

METHOD OF CHEMILUMINESCENCE: ITS PECULIARITIES AND POSSIBILITIES OF USE IN PHARMACEUTICAL ANALYSIS AND MEDICINE (REVIEW)

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Introduction. Chemiluminescence method of analysis is a kind of kinetic luminescent method of analysis. The difference between the chemiluminescence method of analysis and kinetic methods other is in the form of the used for analysis analytical signal.

Aim. Systematization of data about the features and advantages of performing the analysis by chemiluminescence, as well as its use in pharmaceutical analysis and medicine.

Typically, in catalytic methods, the amount of the indicator product is recorded photometrically. In the chemiluminescent reactions, the main «product» is light, its intensity is measured by dint of photographic method, or with a photodiode or using photomultiplier.

In chemiluminescent analysis, a more simple apparatus compared with fluorescent analysis, because there is no need for a quartz lamp or other source of light excitation. In luminescent analysis, most ions with incomplete d-sublevels are reason of luminescence suppression. Instead, in chemiluminescence reactions, these ions are activators or catalysts usually (sometimes it is inhibitors – negative catalysts), and therefore easily detected. It should also be noted that some elements – such as Vanadium or Zirconium – are catalysts for the decomposition of hydrogen peroxide in conventional catalytic reactions, in contrast, in chemiluminescent reactions are inhibitors.

The chemiluminescent method of analysis can be considered as qualitative and quantitative. The method of quantitative analysis is based on the measurement of the intensity (or the sum – integral dependence of the intensity of time) chemiluminescence and is used to quantify the investigated substances. It can be used in the study of macro- and microscopic object.

A qualitative analysis method is based on the energy allocation in the luminescence spectrum and is used to identify substances. A qualitative chemiluminescent method is used to diagnose diseases, the degree of infection of seeds and plants with diseases, the determination of organic substances in the soil, and so on.

A chemiluminescence method of analysis is used in sanitary-hygienic practice to control the quality of food products (checking for presence of foreign impurities or damage). Depending on the freshness of meat, fish and other food products, the activity of enzymes catalase and peroxidase significantly decreases, and hence the value of the signal of the indicator chemiluminescent reactions (intensity or sum of the chemiluminescence) changes.

The method of chemiluminescence also is one of the main methods of research (analysis) in forensic medicine and toxicology, where it is used to detect traces of toxic substances, drugs, biological fluids, latent traces of blood, etc.

The chemiluminescent method of analysis is used for the quantitative determination of microbiological contamination of medicinal substances and monitoring of their changes during prolonged storage. For example, during the hydrolysis of aspirin, salicylic acid, which is a inhibitor of chemiluminescence of the catalytic luminol reaction, is formed, whereas the aspirin itself detects, under certain conditions, an activating action in the oxidation reaction of luminol with hydrogen peroxide (perhydrolysis reaction). Therefore, the degree of its decomposition can be determined by means the value of the intensity or form of the signal. The method of chemiluminescence is currently used in medicine to check the quality of cleaning medical instruments from the remains of hidden blood (for example, in Ukraine there is a test system «Hemotest-M» and «Delatest»).

The phenomenon of chemiluminescence in analytical chemistry is used in such directions:

- for fixing of the end point of titration during titrimetric determinations of various substances;

- determination of small quantities of the main components of the chemiluminescent reaction: hydrogen peroxide, oxidizing agents, organic compounds (inhibitors, activators), indicator substances, catalysts;
- in hybrid analytical methods for the detection of substances (chromatography);
- research of antioxidant and antiradical properties of substances.

Conclusion. From all the above it can be concluded that the chemiluminescent method of analysis is very promising for its further application in the research of the quality of medicinal products, the implementation of pharmaceutical analysis, as well as the diagnosis of diseases in medicine. Its advantages positively are the speed of the analysis, high sensitivity, the simplicity of the necessary equipment and relatively inexpensive unit analysis.

CORIANDER: DESCRIPTION, CHEMICAL COMPOSITION, APPLICATION AND PECULIARITIES OF QUALITATIVE ANALYSIS (REVIEW)

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Introduction. Among the cultivated food and medicinal plants in Ukraine, a special place was taken by coriander. Its popularity is due to the peculiarities of the chemical composition.

Aim. Systematization of data about the application of coriander in medicine and the national economy, about the research of its chemical composition and the features of qualitative analysis.

Coriander is an annual herbaceous plant up to 70 cm high with a thin stem root and rounded erect stems. Radical leaves are located on long petioles, the upper leaves grow on short petioles. Fruit is a cremocarp. Coriander blooms in May-July, fruits ripens in July-September.

Coriander is an essential oil plant, its fruits contain 0.7-1% essential oil and up to 28% fatty oil. Essential oil from mature fruit is a colorless liquid with a sharp odor and bitter taste, but it has a pleasant smell and taste with dilution or in micro doses.

Essential oil contains linalool (60-70%) (this is its main component), geraniol (up to 5%), and also borneol, terpinolene, feland, cymol, decylaldehyde and decyl acid. With further ripening of fruit, the amount of essential oil decreases, but the percentage of linalool increases.

The fatty oil consists of oleic (28.5%), isooleic (52%), linoleic (13.9%), palmitic (3.5%), stearic (1.5%) and myristic (0.6%) fatty acids acids, a small amount of alkaloids, vitamins A and C.

The originality of medicines containing coriander is proved by a qualitative chemical analysis. Qualitative reactions to the main component of the coriander (linalool):

- Discoloration of bromine water;
- Blur of solution with zinc chloride;
- Discoloration of potassium permanganate in acidic medium;
- Violet or purple-colored areas on the chromatogram (thin-layer chromatography).

Goodness is the compliance of the drug with the requirements of the normative documentation. In the case of coriander, the permissible fraction of damaged and immature fruits – no more than 3%, seeds of other species – no more than 1%, organic impurities – no more than 1%, mineral – no more than 0.5%.

During the drying of 1000 g of crushed coriander at a temperature of 105°C for 2 hours, no more than 14% of the weight is lost. The total amount of ash should not exceed the threshold of 8%. The share of ash is insoluble in chloride acid – a maximum of 1.5%.

In medicine, infusion of coriander seeds is used, which has antispasmodic, antiseptic and analgesic properties. The fruits of this plant are used as a correcting agent, and the preparations from them are used to stimulate appetite and improve digestion.

Decoctions of fruits and leaves are recommended for neurasthenia, liver and gall bladder diseases, gastritis and stomach ulcer. Mature fruits are part of the choleric, gastric, laxative and anti-hemorrhagic