

The Institute of Chemical Engineering at the Bulgarian Academy of Sciences – 30 years recap



As scientific and applied discipline chemical engineering is known since the beginning of the last century. Its onset is based on the demands of oil

processing, chemical industry, metallurgy, etc. being the engine of the economic development for the period. Chemical Engineering comprises scientific and applied activity for the implementation of chemical sciences in industry. Therefore its methodology comprises knowledge and theory either of chemistry or of applied physics, applied mathematics, theoretical mechanics, heat engineering, etc.

The Institute of Chemical Engineering (IChE) started as a Department of Mass Transfer processes in the Institute of General and Inorganic Chemistry at the Bulgarian Academy of Sciences. Later, in 1972 it was transformed in autonomous Central Laboratory of Chemical Engineering (CLCE) and finally it was promoted to institute in 1986 by act of the Government. Last year the Institute celebrated its 30th anniversary.

Founder of CLCE and IChE was Prof. DSc Dimiter Elenkov (Corresponding Member of BAS), also founder of the Chair of Processes and Apparatuses in the Chemical and Technological Institute in Sofia (the present Department of Chemical Engineering at the University of Chemical Technology & Metallurgy).

The mission of IChE is to contribute to the environmentally sustainable development with its scientific methodology, scientific capacity and broad experience and applied research in chemical technologies, energy saving and industrial biotechnologies. The following world-wide priorities are assumed:

- Green and waste-free technologies for reduction of industrial waste and exclusion of hazardous waste.
- Methods and processes for integrated waste management (household, industrial,

hazardous) combined by their secondary use as renewable raw materials and energy sources.

- Processes, equipment and entire technologies for enhancement of material and energy efficiency of running and new enterprises.
- Process engineering for chemical technologies and industrial biotechnologies with thermodynamic modelling.
- Training of students and post-docs in the area of competence. During the period 2009/2016 in the Institute 16 PhD theses and two - for DSc were defended. For the same period the institute had trained 43 Bachelor and Master Students.

The Institute publishes about 50 scientific articles with 40% of them in international journals with impact-factor. There are also published monographs, chapters in collections on certain subjects, review articles, etc.

In its applied activity the Institute follows the logics of the chemical technology development in Bulgaria. There are many applied technologies and units developed in the Institute throughout the years. The following has got practical application, namely: sulfur dioxide and fine particulates capturing (1967); nitrobenzene removal from aniline in distillation columns (1977); removal of hydrogen sulfide in absorption columns (1978); extraction of essential oils from plants (1980s); liquid extraction of residual copper from waste streams (1988); advanced method for sulfur dioxide oxidation for sulfuric acid production (1990); contact economizers for energy saving in thermal power plants (1990/93).

In the new century the efforts were concentrated in the field of renewable fuel technologies and waste recycling, like: methanol regeneration in biodiesel production (2007); eight equipments for bioethanol distillation (2002/2008); one for biogas

production (2009); one for pyrolysis of organic compounds, e.g. used tires (2015/16).

Various algorithms and software are developed for optimal design and management of batch and semi-continuous manufacturing.

During the last years new project on hydrogen sulfide conversion, contained in the Black sea waters, into energy was developed.

The Institute develops and maintain various connections with partners from the country and

abroad. There are joint projects with partners from the European Union (Germany, The United Kingdom, Austria, The Netherlands, etc.), the United States, Turkey, India, etc. Many projects supported by the European Frameworks Programs, by bi-lateral agreements with the U.K, Turkey, Belgium, etc. have been running for decades.

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