Group research Laboratory of real samples

Analytical chemistry

Analytical chemistry, discusses in the field of identifying and measuring of ingredients of various organic and inorganic compounds.

Continually preparation and analysis of numerous samples from different stages of production and the final product, to ensure the accuracy of the production process and products standard in the chemical industry, refineries, petrochemical complexes, factories producing pharmaceuticals, foods, cosmetics, health, manure, pesticides and . . . up to biotech industry are the specialist activities in the field of analytical chemistry.

Investigate the causes and ways to prevent of corrosion in different environments is possible by using chemical analysis.

The use of different analytical methods such as: electrochemical, chromatography, spectroscopy, thermal analysis and the measurement of very small amounts of elements is possible in the equipped research laboratories in the Department of Chemistry.

History and necessity of establishing a laboratory:

- This laboratory was equipped and launched in Electroanalytical Chemistry Research Centre in 1381 and in 1392, according to the new rules and policies of the research deputy of university was approved as a group research Laboratory.
- Because of the special importance of analysis and identify materials in the country and the need to develop new high-tech methods for the separation and identification in the manufacturing process and access to the composition and structure of products and raw materials, creating of new compounds and also to identify of production process of new materials such as nano- and bio-compounds, new polymer alloys, composites, catalysts, and … there was an urgent need to establish such a laboratory.

The laboratory activities according to the needs of country in terms of scientific development are in accordance with the following objectives:

- The world's growing need for clean and renewable energy
- The need for measurement and analysis of toxic, pharmaceutical and biological substances in various industries: the activities of this research laboratory can be provided a part of the industry needs in this area.
- Development of research activities and moving towards research-oriented university and the creation of new research centers
- update and development of research in order to respond to the needs of industry
- Strengthen the industry relation sector
- Achieving to new technologies
- Guidance of Graduate project towards the applied research
- Create an environment of creativity and innovation

Major and minor goals of research laboratory program:

On the implementation of quantitative aims 1404 vision, the overall goal is to create a reference laboratory in Central Asia to analysis, identify and measurement of real samples and effort in the field of two key challenges facing human including energy and environmental pollution, will be a part of the general objectives of this research laboratory.
In this laboratory research, real samples (including organic, inorganic and biological obtained from various food, pharmaceutical, medical and … industries), were extracted and analyzed through the new detecting and measurement methods by using different electrochemistry, spectroscopy and chromatography techniques.
As well as, manufacturing and commercialization of various new electrochemical and optical sensors for determination of organic and inorganic pollutants and also pharmaceutical samples in real environments will be studied.
Another objective of this lab is utilization of bio-absorbent for removal of pollutants from the environment or excretion of heavy metals from the biological environment, including the human body.
Today, fossil fuel consumption is increasing and on the other side its resources coming to an end. Also, pollution from these fuels is a very big problem in today's modern world. Therefore, the scientists are desperately looking for clean and renewable alternative for fossil fuels. In this case, hydrogen is considered as a good candidate. Burning of hydrogen produces only water vapor!
But, in order to hydrogen production, we are in the beginning and there are some problems in this way that among these problems can be noted to sources of hydrogen.
Currently, about 84% of hydrogen production again comes back from fossil fuels! And about 4% is produced through the water electrolysis by electrochemical method. Platinum, is the most important catalyst which used for hydrogen production by electrolysis which is very expensive and its resources are limited on the Earth's crust. One of the important issues that will be followed in this laboratory is research on the new catalysts to replace platinum, which does not have its problems.

Short-term and long-term programs:

Although creation of hydrogen production infrastructure and access to it, has many advantages, but it did not happen in the short term and is required that a series of research and development activities, preparation of samples and the performance of pilot plant scale in addition to efforts to reduce costs of each components and creating a culture and grounds required for the adoption with these new technologies.
In the short-term plans, trying to construction of new catalysts with good performance will be done and in case of success, these catalysts are introduced to related industry.
Also, in the field of pollution monitoring and analysis of different pharmaceutical and biological materials, attempts to introduce the newer and more efficient methods will be done and God willing in the future will be introduced to industry and use in order to solve their problems.
Regarding to providing of biological absorbents, in the short term, the study on the identification of new biological absorbers with high performance and low cost will be done and in the long term, studies on their practical application, to control of various industries pollutants will be conducted.

The existing equipment in the laboratory:

	Apparatus	Model
1	Potentiostat - Galvanostat	Autolab PGSTATE 30 model
2	Trace Analyzer	Metrohm 746 VA
3	Potentiostat	µAutolab
4	UV-Vis Spectrophotometer	Schimadzu UV mini 1240
5	PH meter	Metrohm-691
6	Electrical oven	Memmert
7	Ultrasonic baths	Reliance Digita-5L
8	Vacuum oven	MMM vacucell
9	Electronic balance (with an accuracy of 0.0001g)	Satorius-LA z305
10	Spin coater	Backer SC409
11	PH meter	PH meter 140 CORNING

Contact information:

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Scientific and research activities

The number of articles indexed by ISI	37	The number of translated books	1
Number of citations	2389	The number of supervised doctoral students	1
H-index	20	The number of supervised MSc students	64

Titles and scientific honor

- Presented the four Hot papers in prestigious international journals: Analytical Chimica ACTA, Microchemical, Chromatography A
- Top researcher of Department of Chemistry in 1387
- Secretary of the First National Congress of the battery, the Green Research Institute (date of notification: 1379/08/30 & date of Conference: 1380/08/17)
- Secretary of the tenth annual electrochemistry seminar of Iran(date of notification: 1393/04/08 & date of Conference: 1393/09/06 & 1393/09/07)
- Member of editorial board of the battery industry journal - Niroo Battery Company (By 1381 to 1385/10/15)

- Dr. Ali Ghaffarinejad (fellow researcher), Assistant Professor Department of Analytical Chemistry
- Dr. Hossein Ghafuri (fellow researcher), Assistant Professor Department of Organic Chemistry