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Research Article

QUANTITATIVE DETERMINATION OF BIOLOGICALLY ACTIVE COMPOUNDS FROM DRY EXTRACT OF SAFFRON (CROCUS SATIVUS L.) BY GAS CHROMATOGRAPHY

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ABSTRACT

The article presents the results of a study of biologically active substances in a dry extract obtained from the flower buds of the medicinal plant saffron Crocus sativus L. The GSX method was developed to determine the amount of biologically active substances in the dry extract.

KEYWORDS

Dry extract, saffron, chromatography, standard samples.

INTRODUCTION

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Chromatography makes it possible to carry out qualitative and quantitative analysis of the objects under study, study the physical and chemical properties of substances, and monitor and automatically regulate technological processes. Gas chromatography is a method for separating volatile compounds.

This method can analyze gaseous, liquid and solid substances with a molecular weight of less than 400 that satisfy certain requirements, the main ones being volatility, thermal stability, inertness and ease of preparation. Quantitative analysis can only be carried out if the substance is heat-resistant, i.e. evaporates reproducibly in the dispenser and elutes from the column without decomposition (1,7).

In pharmaceutical analysis, the GLC method is widely used to determine residual organic solvents in pharmaceutical substances, biological active substances in liquid and dry extracts of medicinal plant materials, as well as in assessing the quality of essential oils, volatile medicinal substances, and their preparations (2,5,6).

The purpose of our work is to study the quantitative content of biological active substances in a dry extract obtained from plant raw materials of saffron using gas-liquid chromatography. Previously, we studied the qualitative content of biologically active substances in plant raw materials of saffron using gas chromatography-mass spectroscopy (3).

For the quantitative determination of biologically active substances in the dry extract of saffron, we used the dry extract we had previously obtained by the percolation method (4).

Experimental parts.

Quantification method:

Gas chromatograph – Khromatek-Kristall – 5000 (Russia)

Detector-FID

Detector temperature – 250 0C

Thermostat temperature (gradient) - 70 0C (6min), 1500C (6-15min), 200 0C (15-33min), 220 0C (33-38min)

Injector temperature - 200 0C

Carrier gas – nitrogen

Split flow – 1/20

Injection – 1 µl

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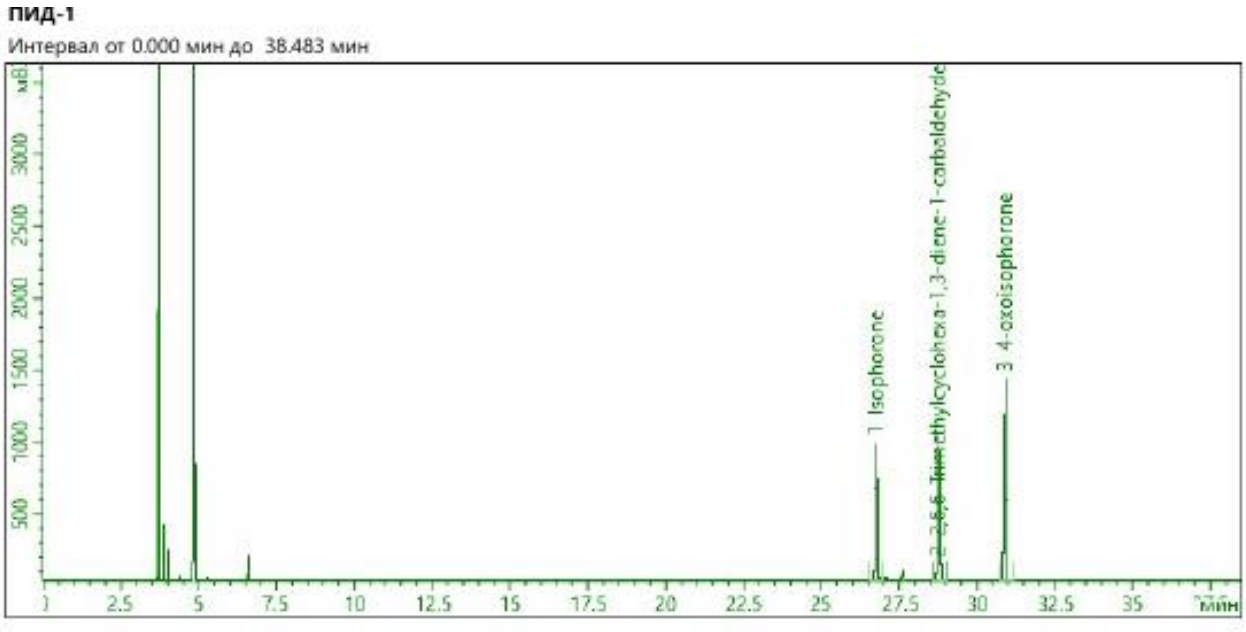

Fig. 1 Chromatogram of standard samples

Figure 1 shows chromatogram data for the three main standard substances isophorone with a retention time of 26.777 min, 2,6,6-trimethylcyclohexa-1,3-diene-1-carbaldehyde with a column retention time of 28.783 min, and 4-ochophorone with a retention time of 30.916 min . For comparison, the concentration of standard samples was 3 mg/ml.

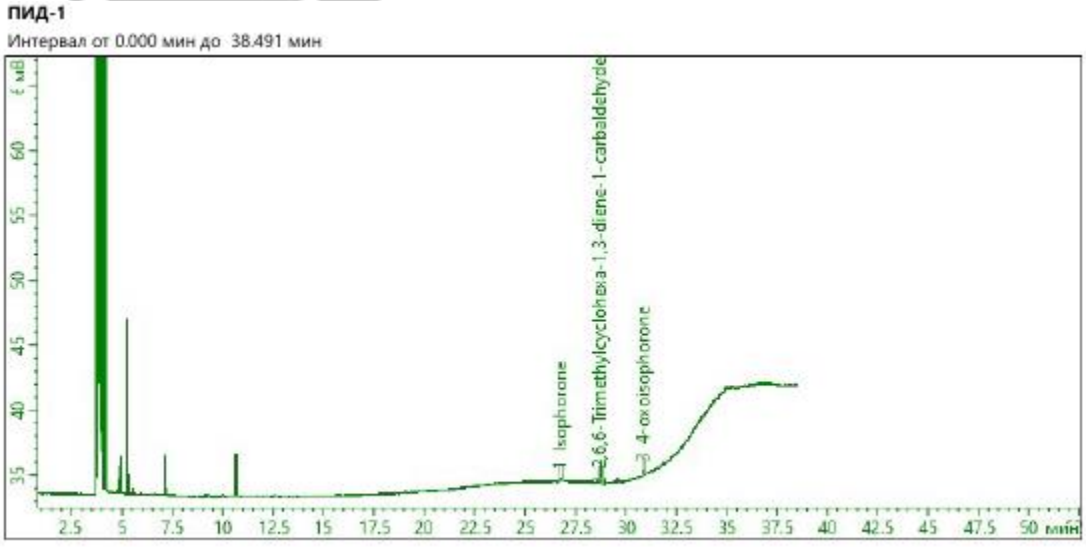

Fig 2 Chromatogram of hexane extract of dry extract of Saffron

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From the data presented in Fig. 2, it is clear that in the hexane extract of the Saffron plant all three main components are observed: isophorone with a retention time of 26.766 minutes, 2,6,6-trimethylcyclohexa-1,3-dien-1-carbaldehyde with a retention time of column 28.751 min and 4-ochophorone with a retention time of 30.875 min. The quantitative content of isophorone is 0.76 mg/ml, 2,6,6-trimethylcyclohexa-1,3-diene-1-carbaldehyde is 5.71 mg/ml and 4-ochophorone is 0.68 mg/ml.

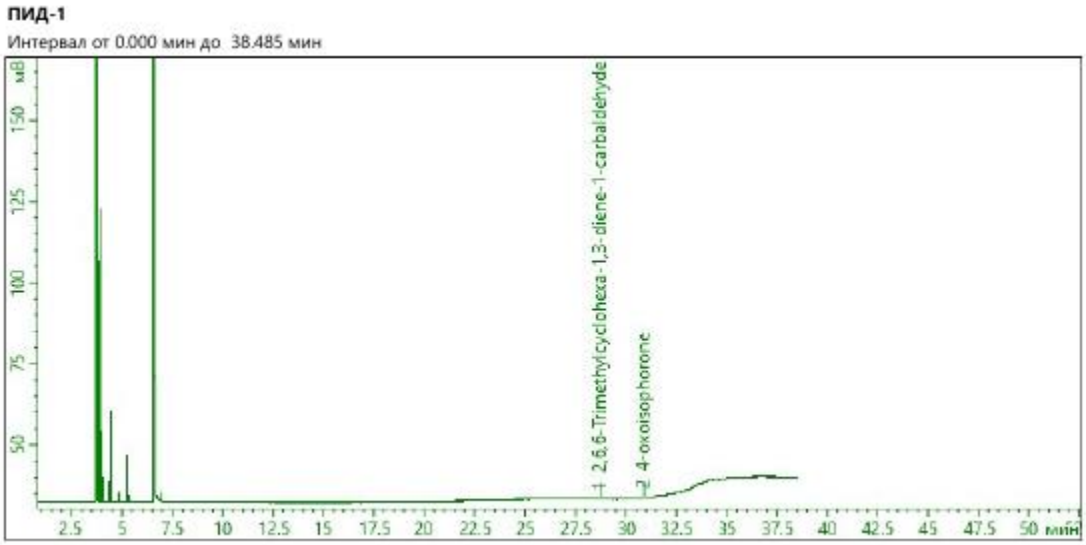

Fig 3 Chromatogram of acetonitrile extract of dry extract of Saffron

From the data presented in Fig. 3, it is clear that in the acetonite extract of the Saffron plant two main components are observed: 2,6,6-trimethylcyclohexa-1,3-diene-1-carbaldehyde with a retention time on the column of 28.745 minutes and 4-ochophorone with retention time 30.877 min. The quantitative content of 2,6,6-trimethylcyclohexa-1,3-diene-1-carbaldehyde is 0.44 mg/ml and 4-ochophorone is 0.42 mg/ml.

Conclusion. Thus, studies have shown that for the extraction of Saffron it is relatively more effective to use hexane as a solvent.

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методов анализа биологически актывних веществ в растительном сыре шафрана посевного(Crocus sativus L) с помощью хромато-спектрометрии», Pharmaceutical journal, №2, том.29, 2020 Тошкент.

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