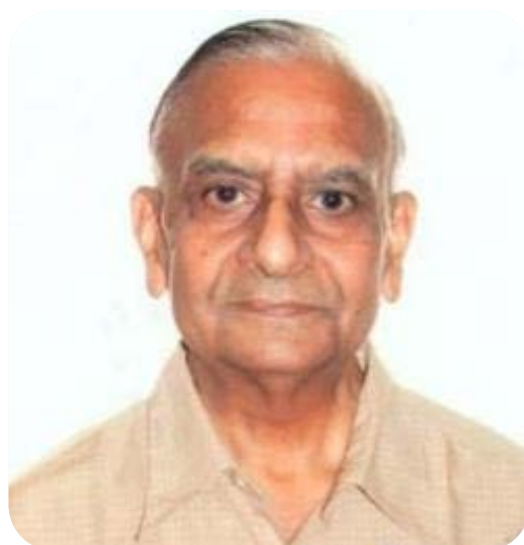




(RSC-IW-SRSM – 2019)

February 22 – 23, 2019



Prof. Girjesh Govil

NASI Senior Scientist,
Tata Institute of Fundamental
Research, Mumbai

PHYSICAL METHODS IN CHEMISTRY AND BIOLOGY

Several physical methods have been used in research and industries in chemistry and biology. In fact, the entire electromagnetic range has been used, starting from microwave to gamma rays. The visible range is often used in estimates of compounds in a mixture. However, the two important techniques are nuclear magnetic resonance and X-rays. In my talk, I will introduce the two techniques and then present their applications in the following areas (a) basic research (b) applications in chemical industries (c) applications in security and (d) human health.



(RSC-IW-SRSM – 2019)

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Prof. Anil Kumar Singh

Ex-HOD,
Department of Chemistry
IIT Bombay

A Few Aspects of Chemical Biology

Lying in the overlap area between biology and chemistry, chemical biology is a relatively new field of research. It deals with creation and use of novel molecular tools and techniques to the study and manipulation of biological systems. In one of the forms, chemical biology involves application of chemical techniques, analysis, and often small molecules produced through synthetic chemistry for probing a biological system, or for use as speciality chemicals. This aspect of chemical biology will be illustrated by discussing: i) the nature of interactions at the reaction centre of retinal-binding biological photoreceptors as probed by employing synthetic analogues of retinal, ii) design and development of synthetic caged compounds for spatially and temporally-controlled release of bioactive compounds under physiological conditions, and iii) development of chemical products including both novel molecules and drop-in replacements using bioprivileged molecular approach. The talk would accentuate on the concept and need behind the use of bioprivileged molecules, which essentially are biology-derived chemical intermediates and have brought in a new paradigm in synthetic chemistry and chemical development. Recent accomplishments in the field and future inroads into other fields will also be highlighted.

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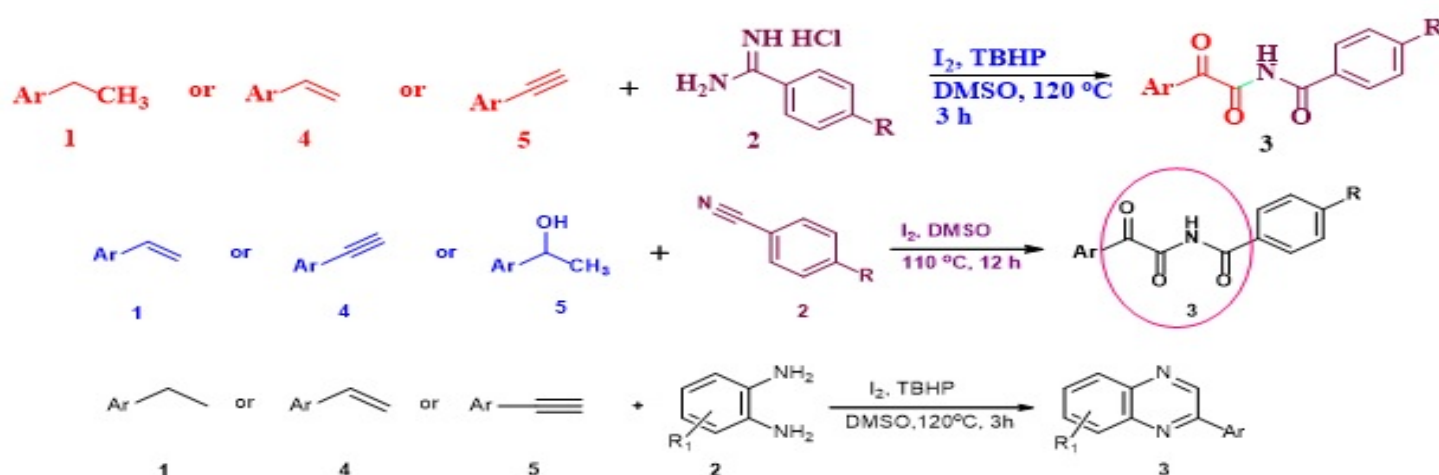


Dr Atul Chaskar

National Centre for Nanosciences and
Nanotechnology,
University of Mumbai

C-H bond Functionalization: A promising tool for synthesis of Key building blocks for construction of complex Drug Candidates

In recent years, C-H bond functionalization has given a great impetus to modern organic synthesis owing to the selective construction of new carbon-carbon and carbon-heteroatom bonds leading to the rapid assembly of complex molecular frameworks from easily available simple starting materials. In these circumstances the power and potential of C-H bond functionalization inspired domino strategies have been demonstrated by synthesizing the library of medicinally important heterocycles. In the context of sustainable organic synthesis, metal free C-H bond functionalization and transition metal catalyzed C-H bond activation are the most efficient, attractive, powerful and highly desirable strategies. In recent years, I₂ in combination with DMSO has proved to be an environment-friendly, metal-free effective system for the series of organic reactions particularly in C-H functionalization. This approach has emerged as an attractive tool in organic synthesis due to its diverse applications. Considering this, we have synthesized various key building blocks from easily available and prefunctionalized multiform substrates.



(RSC-IW-SRSM – 2019)

February 22 – 23, 2019



Prof. Arnab Dutta

Chemistry Discipline, IIT Gandhinagar,
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Inclusion of peripheral basic groups activates dormant Cobalt-Salen like complexes for catalytic H₂ production

The activity of the metalloenzymes is critically modulated by the protein scaffold that tunes the electron and proton movements along with the substrate around the metal active centre. However, this unique outer coordination sphere feature is rarely considered during the designing of synthetic catalysts. In our research group, we have incorporated a minimal but essential outer coordination sphere component around metal complexes. Following this hypothesis, recently, we developed four complexes containing the same Cobalt-Salen (Co-(N₂O₂)₂) like core but have variable basic functionalities on the periphery of the ligand structure. These basic groups are derived from carboxylic acid (-COOH) or phenolic -OH, which resemble the protein scaffold (i.e. outer coordination sphere) in enzymes. Detailed electrochemical data exhibited that the incorporation of these protic moieties around the complex has activated the otherwise dormant Cobalt-Salen like core for catalytic H₂ production in aqueous solution. The presence of carboxylic acid in two of those complexes enabled unique pH-switchable catalytic H₂ production, where the key role is played by the pH-dependent metal-ligand interactions. The complementary NMR and spectroscopic results indicated the formation of an intricate hydrogen-bonding network by the basic functionalities around the metal centre in presence of water. This highlights that the rational inclusion of enzyme-inspired outer coordination sphere features not only improve catalytic performance of an already active catalyst, but also spark catalytic life even into an otherwise inert metal core.



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Rest coming soon