MODERN ANALYTICAL CHEMYSTRY – RESEARCH FRONTS (2016-2019)

Kulenko A.I., Kolodko I.V.
Scientific supervisor: assoc. prof. Moroz V.P.
National University of Pharmacy, Kharkiv, Ukraine
sunfire@ukr.net

Introduction. The Institute for Scientific Information (1960-1992) was founded by the famous American scientist Eugene Garfield. In 1992-2016, it had IP and Science branches of Thomson Reuters. Currently, it is Clarivate Analytics company created in 2016; it operates in more than 100 countries around the world. The company's goal is to select, analyze and provide high-quality information for scientists, teachers, publishers, librarians, physicians, employees of patent offices, pharmaceutical market, managers, etc.

At the end of each year, Clarivate Analytics together with the Institute of Science and Development of the Chinese Academy of Sciences (CASISD) and the National Science Library, Chinese Academy of Sciences (NSLC) publishes Research Fronts reports. In particular eleven research groups were represented in Research Fronts 2019; among them we were interested in a direction close to analytical chemistry – "Chemistry and materials science".

Aim. The aim of our work is to study the Research Fronts reports (2016-2019) relating to chemical disciplines, in particular analytical chemistry, which allows scientists to make modern maps of research in chemical and biomedical disciplines and find the leading hottest research areas.

Materials and methods. We studied the annual Research Fronts 2016-2019 reports of Clarivate Analytics together with CASISD and NSLC, as well as a series of periodicals and electronic publications available to us. Next we tried to conduct a comparative analysis of Research Fronts analytical chemistry in 2016-2017 and 2018-2019.

Results and discussion. Among the leading scientific fronts of analytical chemistry in 2016-2017, according to scientometric estimates of scientists, different types of sensors were ahead – biosensors based on nanomaterials, gas (including graphene-based), microfluidic devices (laboratory on a chip) allowing to obtain controlled flows of small volumes of liquid samples and the corresponding reagents. Paper chips formed a separate research front. In general, microfluidics was a leader in high citations of publications. Works on proteomics, microextraction, hydrophilic extraction, studies of ionic liquids and graphene-based sorbents were of great interest.

The research in the field of creating solar cells and batteries that are necessary for solar energy, electronics, and computer devices is interesting. The direction of fluorescent carbon quantum dots already appeared in the maps of scientific research in 2016.

The general trends should be noted, including the miniaturization of analytical devices that allow determination outside the laboratory. The main trend remains the dominance of the biological analysis over other types of the analytical research.

To evaluate the leading Research Fronts of 2018-2019 in analytical chemistry the researchers compiled lists of about 100 most cited scientific articles in the discipline. These articles have been published over the past 4-5 years in such recognized scientific publications as "Analytical Chemistry", "Trends in Analytical Chemistry", "Analytica Chimica Acta", etc.

Thus, fluorescent carbon quantum dots (fluorescent carbon nanomaterials), paper microfluidic devices, cell microfluidics, 3 D printing in microfluidics, models of human organs (organs on a chip) lead on the map of scientific research in analytical chemistry from 2018. Miniature microfluidic analytical

devices and sensors are each included in up to four separate research fronts and are cited 2.5 times more than in the fronts of 2016. However, the number of articles on proteomics, mass spectrometry and chromatography continues to decline although they hold high positions in the applied research. The emergence of microfluidic analytics for cells, organs on a chip, and exosomes among Research Fronts reflects a trend toward biologizing the chemical analysis.

The promising trends of Fronts in chemistry and materials science in 2018-2019 are dendrite free lithium metal anodes, transition metal-catalyzed electrochemical C-H functionalization, ultralong organic phosphorescence, borophene, solar steam generation, molecular machines, high-energy-density polymer nanocomposite, all-inorganic perovskite ($CaTiO_3$) nanocrystals optoelectronic materials and perovskite solar cells, etc.

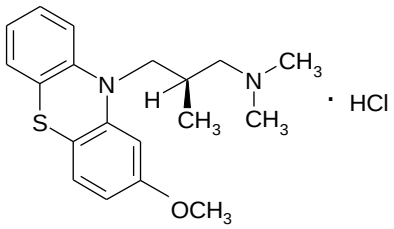
According to the data of Research Fronts 2019 among 10 broad areas, the USA leads in 7 fields of the research activity and influence, while China leads in three, such as chemistry and materials sciences, math/computer sciences and engineering, and ecology and environmental sciences.

Conclusions. The determination of promising areas of scientific research in our time is an important policy issue of the leading world powers. States that are not able to identify the direction of scientific research are doomed to technological backwardness and borrowing of foreign technologies; it calls into question their sovereign existence. Every year, the world's leading countries invest significant budgetary funds in research and development. But it is not only the amount of these costs that is important, but their effective placement as well. To determine these important areas, scientometry is involved, offering various analytical and predictive methods for this purpose. Applicants for higher education at the NUPh young researchers and future scientists have an important task to master the latest arsenal of scientometric methods of the world's leading research institutions.

QUANTITATIVE DETERMINATION OF LEVOMEPROMAZINE IN PHARMACEUTICALS BY SPECTROPHOTOMETRIC METHOD AS ITS SULFOXIDE

Mozgova O. O.
Scientific supervisor: prof. Blazheyevskiy M. Ye.
National University of Pharmacy, Kharkiv, Ukraine
elena.mozgovaya25@gmail.com

Introduction. Chemically, Levomepromazine hydrochloride (Tisercin®) is a derivative of phenothiazine with dialkylaminoalkyl substituents in side chains of molecules in position 10 (Fig.), with antipsychotic activity. Levomepromazine with methoxy group in position 2 has high activity and rapid sedative effect and is used for acute psychosis treatment (depressive-paranoid schizophrenia, psychomotor agitation, alcoholic psychosis, etc.).



In particular, it is produced in the form of a powder of Levomepromazine hydrochloride and maleate tablets, 0.025 g of tablets under the trade name of Tisercin®, a solution for injections of 25 mg/mL (as Levomepromazine base); as auxiliary substances: sodium chloride, citrate acid, monothioglycerol and water for injection.