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## ENVIRONMENTAL CHEMISTRY IN THE UNIVERSITY OF TARTU

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## ENVIRONMENTAL CHEMISTRY IN THE UNIVERSITY OF TARTU

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Since 1987 an Environmental Chemistry course has been a part of the curriculum of the Chemistry Department at the University of Tartu. The course was first developed for 4<sup>th</sup> year students in the Inorganic Chemistry Department of the Faculty of Physics and Chemistry. Student interest for the course was rather high: 30% of the students chose to take this elective course.

In 1990 another course, "Environmental Analysis" was added to address the practical aspects of the initial theoretical "Environmental Chemistry" course. The course consists of both the theoretical basis of environmental analysis and laboratory experiments for investigating the most important parameters of water and soil samples. During the following year, nutritional chemistry and food analysis were also added. Currently students can perform ecotoxicological analysis of wastewater and estimate the inhibition level (EC50) of oxygen consumption and nitrification rates on activated sludges in aeration tanks.

In 1992, the Chair of Colloid and Environmental Chemistry was created allowing broader planning of new courses and research. New master and doctoral degree study programs were developed. Our initial research concentrated on the use of biosensors in environmental monitoring. Since phenolic compounds of the oil shale industry are of great interest in Estonia, we have dealt with the development of phenol sensitive biosensors. Special applications and mathematical models were developed to create a measuring device for determining phenol concentration in waste water.

During the past 9 years 27 students have received their diploma or bachelor degree (B.Sc.) with an emphasis in environmental chemistry. Many of these students are continuing their masters and doctoral level studies. During the 1997 spring semester we have 9 masters and 6 doctoral degree students. A total of 9 M.Sc. degrees were defended on environmental topics during the past 5 years.

The main field of interest of our master and doctoral students is focused on the environmental biotechnology in the field of waste water treatment. We are dealing with investigations in waste water plants to improve the efficiency of the removal of polluting components from the influent by biodegradation. In many bachelor and master degree studies we are using the oxygen uptake rate measurements for the investigations. On the basis of the amperometric oxygen sensor we have developed a special method for these measurements as well as mathematical modelling of the biodegradation processes of wastewater or any other component under investigation. For computerised data management we have worked out special programs. These models and programmes are used in several cases for describing and monitoring processes in water treatment facilities for the purpose of obtaining a deeper understanding of the biodegradation rate and pathways. New investigations are conducted in the phenolic waste water biodegradation study program. The Department is consulting with several companies on waste water treatment problems. One of the biggest textile companies in the Baltics, The Krenholm Holding Ltd. in Narva, has contracted with us to clarify the waste water originate, quality and treatment possibilities. In order to improve the waste water

management in the company, they have undertaken a special study program aimed at this goal. Environmental education in University of Tartu has from 1996 a special project from the European Union supporting the development of environmental courses in our University, the Tempus JEP, which has the title: "Interdisciplinary Environmental Education in Estonia". Prof. Toomas Tenno, Head of the Institute of Colloid and Environmental Chemistry of University of Tartu, is acting as the coordinator of that project. Other Estonian Universities, the Tallinn Technical University and the Estonian Agricultural University, are participants in this project. The main objective of the Tempus project is to support the development of new integrative courses in environmental issues and to coordinate the environmental education system in Estonia. This project provides participants the possibility to create new curricula in the field of environmental sciences, and obtain new knowledge through courses held both by EU participants of the project in Estonia or in those universities who are the project participants from the EU countries (University of Turku, Granada University, Ruhr University, Hannover University). This project will run for three years, and result in a centre for the management of environmental education in Estonia.

This year a new program was also started in Estonia, the creation of the Centre of Competence in many fields of science sponsored by European Union. The Environmental Technology Department will also be as one of the components of this centre and our chair of Colloid and Environmental Chemistry will participate in this centre with competence in waste water treatment technology.