

DEVELOPMENT OF DOXEPIN IDENTIFICATION METHODS SUITABLE FOR CHEMICAL-TOXICOLOGICAL ANALYSIS

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Introduction. Doxepin (3-dibenz[b,e]oxepin-11(6H)-ylidene-*N,N*-dimethyl- 1-propanamine hydrochloride) is a tricyclic antidepressant. Numerous cases of lethal intoxications due to doxepin overdose were reported in the literature. The postmortem blood concentrations ranged from 9 to 19 mg/l, liver concentrations of 71, 75, and 500 µg/g were reported.

Aim. To develop sensitive and accessible methods for doxepin detection and identification with help of colour reactions, thin layer chromatography and UV-spectrophotometry.

Materials and methods. Interaction of doxepin with 10 chromogenic reagents was studied, their sensitivity was determined. R_f values of doxepin in 12 mobile phases including those recommended by The International Association of Forensic Toxicologists (TIAFT) for TLC drug screening for 5 types of chromatographic plates (plates manufactured in Estonia with KSKG sorbent, Sorbfil, Silufol UV-254, Armsorb, Merk) were determined. UV spectrum of doxepin was studied in 0.1 M hydrochloric acid solution.

Results and discussion. Dragendorff's reagent with Munier modification and iodine vapour were the most sensitive (0.5 µg / spot). Mandelin reagent (blue turned into dark-red, sensitivity was of 2.0 µg), Mandelin reagent followed by formaldehyde vapour treatment (red, sensitivity was of 2.0 µg), Marqui's reagent (purplish red, sensitivity was of 3.0 µg), Froehde reagent (green, sensitivity was of 2.0 µg) were selective relating the endogenous biological matrix components. Three mobile phases of chloroform – methanol (90:10) ($R_f = 0.23$), methanol – 25 % ammonia (100:1.5) ($R_f = 0.58$) (or chloroform – dioxane – acetone – 25 % ammonia (47.5:45:5:2.5) ($R_f = 0.50$)), ethyl acetate – methanol – 25 % ammonia (85:10:5) ($R_f = 0.78$) had a low correlation of R_f values. R_f values are given for Merk plates. According to the TIAFT recommendations, the joint use of low-correlation chromatographic systems increases the reliability of drug identification by TLC. Doxepin in 0.1 M hydrochloric acid had absorption maximum in UV region of spectrum at the wavelength of 293 ± 2 nm (A_1^{1224}).

Conclusions. Sensitive and selective techniques developed using colour reactions, thin layer chromatography and UV spectrophotometry are suitable for the purpose of chemical-toxicological analysis.

MODERN CHEMICAL AND PHYSICAL METHODS OF ANALYSIS USED IN SPACE MISSIONS

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Introduction. Nowadays space exploration and scientific progress are inseparable. On the one hand, achievements in mathematics, mechanics, physics, chemistry, biology, medicine, pharmacy and other fundamental sciences were a crucial part in the success of first space missions. On the other hand, creation and development of space technologies contributed a lot to other spheres of scientific activity. Methods of analytical and physical chemistry have always been ahead of modern scientific research.

Aim. The objective of our research is to investigate sources which describe the use of newest methods of analytical and physical chemistry in space missions in the 21st century as well as future perspectives for the 2000-2030 time period.

Materials and methods. We studied the materials of NASA (National Aeronautics and Space Administration), ESA (European Space Agency), SSAU (State Space Agency of Ukraine), CNSA (China National Space Administration), ISRO (Indian Space Research Organization), JAXA (Japan Aerospace