

Executive Summary of the Review of Department of Chemistry
Date of review: March 3, 2014

The review of the department was conducted on March 3, 2014. The following members from the list of reviewers approved by the Chairman, Board of Governors of IIT Bombay were invited: Prof. K. N. Ganesh (IISER Pune), Prof. R. V. Hosur (TIFR and CEBS), Prof. P K Chattaraj (IIT Kharagpur), Prof. G Krishnamoorthy (TIFR), Prof. Sourval Pal (NCL), and Prof. Dr. Dr. h.c. mult. Herbert W. Roesky (Göttingen, Germany).

All the faculty members of the department were invited to attend the report presentation and interact with the reviewers. Prof. Nand Kishore gave a presentation on the overall profile of the department covering the following aspects during the review period: the growth of the department since 1965, teaching and research activities, existing areas of expertise, undergraduate, postgraduate, Ph. D. and postdoctoral programmes of the department, educational outreach, augmentation of research facilities, research publications, citations, sponsored research projects, major faculty awards and honors, conferences and symposia held, visiting appointments and the role of technical and non-technical support teams of the department. There were several queries raised by the members of the committee. These were discussed in detail.

The members of the committee also met a group of undergraduate, post-graduate and doctoral degree students. The students brought out their opinion and comments on the quality of teaching and research programs, and also elaborated various other issues including living conditions, and student-faculty relationship. The members of the committee then made a site visit to the teaching and research laboratories of the department. Safety aspects of laboratories were also inspected. Members of the committee had a working lunch with the faculty members. They interacted at length with the younger faculty members to know how they get grounded in their teaching and research environments. The committee members then met the technical staff of the department and had a detailed discussion on various issues and concerns raised by them. Finally, the members of the committee had another round of discussion with all the faculty members. In this meeting, some of the issues raised by the group of students and the technical staff were conveyed to the faculty members.

Summary of the report submitted to the reviewers:

The department at present has 35 faculty members, 250 PhD students, and more than 200 M. Sc. students, project staff and postdoctoral associates. Over the years, the department has emerged as a major centre for teaching and research in the country. Today, the department of chemistry at IIT Bombay is one of the most preferred destination for faculty and students.

At the undergraduate level, the department is offering UG laboratory course to all the first year students of the B. Tech. and integrated programmes of science streams. The number of students enrolled for this laboratory course has increased from 636 in 2008-2009 to 877 in 2012-2013. This course runs in both the semesters with about 450 students enrolled per semester. The number of students admitted increased from 17 to 25 in the M.Sc. integrated program, and from 23 to 32 in the M.Sc. 2 years program. In the year 2012, an integrated M.Sc.+Ph.D. program has also been started. A new four year BS program will start from the year 2014-2015. During the

review period, an average of 42 students per year were admitted to the PhD program, and 23 students graduated per year.

The faculty of the department are committed to the highest standards of teaching and research. Three faculty members from our department were honoured with excellence in teaching awards of the institute consecutively from the year 2009 to 2011.

The research activities of the department are focused on synthetic chemistry, supramolecular chemistry, biophysical chemistry, materials chemistry, polymers, catalysis, theoretical chemistry, computational chemistry, and chemical biology. The research efforts of the faculty and students of the department have resulted into an increase in number of publications from 106 in 2008 to 186 in 2012, making it an average of 5.8 publications per faculty member in the year 2012. The high quality of the publications is reflected in the following publisher wise distribution: American Chemical Society (27%), Elsevier (23%), Royal Society of Chemistry (16%), Wiley (14%), Thieme (4%), Indian (5%), and others (11%). The number of citations of publications also increased to more than 4200 per year during the review period.

The department had also attracted significant amount of funding from external resources during the review period. A total of 26 crore rupees were received as individual faculty grants from the government agencies, with maximum contribution from the Department of Science and Technology. The multi-PI grants amounted to about 176 crore rupees with maximum funds from the Department of Information Technology. The industrial contribution to the research grant during the review period was 4.536 crore rupees. Several faculty members of the department have been honoured with national and international awards and recognitions. During the International Year of Chemistry (2011), the Department of Science and Technology identified our department as one of the top chemistry departments of the country based on the criteria of number of publications, citation index and h-index.

Input from the reviewers:

Average score given by the reviewers on a scale of 10:

Reviewer(s)	Academics (UG)	Academics (graduate Level, Masters)	Academics (graduate Level, Doctoral)	Research	Infrastructure	Admission and Recruitment
Prof. H. Roesky	9.7	9.6	9.7	9.7	9.0	10
Indian Reviewers	8.3	8.2	7.3	8.3	8.3	8.5

Prof. H. Roesky remarked that the Department of Chemistry of IIT Bombay is producing highly motivated masters students that are showing very successful careers when pursuing PhD abroad. He further remarked that the department has excellent research facilities resulting into outstanding publications. He commented on the visible improvement in research and education in the department.

The Indian reviewers were satisfied with the quality of teaching of various undergraduate courses in chemistry and appreciated the hard work put in by the department. The committee was also appreciative of the overall quality of the master's and doctoral programs. The committee strongly proposed an upward revision of the fellowship to PhD students as it has remained unchanged for the past 4 years. The committee also suggested IIT-Bombay to consider reducing the tuition fees. On the whole, the members of the committee were highly appreciative of the quality of research output from the department. The positive profile of research output was appreciated. The committee members felt strongly that the level of support from the institute should be significantly enhanced in order to ensure that the research does not suffer from discontinuities caused by gaps and delays in external funding. They expressed that the level and quality of infrastructure is quite good. The committee was quite satisfied with the rigorous and open procedure for selecting students and faculty members. The committee members also felt that the current lack of appropriate career profile for the technical staff needs to be corrected.

On the whole, the committee was highly satisfied by the quality of teaching and research. The committee strongly recommended that the department should receive enhanced support from both the Institution and the MHRD.

Action plan to address the comments and suggestions of the reviewers:

A faculty meeting was held on March 12, 2014 to share the report of the reviewers with all the faculty members. Suggestions on addition of some courses in the M Sc and PhD curriculum were discussed. Appropriate modifications and additions will be done in the course curriculum. The faculty members of the department strongly endorse the suggestions of the reviewers to IIT Bombay to reduce the tuition fee of the PhD students and an upward revision of the fellowship. Efforts will be made to generate appropriate space to have library in the department. The faculty also took a note of the suggested areas of future recruitment in biophysical chemistry and fluorine chemistry. The chemistry faculty completely agrees with the reviewers' suggestions that both the space and consumable grants issues should be addressed. It is strongly felt that the institute's support towards consumables be significantly strengthened.

Further plans have been made to strengthen the safety standards and to ensure adherence of safety rules and regulations by all members of the department.

The Department of Chemistry is committed its continuous growth in education, research, and outreach with an objective of contributing to the advancement of science and technology for further societal needs.