

Commercial Activities

Analytical and Consultancy Services

Samples of varied nature from textile, leather, chemical, pharmaceutical and fertilizer industries are analyzed for heavy metals (Cd, Cr, Cu, Fe, Mn, Zn, Pb, Ni, Ag, As, Se), toxic ions (F⁻, CN⁻) and different elements (C, S & N) to achieve **ISO 9002** and **ISO 14001** certification and **OEKO-TAX** standards.

Microbiological Analysis

Samples of varied nature and sources are analyzed for microbial load to meet the WHO standards.

Facilities

We have basic and hi-tech tools for microbiological and molecular biology research such as phase contrast microscope with imaging, shaking incubators with cooling, centrifuges, thermocyclers, DNA and protein gel electrophoresis systems, ultra freezers, FTIR, elemental analyzer, atomic absorption spectrophotometer, double beam UV-visible spectrophotometer, capillary electrophoresis, HPLC, PG STAT etc. Besides research activity these are available to provide analytical services for commercial purposes.



Elemental Analyser



PG Stat For Biosensors Studies



Capillary Electrophoresis Facility

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BIOPROCESS TECHNOLOGY



Coal heap for biodesulphurisation



Phase Contrast Microscopy

Research Team

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Muhammad Amer Zahid (SA-I)
Syed Habib-ur-Rehman(SA-II)
Abdul Wahid (SA-II)
Muhammad Ejaz (SA-IV)



HPLC Facility

Research Theme

Biotechnology is at the vanguard of new methods for the efficient and clean production of biological materials and chemicals. These environmentally friendly processes utilise the power of biology to make antibiotics, enzymes, proteins and chemicals for commercial uses. Economical production using biological systems is not always simple and has to be performed safely and reliably. The aim of our research is to investigate and develop innovative systems, so as to intensify and simplify the control of bioprocesses ensuring safe, reliable and cost-effective production and recovery of commercially important materials.



Group Photo of Bioprocess Technology Division

Research Focus

The current research focus of Bioprocess Technology Division encompasses following areas:

- Biotechnology of fossil fuels
- Biotransformations of biologically active compounds
- Gene silencing through RNAi technology
- Bacterial leaching of precious metals from ores
- Microbial biodiversity and systematics
- Gene mining and extremozymes
- Development of biosensors for analytical and environmental uses

Achievements

Research Findings

- A range of bacterial strains capable of coal desulfurization has been isolated from coal mine sites and various process parameters have been optimized in laboratory scale bioreactors.
- About 50 and 68% of total sulfur has been removed through biodesulfurization of a 20 and 300 tons coal heap respectively using locally isolated bacteria.
- Established biotechnological process for recovery of uranium and copper from indigenous ores.
- Serological assay has been devised for the identification and enumeration of chemolithotrophic bacteria in bioleaching systems.
- Different fungal strains capable of producing Tylosin and Cephalosporin C have been isolated from local environment.
- More than 100 microbial strains have been isolated from varied extreme environments of Pakistan, and two strains of *Acidithiobacillus ferrooxidans* have been deposited to NCIMB, United Kingdom.
- About 60 genes of extremophiles have been deposited to GenBank as a Public Resource Domain.
- A new class of integron (class 11) has been discovered.

Educational Endeavours

- | | | | |
|--------------------------|-----------|----|-------------|
| • M.Sc. theses completed | 05 | | |
| • M. Phil. theses | Completed | 16 | In progress |
| • Ph. D. theses | Completed | 01 | In progress |

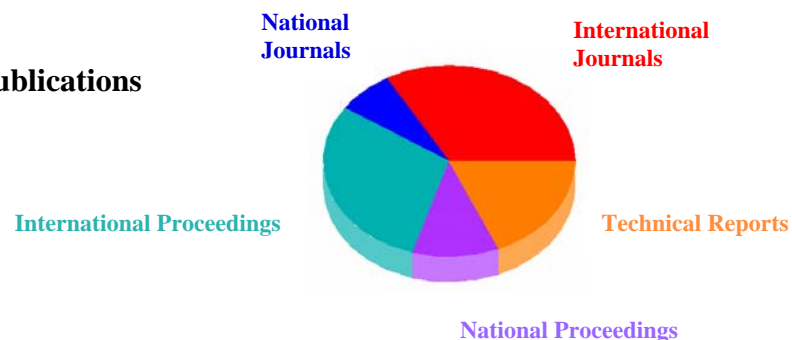
Merit Scholarships

- Sakandar Rauf-MPhil scholarship, University of Cambridge, UK (2004-05)
- M. Saleem Raza-PhD scholarship, University of Manchester, UK (2005-08)
- Munir Ahmad Anwar-PhD S&T scholarship University of Groningen, The Netherlands (2006-2009)
- Aamira Iqbal-PhD scholarship, University of Brighton, UK (2006-2009)

Competitive Grants

- Biodesulfurization of indigenous fossil fuels. Government of Pakistan (MoST)- Rs 28.8 Million (In Progress)
- Development of hyper producer cephalosporin C producing strain of *Acremonium chrysogenum* by RNA interference technique. Pakistan Science Foundation-Rs. 9,82000 (In Progress)

Publications



Future Aspirations

- Biotechnological process for organic sulfur removal from fossil fuels
- Enhancement of yield of cephalosporin C by RNAi gene silencing
- Development of DNA biosensors
- Establishment of a culture collection
- Hyperproduction of tylosin from *Streptomyces fradiae* by genetic manipulation
- Mevastatin biosynthesis and its biotransformation to pravastatin
- Production of extremozymes from local isolates



FTIR Facility



AAS Facility