



## Chemical and Toxicological Examination of Small Amounts of Unknown Narcotic Substances in a Mixture Using the Gas-Liquid Chromatography Method with a Mass Spectrometric Detector

**Tashpulatov Akram  
Yusupovich**

Associate Professor of the Department of Organization of Pharmaceutical Business and Pharmaceutical Technology of the Faculty of Advanced Training and Retraining of Pharmacists of the Tashkent Pharmaceutical Institute, Candidate of Pharmaceutical Sciences

**Reviwer: Sidametova Zaynab  
Enverovna**

Associate Professor of the Department of Pharmacognosy and Standardization of Medicines of the Faculty of Retraining of Pharmacists, Tashkent Pharmaceutical Institute, Doctor of Pharmaceutical Sciences

**Abdullayeva Munira  
Ubaydullayevna**

Senior lecturer of the Department of Pharmacognosy and Standardization of Medicines of the Faculty of Retraining of Pharmacists Tashkent Pharmaceutical Institute, Candidate of Pharmaceutical Sciences  
e- mail:[abdullayeva19530101@gmail.com](mailto:abdullayeva19530101@gmail.com)

**ABSTRACT**

The article presents the results of studies of small amounts of unknown substances in a mixture on carrier objects by gas-liquid chromatography with a mass spectrometric detector. It was established: the presence of unsaturated and unsaturated fatty acids, diphenhydramine, as well as narcotic drugs - codeine and thebaine in the examined syringe and on cotton swabs; retention time, molecular and fragmentation ions, their intensity, individuality of fragmentation of molecules of diphenhydramine, codeine and thebaine.

**Keywords:**

expert research, narcotic drugs, gas-liquid chromatography, mass spectrometry, retention time, fragmentation ions

In the expert study of narcotic drugs, tasks are often set for resolution not only to establish their chemical nature, properties and structure, but also one of the most difficult - to detect their minimum concentrations in various objects. To solve such problems, the gas-liquid chromatography method with a mass spectrometric detector has high selectivity, which in some cases allows obtaining the necessary information about the

composition and structure of the compounds under study. The analysis of expert practice on the use of gas-liquid chromatography with a mass spectrometric detector in the analysis of narcotic drugs illustrates its wide possibilities in cases where the information content of other analytical methods is insufficient [1].

The purpose of the study: The judicial authorities presented material evidence to the Republican Center of Forensic Examination

named after H. Sulaimanova on the fact of the death of Mr. A.: an empty used disposable syringe, with a capacity of 10 ml, inside contains the remains of a solidified brown substance similar to blood and two cotton swabs contaminated with a pungent odor. The experts were asked whether there were narcotic or psychotropic substances in the syringe and on the tampons submitted for the study, and if so, which group they belong to.

The research methods used: To accomplish this task, the inner wall of the syringe was washed, and the tampons were filled and extracted three times with ethyl alcohol, the resulting flushes were combined, evaporated at room temperature to 1 ml and used for analysis on a gas-liquid chromatograph with a mass spectrometric detector.

The analysis of the flushes from the syringe and tampons was carried out on an Agilent Technology GC 6890/MS 5973 chromatograph using the Drug SP-SHORTSPLITLESS-100H2 method.M and CODEIN M method (HP-5MS capillary column, 30 m long, 0.25 mm diameter, with 5% phenylmethylsiloxane in dimethylsiloxane,

mass-selective detector) under the following analysis conditions: ionizing electron energy 70 eV, injector temperature 280 ° C, furnace temperature from 150° to 280 ° C in a programmed mode with a temperature rise rate of 15 ° C per minute, the sample size is 1 µl, the vapor pressure of the test substance is 10 mm Hg. for example, the analysis time is 20 minutes, the gas carrier is hydrogen, the flow rate is 2.1 ml/min, in the mode with a 10:1 flow division.

The results and their discussion: Interpretation of the obtained chromatograms and mass spectra indicates that the mass spectra of the studied flushes from the syringe and tampons are characterized by the presence of stable fragments, characteristic ions formed along the common pathways of fragmentation of molecular ions. Below are their chromatograms and mass spectra (Figures 1-4). Identification of peaks detected on chromatograms and mass spectra of flushes from a syringe and tampons was carried out using a database library called NIST02.L., NIST11.L., Wiley225.L., SWDRUG.L., CAYMAN-SPECTRA.L., SWDRUG3.5.L., PMW\_TOX3.L.[2, 3].

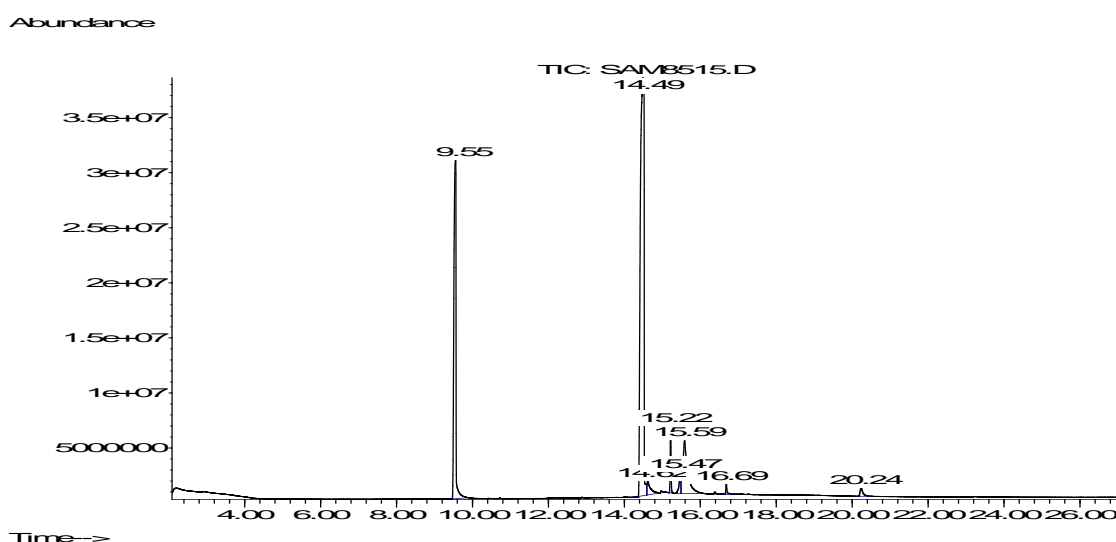


Fig. 1. Typical chromatogram of flushes from a syringe and tampons

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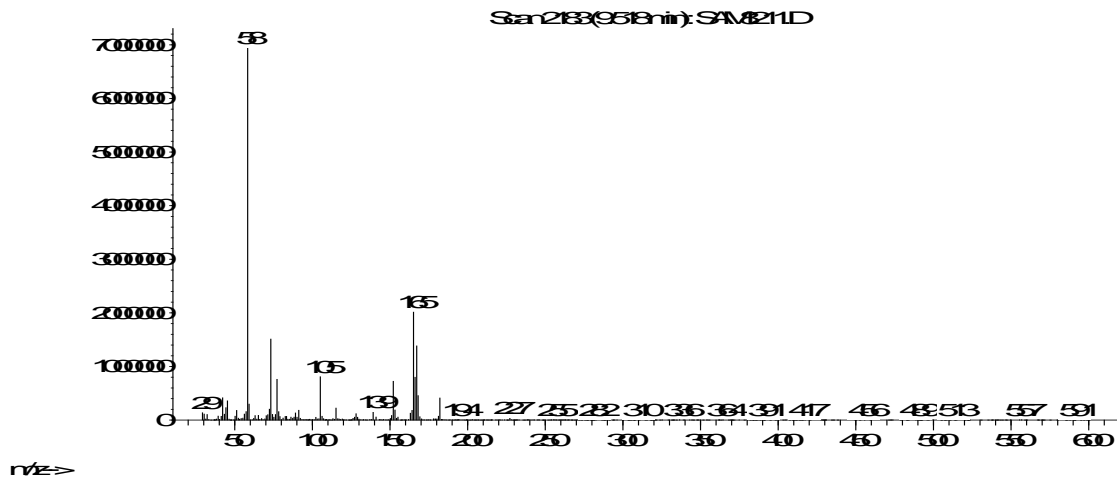


Fig. 2. Mass spectrum of the first peak of the chromatogram of flushes from the syringe and tampons

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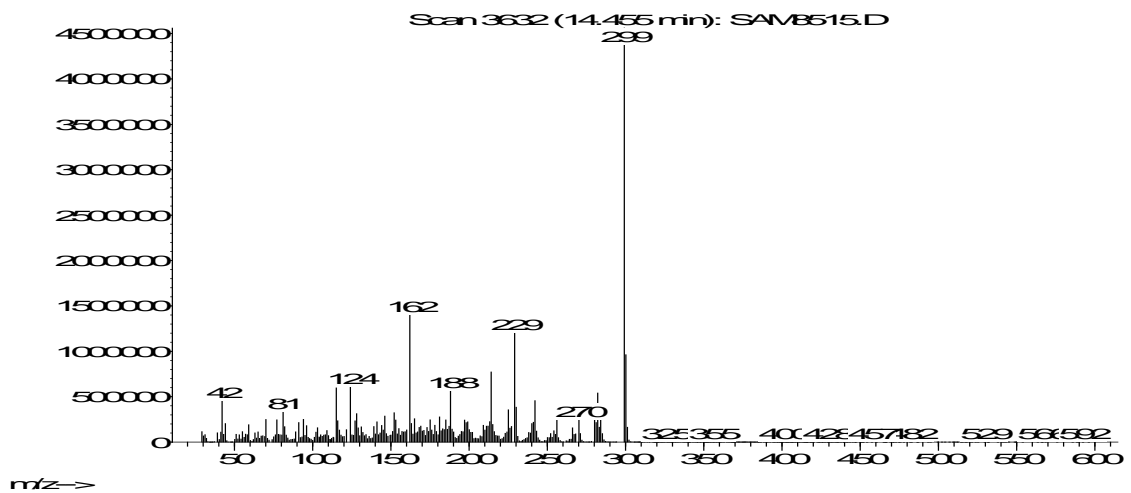


Fig. 3. Mass spectrum of the second peak of the chromatogram of flushes from the syringe and tampons

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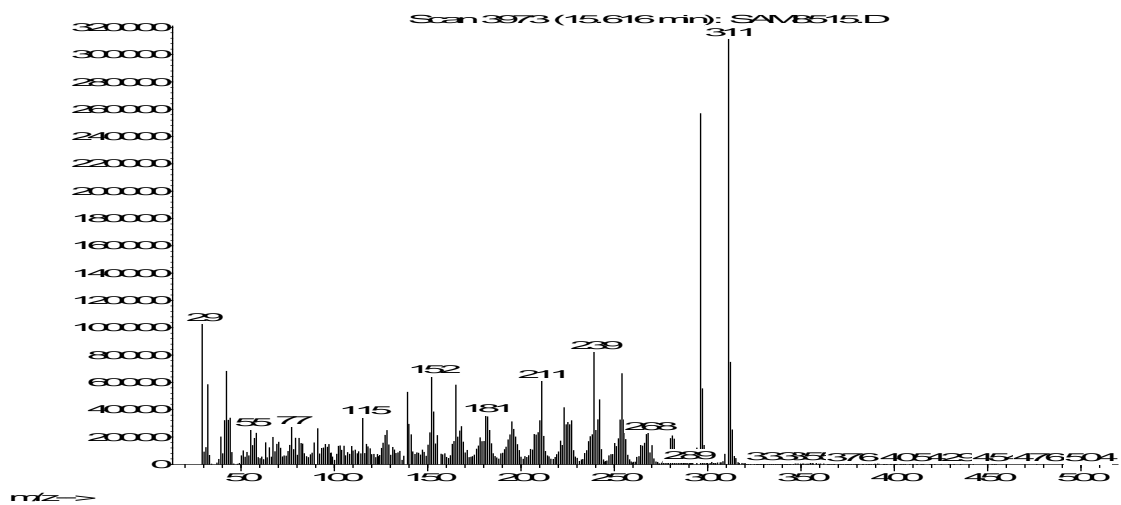


Fig. 4. Mass spectrum of the third peak of the chromatogram of flushes from the syringe and tampons

Thus, the chromatograms of the flushes from the syringe and tampons revealed the same: the main peaks with retention times of 9.55 min., 14.45 min. and 15.59 min. and fragmentation ions, respectively,  $m/z$  165, 139, 115, 77, 58;  $m/z$  299, 282, 229, 214, 188, 162, 124, 59 and  $m/z$  311, 296, 152, 115. Based on the results of studying the obtained chromatogram and comparing them with the database, it was found that the peak with a retention time of 9.55 min. and fragmentation ions  $m/z$  165, 139, 115, 77, 58 corresponds to diphenhydramine; peak with retention time of 14.45 and fragmentation ions  $m/z$  299, 282, 229, 214, 188, 162, 124, 59 corresponds to codeine and peak with a retention time of 15.59 min. and fragmentation ions  $m/z$  217, 83, 56 corresponds to thebaine. Peaks with retention times of 9.73-14.96 min were also detected, corresponding to saturated and unsaturated fatty acids, palmitic, linoleic acids and their methylated derivatives.

Thus, analysis by gas-liquid chromatography with a mass spectrometric detector revealed the presence of diphenhydramine, codeine and thebaine in the syringe and tampons submitted for the study.

According to the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 878 dated October 27, 2018 "On amendments to the Resolution of the Cabinet of Ministers dated November 12, 2015 No. 330 "On improving the procedure for the import, export and transit through the territory of the Republic of Uzbekistan of narcotic drugs, psychotropic substances and precursors, as well as control over their turnover" codeine and thebaine include in the "List of narcotic drugs whose turnover in the Republic of Uzbekistan is limited" (List II, items 13 and 43, respectively) [4].

**Conclusions:** According to the results of the analysis by gas-liquid chromatography with a mass spectrometric detector, it was established: the presence of saturated and unsaturated fatty acids, diphenhydramine, as well as narcotic drugs - codeine and thebaine, retention time, molecular and fragmentation ions, their intensity, the individuality of fragmentation of diphenhydramine molecules

in the studied liquid from eggplant and extract from plant seeds of black color, codeine and thebaine.

Thus, a technique has been developed for the chemical-toxicological study of small amounts of codeine and thebaine in the mixture using the method of gas-liquid chromatography with a mass spectrometric detector. It is proved that the use of this method, which has a high sensitivity, speed and ease of use, allows you to quickly and with high accuracy (about 10-12 g) identify unknown substances in the composition of objects coming to the expert study.

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