

Service

➤ **Laboratory for Advanced Research in Natural and Synthetic Chemistry**

After superannuating from the Chemistry Department of Indian Institute of Technology, Bombay, Prof. Sujata V. Bhat established this laboratory from scratch and started guiding several students for Ph. D. and M.Sc. degree, which they completed successfully. Several of them were won Awards in Avishkar Research Competitions at Maharashtra state level and western region level and in Chemist's convention (Indian Chemical Society) at National Level. She Improved Instrumentation facility and Research standard of V. G. Vaze College (Autonomous).

➤ Sujata V. Bhat **assisted several Industries in the products development.**

• **S. H. Kelkar and Co. Pvt. Ltd.**

Development of new molecules for Perfumery and cosmetic applications. Design of simplified and green procedures for production of perfumery chemicals.

• **Godrej Agrovet**

Development of Neem based products.

Computer aided design, synthesis and evaluation of new herbicides.

Improvement in the synthesis of Herbicides.

• **Sunmoon Chemicals**

Asymmetric Syntheses of taxol[®] (antitumor agent) and taxotere[®] side chains.

Design of simplified procedures for production of these important antitumor molecules.

• **BioAmber, USA**

Synthesis of various esters of bio-succinic acid from BioAmber,

Evaluation of cosmetic properties and commercial potential of these esters.

• **Gujarat Themis Biochemicals Limited**

Development of new process for Rifabutin.

• **Ranbaxy Laboratories**

Synthesis of new quinolone and naphthyridine analogues for evaluation of antibacterial activity.

• **Arya Business Combine**

Forskolin estimation in *Coleus forskohlii*

Presently 31 companies are exporting Forskolin from India.

- **Prasad Organics**

Identification of rose glycol

➤ **Recent Projects executed by Sujata V. Bhat at Indian Institute of Technology, Bombay**

1) **Title: Computer aided design, synthesis and crystallographic evaluation of HIV protease inhibitors.**

Agency: Board of Research in Nuclear Sciences (BRNS)

Sanction No: 2000/37/8/BRNS 687 (3/10/2000)

Duration: 2 years May-2000-June 2002

Summary: New molecules were designed based on computer model of HIV protease enzyme and were synthesized in laboratory. These compounds were evaluated by co-crystallization with HIV protease enzyme and X-ray crystallographic evaluations. They were also evaluated *in-vitro* for enzyme inhibitory activity. Some new compounds have been found to be HIV protease inhibitors.

2) **Title: Synthesis of novel spiroketals and biological evaluations.**

Agency: Council of Scientific and Industrial Research (CSIR)

Sanction No: 01 (1633) EMR II 15.06.2000 (Sep 2000)

Duration: 2 years Sept 2000- August 2002

Summary: New spiroketals were synthesized by cyclization in the presence of acidic zeolites. Their biological activities for antimicrobial and insecticidal were evaluated.

3) **Title: Discovery and development of bioactive natural products.**

Agency: Council of Scientific and Industrial Research (CSIR)

Sanction No: 9/87 (285) /2000 EMR I

Duration: 2 years June 2000- May 2002.

Summary: Medicinal plants from Zingiberaceae and Rutaceae families were grown in hydroponic media and investigated for elicitation of new compounds after stimulation. The structure elucidation and applications of elicited molecules were investigated.

4) **Title: Synthesis of Rifabutin**

Agency: Gujarat Themis Biochemicals Limited

Duration: 9 Months, 1/3/2002 to 1/12/2002

Summary: Process development for manufacture of Rifabutin from Rifamycin has been standardized.

5) **Title: Development of biopesticides from abundant plant sources**

Agency: Indian Council of Forestry Research, Dehra Dun (UP)

Sanction No: 37-2/96- ICFRE dated 10.12.96

Duration: 3 years June 1993- May1996

Summary: Abundant plants from Rutaceae were screened for various biological activities such as insecticidal, antifeedant, antifertility activities.

6) **Title: Asymmetric synthesis of natural products through applications of chiral sulfoxides**

Agency: Council of Scientific and Industrial Research (CSIR)

Sanction No: SP/SI/GO8/96

Duration: 3 years June 1993- May1996

Summary: Synthesis of chiral sulfoxides and their uses in asymmetric synthesis of bioactive natural products were investigated. The bioactive molecules included lignans, β - aminoacids, β -phenyl-ethanolamines, terpenoids.

7) **Title: Synthesis and application of new chiral reagents- asymmetric synthesis.**

Agency: Board of Research in Nuclear Sciences (BRNS)

Sanction No: 37/12/89-G (June 2, 1992)

Duration: 3 years June 1992- May 1995

Summary: New chiral phosphine and crown ether were synthesized starting from simple chiral molecules. The utility of these reagents were evaluated in asymmetric synthesis of useful molecules.

8) Title: Use of modified zeolites in the synthesis of terpenoids, heterocycles and fine chemicals

Agency: Council of Scientific and Industrial Research (CSIR)

Sanction No: 01/(1278)/93/EMR II

Duration: 3 years June 1993- May 1996

Summary: The syntheses of new isoindoles, spiroketals, cyclohexenones, terpenoids etc. have been achieved using modified acidic zeolites.

9) Title: Synthesis of amine peroxides and evaluation of antimicrobial activity.

Agency: Indian Council of Medical Research (ICMR)

Sanction No: 22 / 7 /93/ EMR II

Duration: 3 years (July 1993 to June 1996)

Summary: Several new amine peroxides were synthesized and evaluated for antimicrobial activity. Some of the amine peroxide displayed good antimicrobial activity.

10) Title: Computer aided design, synthesis and evaluation of new herbicides.

Agency: Godrej Agrovet

Duration: 5 years (July 1996 to July 2001)

Summary: Computer aided design was achieved for new inhibitors of the enzyme acetolactate synthase. These molecules were synthesized in laboratory and evaluated for herbicidal activity against monocotyledon and dicotyledon herbs.

11) **Title: Development of tissue culture facility for biotechnological applications.**

Agency: The ministry of Human Resource Development (Thrust Areas in technical Education)

Duration: 5 years (June 1996- May 2001)

Summary: The facility has been set up in the biotechnology center for animal tissue culture.

12) **Title: Synthesis of new quinolone and naphthyridine analogues.**

Agency: Ranbaxy Laboratory

Duration: 1 year. (2000)

Summary: New antibacterial quinolone analogues were synthesized starting from simple materials.

➤ **Recently Sujata V. Bhat arranged National Symposium and Short Term Courses**

1) National Symposium on 'Emerging Trends in Chirality, Medicinal Chemistry and Perfumery', V. G. Vaze College, Mulund East, Mumbai

Background:

It is well known that many pharmaceutical and perfumery molecules have bioactivity difference between enantiomers. Therefore, it is very important to obtain enantiomerically pure compounds. Thus, there is a growing demand for economical methods for asymmetric synthesis or kinetic resolution to obtain enantiomerically pure bioactive molecules. One section of this symposium was devoted to Chirality.

Recent natural product- based lead identifying strategies have successfully and rapidly integrated rational approaches that exploit and evolve the structural diversity provided in nature. The rational approaches include the application of structure and ligand (enzyme and receptor) based computer aided drug design (CADD). This symposium had focused on recent trends in Medicinal Chemistry, Chirality and Perfumery.

Several natural and synthetic small molecules display important olfactory property. This symposium had also discussed novel trends in perfumery field as well.

Structure of the Symposium

Many participants including students and researchers from various Research and Teaching institutes attended the conference. This symposium had helped in further enhancement of research and teaching activities in this prominent field. Students were encouraged to present research work as poster presentation.

2) Short Term Courses during Vacation (10 days)

Title of course -‘Modern Concepts in Pharmaceutical and Chemical Industries’ , V. G. Vaze College,

These courses were successfully completed with enthusiastic students from Chemistry, Biotechnology, Pharma-analytical, Bio-analytical and Microbiology background from various colleges in Mumbai including some from Ratnagiri.

Through this course these students were exposed to **various aspects of Industries**. The technical as well as commercial aspects of **Natural Products, Pharmaceutical, Agrochemical, Perfumery and Cosmetic industries** were discussed. The Indian and global scenario of these Industries were discussed. The lectures also included the separation and identification techniques including instrumentation such as NMR, IR, UV, GC, HPLC, digital polarimeter etc. In perfumery lecture various plants with their odor value and their cultivation methods were discussed. In the quality control and quality assurance lecture students were also made aware of good work environment and work ethics including team work, honesty, documentation and responsibility.

Afternoon sessions consisted of practical demonstrations, which included steam distillation of essential oils, plant extraction, simple solvent distillation, vacuum distillation, fractional distillation, thin layer and column chromatography, NMR, IR, UV, GC, HPLC and digital polarimeter instruments’ operations. On the last day students were taken to Industrial R and D and quality control departments of KEVA fragrances in Mulund West, Mumbai.

This course consisted of **sixteen lectures** including **seven lectures from eminent people from industries**, seven practical sessions and **one industrial visit**. On the whole it was very interactive course. **Employment opportunities in various industries** were also discussed. Last lecture encouraged students to become entrepreneur. The lecture and practical sessions were conducted effectively. Students gave excellent feed- back at the end of course.