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

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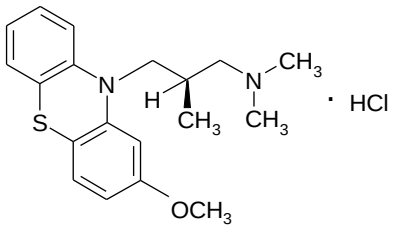
Introduction. Chemically, Levomepromazine hydrochloride (Tisercin®) is a derivative of phenothiazine with dialkylaminoalkyl substituents in side chains of molecules in position 10 (Fig.), with antipsychotic activity. Levomepromazine with methoxy group in position 2 has high activity and rapid sedative 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.

The literature shows a wide variety of analytical techniques used for its determination, such as liquid chromatographic methods with different detectors, gas chromatography-mass spectrometry, fluorimetric, voltammetric and other methods. A lot of them employed HPLC technique which allows simultaneous determination of Levomepromazine and its metabolites in miscellaneous samples: brain tissues, human plasma or serum. In addition to these electro-migration techniques like capillary zone electrophoresis, solid-phase extraction were used for the separation and the determination of Levomepromazine and its metabolites too.

With the development of modern pharmaceutical chemistry, the need arises to develop new methods of determination using contemporary analytical techniques. Recently, was proposed reliable and accurate UV-spectrophotometric methods for the simultaneous assay of Levomepromazine hydrochloride and its sulphoxide. One of them has applied derivatization of spectra for the separation of overlapped signals. The second one has utilized a bivariate calibration algorithm. The elaborated methods have been applied for the determination of studied compounds in synthetic mixtures without initial separation. Additionally, the proposed procedures have been used for assaying the Levomepromazine content in coated tablets “Tisercin”. The obtained results have been compared with a declared value. The value of relative error less then ±1% has shown an excellent accuracy of both spectrophotometric methods.

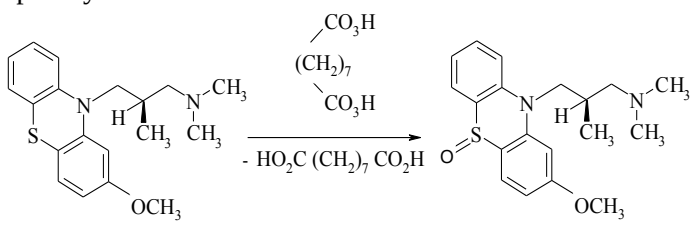
The scientific literature describes methods for the quantitative determination of Levomepromazine as an intermediate product of oxidation of the cation-radical Phenthiazonium Levomepromazine. However, most of them require long-term heating and/or containment for the development of color. Almost all spectrophotometric methods based on the formation of colored cation-radicals strongly depend on the concentration of acid or oxidizer, and their colored forms are unstable, the color is retained for 20-30 minutes.

Aim. The development of oxidative derivatization method using Diperoxyazelaic acid for the indirect spectrophotometric determination of Levomepromazine hydrochloride.

Materials and methods. Sample preparation is Tisercin®, Levomepromazine hydrochloride 25mg / mL, solution for Injection of 1 mL. Tisercin® solution for injection, 1 vial contains 25 mg of Levomepromazine hydrochloride calculated on Levomepromazine base; excipients: citric acid anhydrous (9 mg), monothioglycerol (7.5 mg), sodium chloride (6 mg), water for injections (up to 1 mL). Manufactured by EGIS Pharmaceuticals PLC, Hungary; Lot: 23F0317.

Registration of Levomepromazine hydrochloride solutions and products of its oxidation spectra, as well as the measurement of absorbance of solutions, was performed in a 1 cm quartz cuvette on an Evolution 60S UV-Visible Thermo-Scientific Spectrophotometer (USA) against a solution without the analyzed Phenothiazine derivative or double distilled water (compensation solution). Measurement of the pH of the solution was carried out by electrometric method using the glass electrode ESL-43-07 and the "Ionomer I-130".

Results and discussion. We have proposed a quantitative determination of Levomepromazine hydrochloride by indirect spectrophotometry in the form of a corresponding sulfoxide, which was obtained with the help of diperoxyazelaic acid as a new analytical reagent. The scheme of S-oxidation of Levomepromazine via diperoxyazelaic acid in an acidic medium is



Diperoxyazelaic acid is introduced as a derivatizing agent for Levomepromazine, yielding the sulfoxides. This reaction product was successfully used for the spectrophotometric determination of the Levomepromazine hydrochloride. The UV spectroscopic detection of the sulfoxide proved to be a more robust and sensitive method. The elaborated method allowed the determination of Levomepromazine hydrochloride in the concentration range of 3-150 μg/mL. It shows that the proposed method of

performing the analysis allows us to determine the substituted derivative of phenothiazine (Levomepromazine hydrochloride) in the dosage forms with reliable accuracy. The relative standard deviation does not exceed ±1.24%. The obtained results are in good correlation with the data of the determination of phenothiazine derivative by the recommended Pharmacopoeial method of liquid chromatography (Ph Eur). Limit of detection(LOD) is 0.94 μg/mL and limit of quantification (LOQ) is 2.85 μg/mL.

Determination of Levomepromazine hydrochloride in a solution for injections of 25 mg/mL in a form of the corresponding sulfoxide obtained with diperoxyazelaic acid is more sensitive, faster and less labor-intensive in comparison with methods based on the formation of free radicals of Phentyasonium, as well as simpler than the method recommended by Ph Eur.

Conclusions. The procedure of indirect spectrophotometric determination of Levomepromazine hydrochloride as its S-oxide that was obtained reaction with diperoxyazelaic acid was first proposed for application in the practice of pharmaceutical analysis. The proposed spectrophotometric method for the determination of Levomepromazine hydrochloride is simple, reliable, sensitive and less time-consuming. The statistical analyses are in good agreement with those of the Oficial USP XXXIX. The method can be successfully applied to the determination of Levomepromazine hydrochloride in pure substances as well as in Levomepromazine hydrochloride Solution for Injection. The reaction is specific for Levomepromazine hydrochloride. Other excipients such as anhydrous citric acid, monothioglycerol, sodium chloride did not interfere.

IONOMETRIC ANALYSIS OF MAGNESIUM SULPHATE IN INJECTION SOLUTION

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Introduction. Magnesium sulphate is widely used in medicine, usually in the form of a 25% injection solution and has a various effect on the body. In medicine, drugs, which are based on magnesium sulphate with parenteral administration, have a

Calming effect on the central nervous system. When administered intravenously, it quickly reduces pressure, increasing diuresis. In the case of taking orally, it acts as a laxative and has a choleretic effect, which is associated reflexes that occur when the nerve endings of the mucous membrane of the duodenum are irritated. Today, a reaction with sodium hydrogen phosphate is used in order to identify magnesium sulphate as result a white precipitate is formed, as well as a reaction with barium chloride. The white precipitate is formed when carrying out the latter reaction, which is insoluble in hydrochloric acid. The complexometric method is recommended so as to quantify magnesium sulphate. The proposed methods are not specific. Therefore, there is interest to develop a specific and rapid method for the analysis of an injection solution of magnesium sulfate.

Aim. Development of econometric method of an injection solution of magnesium sulphate using an industrial ion – selective film electrode (ISE) – EM – Mg – 01.

Materials and methods. To study the electrode function of ISE – EM – Mg – 01 used a galvanic circuit with the transfer:

Reference electrode	(KCl, saturated)	Test solution	ISE EM – Mg – 01