

# REPORT OF THE TWO DAY NATIONAL SEMINAR

## ORGANIC SYNTHESIS

28<sup>th</sup> & 29<sup>th</sup> January 2016

### ORGANIZED BY PG AND RESEARCH DEPARTMENT OF CHEMISTRY ST.JOSEPH'S COLLEGE IRINJALAKUD

The National Seminar on Organic Synthesis was organized at St.Joseph's college, Irinjalakuda, Kerala on 28<sup>th</sup> and 29<sup>th</sup> January 2016. There were 120 participants, 27 teachers and 93 students from various colleges of Kerala. The overall aim of this seminar is to inculcate knowledge in the field of Organic Synthesis. The seminar is a unique platform for the faculty and the students to showcase their research to the scientific community. It provided an opportunity for them to interact, share and exchange their experiences with resource persons. Well experienced resource persons could motivate and induce research aptitude in the participants in their respective thrust areas.

The inauguration function started at 9.30am in the seminar hall with prayer song. Dr. Jessy Emmanuel, Convenor of the seminar offered a warm welcome to all those who were present for the inaugural function. Dr.Sr.Isabell, Vice Principal of the college delivered the presidential address in which she stressed the importance of scientific interactions. Dr.V.Kumar, Director-MET Thrissur inaugurated the function.

Dr.Prathapachandrakurup Professor CUSAT gave keynote address. In his keynote address, he explained the significance of organic synthesis in this current Chemistry world. Sr.Mini Thomas co-ordinator of the seminar, offered the formal vote of thanks.

After the tea break, Dr.Prathapachandrakurup, Professor CUSAT, Kochi delivered the first lecture on 'epr aspects of metal complexes of Aroyl hydrazones. The session ended at 12.30pm with the vote of thanks by Dr.Kala faculty from SN College Nattika.

After lunch the second session began at 1.30.Dr.Anil Kumar Professor, MG University Kottayam, talk about 'Asymmetric syntheses'. The session got over by 3.30 pm. After a short tea break, the last session began. Ms.Aleena, Ms.Arya, Ms.Raina, Ms.Shanty, Ms.Gilgy presented their research papers in this session. Dr.Annie CF, Associate professor St.Joseph's college, chaired the session.

The second day the first session was engaged by Dr.MuraleedhranKM, Associate professor, IIT Chennai. He gave an inspiring class on Non-Covalent interactions in Material design and medicine.After tea break,five paper presentation were done.Ms.Reeja,Dr.Manoj, Ms.Vidhya, Ms.Parvathy, Ms.Sruthy presented their papers.

After lunch break, the last session was handled by Dr.Vijay Nair, NIIST, Trivandrum. The topic of the lecture was 'Demystifying Organic Synthesis'. After the tea



break, there were 10 paper presentations. Concluding session in which the participants expressed their views regarding the conduct and content of the seminar. The lectures and presentations were well appreciated by all the participants. They were truly benefited and enriched with new facts. Evaluation forms were filled by all the participants. They expressed their satisfaction and gratitude towards the conduct of the seminar. And the whole programme ended by 5.30 pm in a good note.

The following are a brief note on the four lectures that were delivered during the seminar.

### **Dr.PrathapachandraCurup**

Electron paramagnetic resonance (EPR) or electron spin resonance (ESR) spectroscopy is a technique for studying chemical species with unpaired electrons, such as organic and inorganic free radicals or inorganic complexes. EPR spectra can be mainly of four types viz. isotropic, axial, and rhombic and reverse. EPR spectroscopy plays an important role in determining the stereochemistry of copper complexes. For coordination geometries corresponding to an elongated octahedron, a square pyramid or square planar, the ground state is  $d_{x^2-y^2}^2$ . When the coordination around Cu (II) ion is a compressed octahedron or a trigonal bipyramid, the ground state is  $d_z^2$ . EPR spectroscopy can distinguish the ground states  $d_{x^2-y^2}^2$  and  $d_z^2$  on the basis of the principal values of the  $g$  tensor in the anisotropic spectra<sup>1</sup>. For copper (II) in most environments, the ground state magnetism is essentially spin only and orbital motion is said to be quenched. The  $g$  factors are shifted from the free electron value of 2.0023 by spin-orbit coupling of the ground state to excited states. He explained about Synthesis of di-2-pyridyl ketone nicotinoylhydrazone (HL), Synthesis of  $[Cu(L)_2]$  and Synthesis of  $[Cu_2(L)_2(\mu-N_3)_2]$  and synthesis of Aroyal hydrazones.

### **Dr.Anil Kumar**

Asymmetric synthesis deals with the formation of one or more new chiral centers in a molecule from an achiral molecule without the use of resolution. Asymmetric synthesis is very essential since many drugs used for different ailments are chiral, and the enantiomers show different biological properties. The following asymmetric reactions such as CBS reduction, Noyori hydrogenation, Hajos-Parrish-Eder-Sauer-Wiechert reaction, Mannich reaction, Davis hydroxylation, Sharpless dihydroxylation, Shi epoxidation, Sharpless epoxidation, Jacobsen-Katsuki epoxidation and Aggarwal epoxidation are discussed. The invention of Beller epoxidation using Ru and Fe catalysis is discussed in detail. The transition metal catalyzed cross-coupling reactions are the most predominant branch of synthetic organic chemistry used for both carbon-carbon and carbon-heteroatom bond-formation



reactions.<sup>i</sup> Over the last few years momentous growth has been recorded in the field of transition metal catalyzed carbon-heteroatom bond-formation.<sup>ii</sup> In this context, numerous procedures have been reported for Carbon-Nitrogen and Carbon-Oxygen bond forming reactions while that for Carbon-Sulfur bond formation is moderate. This is due to the deactivation of the metal catalysts by organosulfur reactant because of the strong coordination capacity of sulphur with the metal catalysts. One of the major challenges associated with the transition metal-catalyzed Carbon-Sulphur bond formation is its greater tendency for oxidative S-S coupling. We have developed a promising protocol for the zinc-catalyzed S-arylation of aryl thiols with differently substituted aryl iodides. The *in situ* generated Et<sub>2</sub>Zn-BINOL complex in DME in the presence of K<sub>2</sub>CO<sub>3</sub> at 80°C showed moderate catalytic activity for the C-S cross-coupling reaction.

### **Dr.Muraleedhran KM**

Secondary interactions like hydrogen bonding, hydrophobic effect, pi-pi stacking etc. play central role in maintaining the tertiary and quaternary structures of proteins. Such stabilizing effects are also responsible for the properties of liquid crystals and gels. Design and synthesis of short peptides with specific folding, stabilized by hydrogen bonding, is an area of active research because of their potential use in the development of modulators of protein-protein interactions. Usually, this is accomplished by choosing pre-organized building blocks with appropriate substitution pattern. Our laboratory is involved in the design and synthesis of such systems using trans-2, 3-amino acid building-blocks. The synthetic strategy adopted for the preparation of these monomers and their peptides, conformational analysis of different peptides in this series, and regulation of their self-assembly through modulation of chemical environment will be discussed during this presentation.

### **Dr.Vijay Nair**

Catalysis of organic reactions by small organic molecules, commonly called organocatalysis, has been an area of immense research activity in recent years. Contemporaneously, the use of nucleophilic heterocyclic carbenes (NHCs) as catalysts in organic reactions was pursued by a number of groups. Surprisingly NHCs received very little attention for more than four decades except for their role in Stetter reaction and benzoin condensation. However a dramatic change occurred during the last decade; presently work on the NHC-catalysis is proceeding at a torrid pace in many laboratories. Another reaction that intrigued us most was the NHC mediated annulation of enals with chalcones leading to

cyclopentenones, observed in our laboratory. We have uncovered a hitherto unknown NHC catalyzed homoenolate reaction with chalcones, leading to the efficient formation of 1,3,4-trisubstituted cyclopentenones. The simple and mild reaction conditions and the high yields of products are likely to make the reaction attractive for its application in the synthesis of a variety of natural and unnatural cyclopentene derivatives..Further work to define the scope of the reaction and to gain insight into the mechanistic details will be undertaken.

