

UDC 543.544(075)

*Published by the decision of the Editorial Review Board  
of the Kazan National Research Technological University*

*Reviewers:*

*PhD., Professor G. Ziyatdinova*

*PhD., Professor L. Nikitina*

**Bakeeva R.**

Chromatographic methods of analysis : educational aid /  
R. Bakeeva, S. Garmonov; The Ministry of Science and Higher Education of the Russian Federation, Kazan National Research Technological University. – Kazan : KNRTU Press, 2022. – 92 p.

ISBN 978-5-7882-3221-8

Basic principles of chromatographic methods of analysis are described. Theoretical questions like fundamentals of chromatography and classification of chromatographic methods, gas chromatography, high performance liquid chromatograph, main characteristics of the chromatographic process, chromatogram processing methods, planar chromatography, gel chromatography are considered. Examples of control questions and tests are given. Methods for conducting laboratory work are given. A glossary of chromatographic terms is provided.

Designed for students majoring in Chemical Technology programmes (18.03.01) and studying Analytical Chemistry in English.

Prepared at the Department of Analytical Chemistry, Certification and Quality Management.

**UDC 543.544(075)**

ISBN 978-5-7882-3221-8

© R. Bakeeva, S. Garmonov, 2022

© Kazan National Research Technological  
University, 2022

## CONTENTS

1. CHROMATOGRAPHIC METHODS OF ANALYSIS .....	5
1.1. Fundamentals of Chromatography and Classification of Chromatographic Methods.....	5
1.2. Gas Chromatography .....	7
1.3. High Performance Liquid Chromatography.....	15
1.4. Main Characteristics of the Chromatographic Process.....	22
1.5. Chromatogram Processing Methods.....	26
1.6. Planar Chromatography.....	29
1.7. Gel Chromatography .....	37
2. LABORATORY WORKS .....	42
2.1. Laboratory works on gas-liquid chromatography .....	42
Laboratory work 1. Qualitative Analysis of a Hydrocarbon Mixture.....	42
Laboratory work 2. Determination of Quantitative Hexane Content in a Mixture of Hydrocarbons .....	45
Laboratory work 3. Evaluation of the Qualitative and Quantitative Composition of Turpentine .....	48
<i>Control Questions and Tasks</i> .....	50
<i>Test</i> .....	51
2.2. Laboratory Works on High-Performance Liquid Chromatography .....	54
Laboratory work 4. Liquid Chromatograph Device and Testing of its Operation .....	54
Laboratory work 5. The Obtaining a Chromatogram of the Test Mixture in Reverse-Phase Chromatography. Determination of Chromatographic Column Efficiency.....	57
Laboratory work 6. Identification of Naphthalene in a Test Mixture of Aromatic Hydrocarbons by Retention Time and Spectral Ratio. Determination of the Error in Determining the Spectral Ratio of Naphthalene .....	60
Laboratory work 7. Definition of Adulteration of Gasoline.....	64
<i>Control Questions and Tasks</i> .....	67
<i>Test</i> .....	69

3.3. Laboratory Works on Planar Chromatography .....	72
Laboratory work 8. Separation and Detection of Halides.....	72
Laboratory work 9. Separation of Amino Acids by Thin-Layer Chromatography .....	75
<i>Control Questions</i> .....	76
<i>Test</i> .....	77
Bibliography.....	81
Glossary .....	82
Definitions of chromatographic terms.....	82
Terms and Definitions of GLC from the Current GOST 17567-81. Types of Chromatography.....	85
Gas chromatograph and its structural elements. In accordance with state standard 17567-81.....	86
General concepts used in gas chromatography.....	88
Main parameters of the gas chromatographic process .....	89