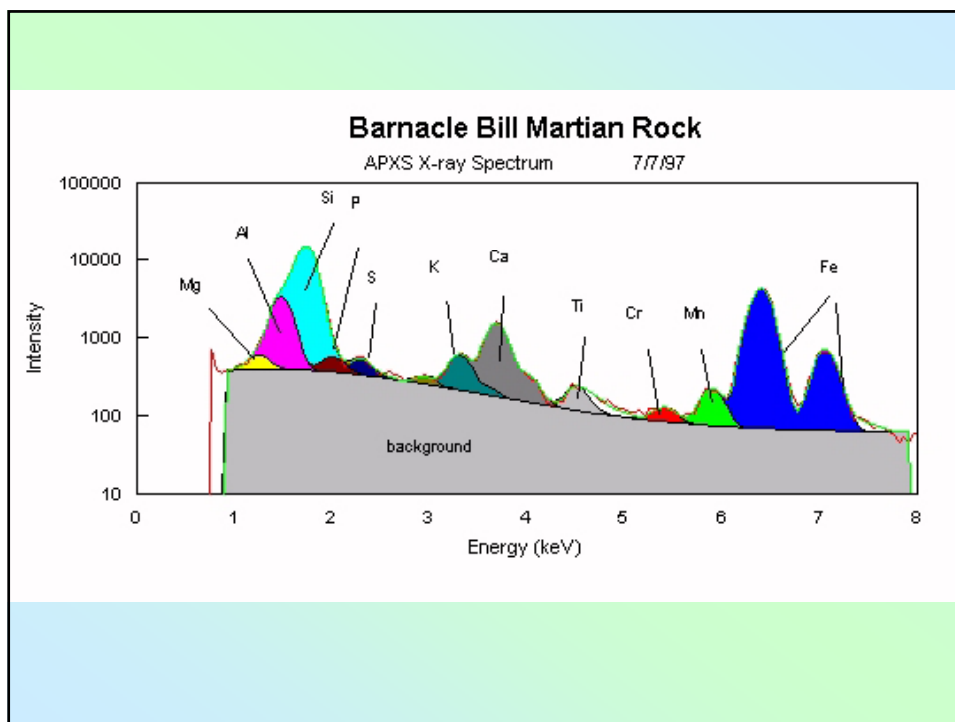
Let us make water!

Experiment to demonstrate that D₂O is heavier than H₂O

Property	D ₂ O (Heavy water)	H ₂ O (Light water)
Freezing point (°C)	3.82	0.0
Boiling point (°C)	101.4	100.0
Density at STP (g/mL)	1.1056	0.9982
Temp. of maximum density (°C)	11.6	4.0
Dynamic viscosity (at 20°C, mPa·s)	1.25	1.005
Surface tension (at 25°C, μJ)	7.193	7.197
Heat of fusion (cal/mol)	1,515	1,436
Heat of vaporization (cal/mol)	10,864	10,515
pH (at 25°C)	7.41 (sometimes "pD")	7.00
Refractive index (at 20°C, 0.5893 μm)	1.32844	1.33335

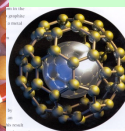
Chemistry on the surface of Mars!



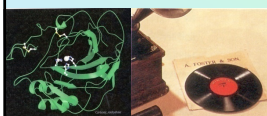
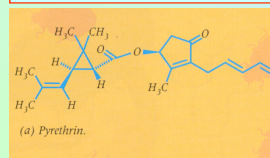


Chemistry: The central, useful and creative science - Ronald Breslow

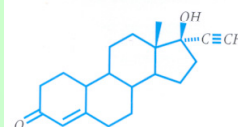
Central
Important to:
**Biology, Geology,
Materials science
AND many
engineering
disciplines**



Creative
Designs structures
with new and
unique properties



Useful
Provides many materials
essential to everyday life,
Knowledge to better
human, veterinary and
plant care, better food,
environment



Norethindrone (Nolutin)
Figure 14. Norlutin, the first contraceptive pi



Chemistry - The **Central** Science

What in the world isn't Chemistry?

Chemistry is everywhere in the world around us - in what we eat, in what we breathe, in how we live, in what we are. Chemists study not only what things are, but also what they do and how they do it, from sub-atomic particles to large arrays of molecules.

Future projections

- **Chemistry to interact more with**
 - **Biology**
 - **Materials Science**
- **Green Chemistry (“Friendly” to environment)**
 - Reduce**
 - Energy consumption**
 - waste generation**
- **New drugs (cancer, anti-viral agents, immunosuppressive drugs, Alzheimer’s disease and osteoporosis, gene therapy?)**

Let us start playing!

Video clips from IISc open day in March 2011



Chemistry

Let us start with a big bang!

The flame test

Water expands upon freezing

The Hg beating heart experiment

Sodium in acid?

Let us make salt!

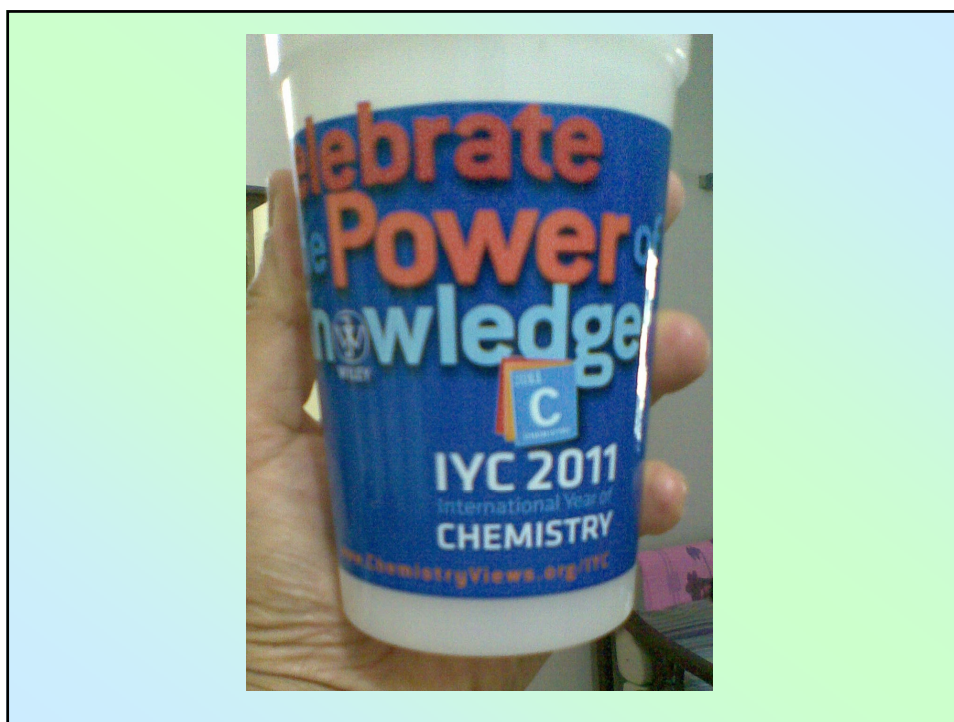
Optical rotation

KMnO₄ is a strong oxidizer

Mg fire? CO₂ extinguisher? No way!

The feather-touch experiment!

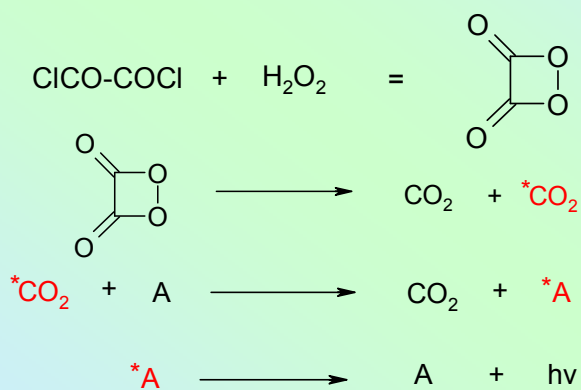
Demonstrations



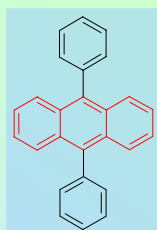
Thermochromism

Ag_2HgI_4 , a double salt of mercuric and silver iodides, shows thermochromism at $50.7\text{ }^\circ\text{C}$ changing from yellow to orange. Similarly, Cu_2HgI_4 turns from red to black at $67\text{ }^\circ\text{C}$.

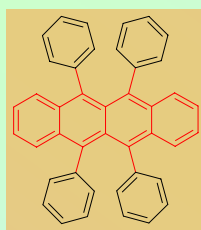
Chemiluminescence



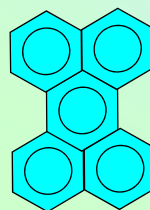
Chemiluminescence



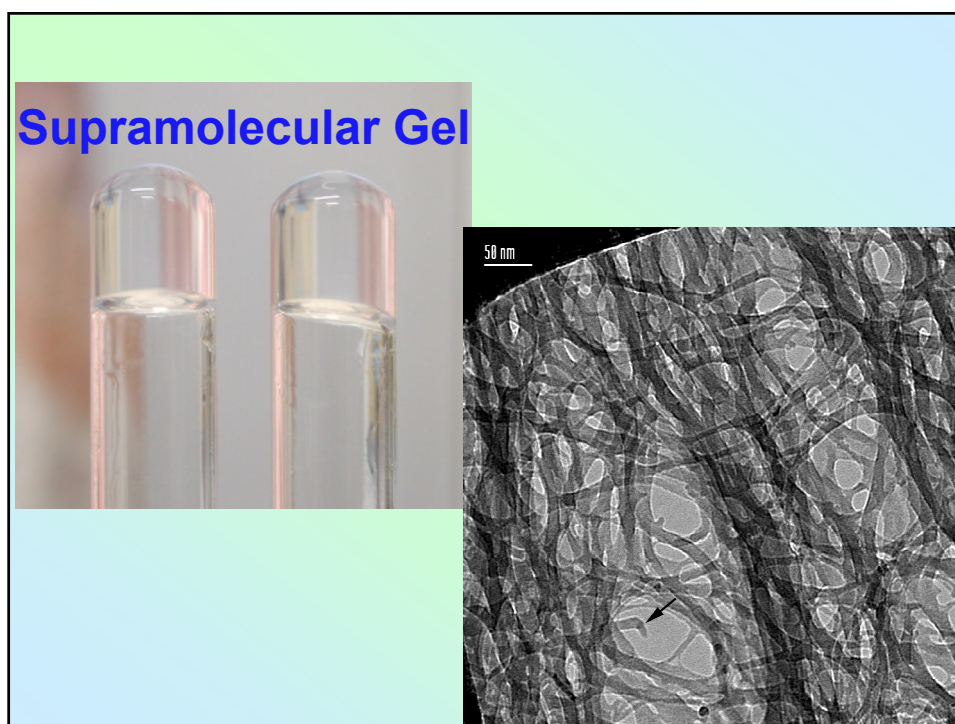
9,10-Diphenyl
anthracene

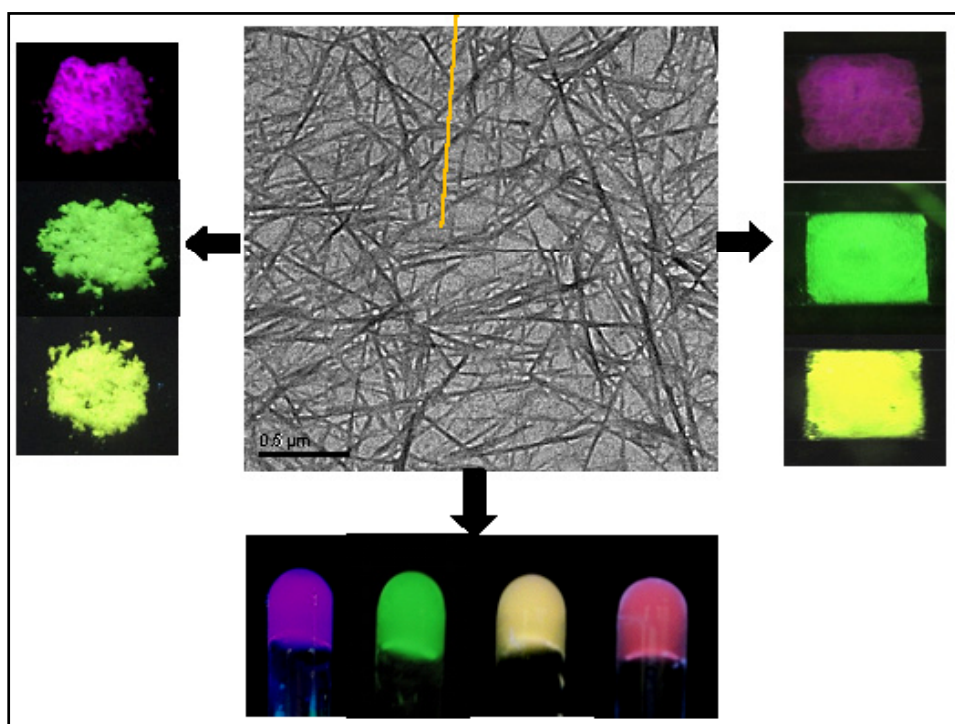


Rubrene



Perylene





Video on the life of Linus Pauling



The periodic table of elements – and the song!



(<http://www.privatehand.com/flash/elements.html>)







