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Section 1. Architecture

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THE ARCHITECTURE OF THE CENTRAL PART OF GANJA IN THE FIRST HALF OF THE XVII CENTURY (AZERBAIJAN)

Abstract: Ganja at the very beginning of the XVII century was intensively developed and filled with buildings and structures of a wide typological palette, both independent (detached) and in complex structures. The huge flow of funds within the Safavid Empire (1501–1736) tempered the megalomaniacal desires of the rulers, which led to creation of large-scale plans and their practical implementation. The urbanization policy has proven to be quite effective on the example of the central square in Ganja, which development included construction of monumental buildings by the outstanding architect Sheikh Bahā' al-Dīn, resulting in a wonderful ensemble (religious buildings complex, caravanserai, hamam).

Keywords: urbanization, square, cult complex, hamam, caravanserai.

Introduction

Radical changes in the urban planning and architectural and artistic image of the city happened at the very beginning of the XVII century, after the main foreign policy issues were resolved. The international trade route gave a powerful impetus to the city, the development of which was an important strategic task. The vast territory of Ganja, surpassing other cities in its scale, was quite significant. This is due, first of all, to the presence of freely spreading gardens in courtyards of estates with one- and two-story houses. Gardening, which played an important role in the economy, had a definite effect both on the layout of the city and on its artistic image.

The architects of medieval Azerbaijan paid great attention to the development of the traditions of

organized urban planning. Strengthening the tendencies of the holistic organization of the Ganja cityscape, subordinating the organization of its central part to the difficultly interacting mutually perpendicular axes contributed to the formation of a trapezoidal plan in terms of a huge meydan (square). The principles of ensemble development, including the creation of differentiated spaces, the methods of combining architectural forms, get local specific expression here. All this ensured the orderliness and integrity of the compositional basis of the square as an important urbanization factor.

The drawing of the city meydan, where the religious buildings complex is located at one end of the axis, and the opposite one is closed by the trading district, was the basis for the planning and

volumetric-spatial idea of a huge, sinking in greenery plane tree square (320 × 65 m) stretching from the north-east to south-west. At the heart of the architectural ensemble of the Ganja city center, as well as in

a number of cities (Ardabil, Tabriz), the established urban planning traditions and established canons can be traced, including the compositional technique of the “continuity effect”.



Figure 1. Ganja. Square (fragment of the plan of 1797)

It should be noted that in the latter, the Sahibabad Square, construction of which started under Ilkhanate, was finally completed by the XVI century. It had a rectangular form, along the perimeter of which administrative, religious, commercial buildings and structures were located in a system grouping with a complex of front buildings [3, p. 80–89]. Similar to the colossal sizes of the square, the main element of the large cities of the Middle Ages were present in Qazvin and Isfahan.

Judging by the Ganja plan of 1797 (made by engineer-major I. Garting) under the name “Plan of the Ganja fortress with an indication of the adjacent esplanade and part of the outer settlement”, the architectural and art organization of the meydan was subordinate to the principle of the tradition of peculiar differentiation of areas and their clear ordering through rhythmic rows of equivalent dukans (approx. up to 200 shops), covered with small domes of a horizontally unfolded visual canvas [4, P. 126]. The long rows were articulated in larger cells, and thus the monotony of the metric design was lost, behind them were the buildings marked on the city

map as “silk and paper mills” [4, P. 126, 127]. On the same plane, the actual presence of a rectangular grid of streets tending to the center intersected with secondary radial lines can be found.

A decrease in the absolute dimensions of one of the short sides of the square in Ganja created a promising thickening of the metric structure of the trade and craft rows stretching along its long front. As a result, the spatial dimension of the square was visually enhanced, not completed, but continued by the religious buildings complex of the Juma Mosque (1606, architect Bahā’ al-Dīn), which occupies the narrow (54 m) southwestern side of the square, where access is organized as a front portal composition with paired round-tower minarets. The monumental mosque of the central – dome composition (25.30 × 25.28 m, d domes – 14 m), located in the center of the spacious courtyard, was built up by the hudjras of the madrasah, partially preserved until the 50s of XX century. Here, there was a necropolis (lost) [1, P. 668]. Nearby is the remarkable large-scale plastic Chokek hamam, with two large and a series of small domes, covering premises of various sizes.



Figure 2. Ganja Chokek hamam

The opposite side of the square (85 m) ended with a multi-yard bazaar (market) with wholesale warehouses, caravanserais, specialized bazaars (small bazaars), and a magnificent portal preceding it. About the latter, Avril Philippe (XVII century) wrote: "... the bazaars or markets located in the city center are the most beautiful and most magnificent of all that I have seen in the East not to mention their extraordinary length. They are all well covered with roofs, and each

kind of goods occupies a certain part. This is one of the main city attractions, which draws everyone attention" [4, P. 127, 128]. Such a comparison contributed to the achievement of one of the important compositional tasks – the enlargement of the large-scale characteristics of the religious buildings complex, a significant strengthening of its artistic and aesthetic value. West European travelers, merchants and messengers (A. Olearius, J. B. Tavernier, O. Chardin and other).



Figure 3. Ganja. Shāh Abbās caravanserai

The large trading city had dozens of caravanserais, of which only a few survived. The Shāh Abbās caravanserai, which is part of the central city ensemble, is another monumental building by the architect Sheikh Bahā' al-Dīn, located a short distance from the religious buildings complex. Opposite it, on the axis of the ensemble was a carpet bazaar (caravanserai?) With a large yard (lost). The caravanserai of Shah Abbas adjoins a small frontal composition of the caravanserai of Ugurlu bey (XVII century), with a deep roofed tunnel-like passage into the courtyard. It occupies an asymmetric position on the facade of the building with richly developed plastic.

Conclusion

The architects of medieval Azerbaijan paid great attention to the development of the traditions of organized urban planning. The unifying link of a large number of cities that had their own individual features was architecturally designed centers. The central square of Ganja with a canonically geometrized plan has acquired the significance of the urban core with an integrated rational layout. The compositional techniques of the ensemble with differentially designated public areas are based on the feasibility of architecturally organized areas, and where urban development and elements of nature are organically combined.

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Section 2. Biology

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PURIFICATION OF RECOMBINANT PRES2-S PROTEIN, THE SURFACE ANTIGEN OF HUMAN HEPATITIS B VIRUS (HBV) EXPRESSED IN *BOMBYX MORI* LARVAE

Abstract. Purification of recombinant PreS2-S protein, the surface antigen of human Hepatitis B virus (HBV) expressed in *Bombyx mori* larvae (silkworm) cells is described. The method includes homogenization of the silkworm larvae in special buffer, ammonium sulfate gradient precipitation, separation of protein fractions using ion exchange (DEAE Sepharose FF) and size exclusion (HiLoad 26/600 Superdex 75 pg) chromatography.

Keywords: recombinant PreS2-S protein, HBV, *Bombyx mori*, ion exchange, size exclusion chromatography.

Introduction

The baculovirus-insect expression system is one of the most useful platform for producing of recombinant proteins [1–5]. The system has many advantages include correct post-translational modifications and high-level expression compared to those in other eukaryotic systems [6–10]. The *Bombyx mori* nucleopolyhedrovirus (BmNPV) and the silkworm larvae as a host for infection have remarkable advantages in the mass production of eukaryotic proteins over other systems [11; 12]. Viral Hepatitis B (HBV) is one of the serious problems of world health care.

The virus constantly mutates, in this regard, the creation of new effective vaccines based on several antigenic determinants providing the best protection against viral hepatitis B is relevant. Early we have obtained the recombinant PreS2-S protein, the surface antigen of the Hepatitis B virus with several antigenic determinants in the baculovirus expression system [13], as a candidate for developing of new generation vaccines.

The aim of the this investigation is to develop an effective method for purification of recombinant PreS2-S protein, synthesized in the silkworm larvae,

which exclude the use of expensive immune-affinity sorbents, numerous purification steps, such as a multi-stage gel and ultrafiltration, ultracentrifugation.

Materials and methods

Bombyx mori larvae containing recombinant PreS2-S protein were frozen in liquid nitrogen and crushed in a homogenizer. The buffer (0.1 M Tris, pH 7.4, 0.1% SDS, 0.09% EDTA, 2mM PMSF) was added to the resulting mass in a ratio of 1:5 (1 g biomass: 5 ml buffer). Extraction of proteins from the

homogenate was carried out in buffer for 4 hours at + 4 °C on magnetic stirrer. To destroy of cells and maximize the yield of protein in the solution the homogenate was disintegrated on an ultrasonic cell disintegrator UZDN-1 at a frequency of 22 kHz for 1 minute (the procedure was carried out on ice bath). After the homogenate was centrifuged at 4500 rpm for 30 minutes and the supernatant was separated. The content of the recombinant PreS2-S protein was determined by ELISA (Table 1).

Table 1. – Results of content of the recombinant PreS2-S protein

| Samples | | Results of ELISA (value of OD at 450 nm) | Protein content, mg/ml |
|---------|---|--|------------------------|
| 1. | HBsAg Negative control | 0.053 | |
| 2. | EuvaxB20 mcg/ml, Sanofi Pasteur Korea Ltd. | 1.975 (diluted 1:2000) | 21.4×10^{-3} |
| 3. | Supernatant of homogenate of uninfected silkworm larvae | 0.090 | 10 |
| 4. | Supernatant of homogenate of silkworm larvae containing recombinant PreS2-S protein | 0.780 (diluted 1:2000) | 10 |
| 5. | Purified PreS2-S protein after separation on HiLoad 26/600 Superdex 75 pg | 2.902 (diluted 1:2000) | 22.6×10^{-3} |

Salting out the fraction containing the recombinant PreS2-S protein. Subsequently, ammonium sulfate added to the supernatant, with constant stirring in several portions to obtain a 20% solution. The solution was centrifuged and the supernatant was separated. To isolate the fraction containing the target protein, ammonium sulfate was added to the supernatant with constant stirring. The sample (60% ammonium sulfate) was centrifuged and the supernatant was separated. The precipitated fraction of recombinant PreS2-S protein was desalted using chromatography on a HiPrep 26/10 Desalting column (GE Healthcare). The desalted fractions are purified by ion exchange chromatography using DEAE Sepharose FF (GE Healthcare). At the final stage, using the gel filtration on HiLoad 26/600 Superdex 75 pg column (GE Healthcare) and borate buffer (8.9 mM NaOH, 45.5 mM Na₂B₄O₇, pH 9.3) as an eluent the recombinant PreS2-S protein was isolated. The content of the recombinant

PreS2-S protein in the samples was determined by ELISA (Table 1).

Results and discussion

Several methods for purification of recombinant surface antigenic proteins of the HBV are described. One of them is the purification of recombinant PreS2 protein synthesized in yeast cells. Purification process of the target protein is multistep, complicated and carried out as follows: surfactants (Tween-20 or Tween-80, or Triton X-100, or 0.1–0.5% sodium deoxycholate sodium) are added to the biomass of recombinant yeast cells and homogenized with buffer solutions containing chaotropic salts at a concentration of 1–8 M. The desired fraction is isolated by centrifugation, sorption on silica, desorption of the fraction with a buffer of pH 8.8–11.0, containing 1–8 M urea and 0.1–0.3% sodium deoxycholate. Subsequently, carried out gel filtration repeatedly using various columns filled with polyacrylamide or dextran gels with a molecular weight of about 1 million, while

the working buffers are Tris- or phosphate buffers with a pH 6–8, containing 0.1–0.2 M NaCl. In addition to these steps, hydrophobic column chromatography carried out using an agarose gel containing phenyl groups [14]. The disadvantages of this method is a multi-stage purification process that is technologically complicated, as well as using large amounts of chromatographic medium such as silicon dioxide, Sephadex of various types. In work [15] authors described the method of purification of recombinant PreS1-S protein synthesized in the larvae of the silkworm. In this work, affinity chromatography was performed to purify the target product. Monoclonal antibodies to plasma HBsAg serve as ligands. The disadvantage of this method is that affinity chromatography is a rather expensive procedure that requires highly purified monoclonal antibodies, which significantly increases the cost of purification of target proteins.

Purification of recombinant PreS2-S protein is provided as described in Materials and methods. Evaluation of the homogeneity of recombinant PreS2-S protein was performed using size exclusion chromatography on Superdex 75 pg, instrument AKTA Pure 150 M. Table 1 shows the degree of purification of the purified recombinant PreS2-S protein. In this case, the vaccine EuvaxB of the Korean company Sanofi Pasteur was used as the standard for comparison. The table shows that the homogeneity of the recombinant PreS2-S protein purified by the proposed method is the same as that used vaccine in the world today. The activity of purified recombinant PreS2-S protein is higher than the standard.

The results of the analysis are shown in (Figure 1). As can be seen from (Figure 1), the recombinant PreS2-S protein is eluted at 112.56 ml (Peak A).

Appendix

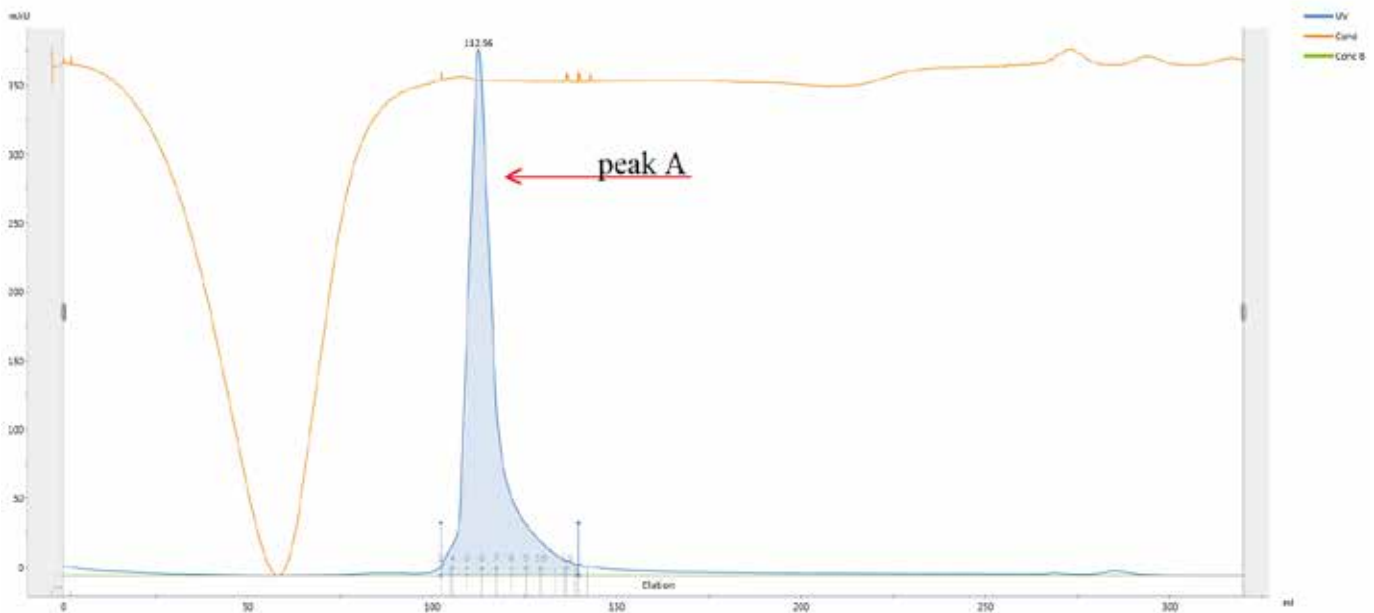


Figure 1. Chromatogram of recombinant PreS2-S protein on HiLoad Superdex 75 pg 26/600 column: Peak A – Recombinant PreS2-S protein (retention time 112.56 ml)

Conclusion

Thus, a method of purification of recombinant protein PreS2-S, synthesized in *Bombyx mori* larvae (silkworm) was developed, which allows isolating of individual protein. This purified recombinant pro-

tein is considered as a potential candidate for new vaccines or diagnostics.

Abbreviations

DEAE: diethylaminoethyl cellulose

FF: fast flow

SDS: sodium dodecyl sulfate
EDTA Ethylenediaminetetraacetic acid
PMSF phenylmethane sulfonyl fluoride

ELISA The enzyme-linked immunosorbent assay
NaOH Sodium hydroxide
Na₂B₄O₇ disodium tetraborate

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IDENTIFICATION OF HEPATITIS C VIRUS WITH PCR REAL TIME METHOD

Abstract. A set of reagents was developed to detect Hepatitis C virus (HCV) in human plasma by using real-time PCR. For this, the genomes of the 6 main HCV genotypes were analyzed; based on the analysis, primers and a fluorescent probe were designed and synthesized for PCR analysis. The sensitivity and specificity of a set of reagents were investigated on clinical blood plasma samples.

Keywords: Viral Hepatitis C (HCV), PCR, primer, fluorescent probe.

Introduction. Viral hepatitis C is one of the most common viruses, causing serious diseases, becoming chronic and leading to cirrhosis, liver cancer or hepatocellular carcinoma, from which more than 100 thousand people die every year [1; 2; 3; 4; 5].

Hepatitis C virus consists of single-stranded RNA with a positive chain. It belongs to the family Flaviviridae. Flaviviridae includes 4 genera: Flavivirus, Pestivirus, Hepacivirus and unclassified viruses. In addition to HCV, the Flaviviridae family includes yellow fever virus, tick-borne encephalitis virus, Japanese encephalitis virus, and chronic fever virus. HCV together with the recently discovered viruses

HGV/GBV-A, B and HGV/GBV-C are the only representatives of the genus Hepacivirus. The HCV chain exhibits a high degree of genetic heterogeneity. HCV is divided into 6 main genotypes, which are further subdivided into subtypes [6; 7; 8]. In this regard, the task of the study is to develop a test kit for the detection of Hepatitis C virus of all genotypes in blood plasma using PCR analysis.

Materials and methods. Design of oligonucleotide primers. Primers were designed based on conserved regions of the genome for each genotype of the virus and common to all genotypes. For this, we used the sequence of 6 main HCV virus genotypes

from NCBI (<http://www.ncbi.nlm.nih.gov>). These sequences were then analyzed using UGENE software and conserved regions were identified for all six genotypes. The 5'NCR region of the HCV genome was selected (Table 1). The length of the PCR product was ≈ 200 bp. To analyze the thermodynamic properties of the primers, the Oligo Analyze program was used.

Synthesis of primers and fluorescent probe. The primers were synthesized by the ASM-2000 DNA synthesizer. In total, 3 pairs of primers were synthesized: 1. ACF92-ACR94; 2. HCV-F1 – HCV-R3; 3. HC1315 – HC1316 and fluorescent probe HCPO2 FAM51 – 3I BHQ1.

Extraction of viral RNA. Sixty different plasma samples were taken in this study. They included 50 samples positive for HCV and 10 negative for HCV from healthy people. Plasma was stored at -60°C until use. To isolate viral RNA from plasma samples, a set of reagents for extraction of nucleic acids was used

(DNA – Technology, Russia). HCV-positive samples were obtained from the Institute of Virology of the Ministry of Health of the Republic of Uzbekistan. All blood samples are transferred to our institute by qualified personnel in appropriate conditions.

HCV detection using RT-PCR. To evaluate the analysis, an RT-PCR reaction composition was shown in (Table 1).

PCR was performed in accordance with the following temperature program:

- 37°C – 30 min 1 cycle;
- 95°C – 10 min 1 cycle;
- 95°C – 10 sec;
- 59°C – 50 sec 40 cycles;
- 72°C – 20 sec.

PCR reactions were performed using STRATAGENE RoboCycler Gradient 96. PCR products were treated on a 2% agarose gel. RT-PCR reaction was performed using a real-time Step ONE PCR system, Applied Biosystems.

Table 1. – The composition of the reaction mixture

| Reagent | Description | Quantity μl | Notes |
|--------------------------------|---|------------------------|-------|
| Virus RNA isolated from plasma | Solution containing virus RNA | 10 μl | |
| MMLV OT | Reverse transcription enzyme | 1 μl | |
| RNase inhibitor | Enzyme RNazine inhibiting RNase | 1 μl | |
| Buffer | Enzyme work buffer | 4 μl | |
| DNTPs | A mixture of 4 nucleotides (A, T, G, C) | 0.2 μl | |
| H ₂ O | Bidistilled and deionized water | 5.6 μl | |
| MgCl ₂ | Solution of MgCl ₂ | 1 μl | |
| Primer forward | A solution containing a reverse primer | 1 μl | |
| Primer reverse | Solution containing forward primer | 1 μl | |
| Probe | A solution containing a primer probe with a fluorescent label | 0.1 μl | |
| Taq polymerase | Taq polymerase | 0.2 μl | |

Results and discussion. Design and synthesis of primers. The genomes of the 6 main genotypes of Viral Hepatitis C were analyzed. Based on the data obtained, a conserved region was identified for all 6 genotypes of the virus. 3 pairs of primers were designed for this site. After they were synthesized on an oligonucleotide synthesizer ASM-2000. The se-

quence of the selected primers and fluorescent probe are shown in (table 2):

Arrangement of PCR analysis and electrophoresis in 2% agarose gel. Figure 1 shows gel electrophoresis, PCR products in which a particular target was amplified and separated in size.

Table 2. – The nucleotide sequence of the selected primers and probe

| Nº | Identificational the code | Sequence |
|----|---------------------------|-----------------------------|
| 1. | HCV-F1 | TCACGCAGAAAGCGTCTA |
| 2. | HCV-R3 | GCAGACCACTATGGCTC |
| 3. | HSSHZF | FAM-TACAGCCTCCAGGACCCC-BHQ1 |

With the selected primers, a number of PCR formulations were performed to select the optimal reaction conditions. PCR results were analyzed by gel electrophoresis. As a result of the analysis, it was found that primers with the numbers: 2.HCV-F1

and HCV-R3 give a clear positive result at an annealing temperature of 59 °C (Figure 1).

As a result of standard PCR analysis, it was found that for viral hepatitis C pairs of primers with numbers HCV-F1 and HCV-R3 were more effective.



Figure 1. 1 – Primers -ACF92/ACR94; 2 – HCV-F1/HCV-R3; 3 – HC1315/HC1316; 4 – ACF92/ACR94; 5 – HCV-F1/HCV-R3; 6 – HC1315/HC1316

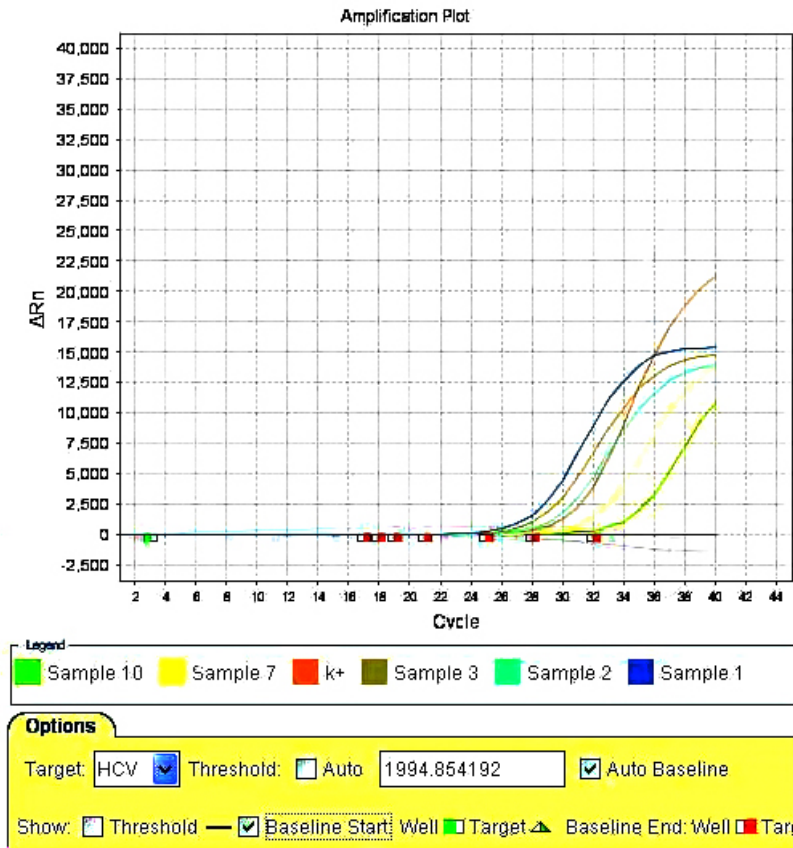


Figure 2. Determination of the sensitivity of PCR analysis at different concentrations of samples

Specificity and Sensitivity

To determine the sensitivity of the method, the lowest cDNA concentration detected by PCR was determined. For this, blood samples were taken from the already known viral load from the Institute of Virology. The samples contained the following amounts of viral particles: blue- 10^6 , beige- 10^5 , blue- 10^4 , yellow- 10^3 , green- 10^2 as a result of the analysis, the smallest amount of RNA that can be detected in the PCR reaction is 100 copies (Fig. 2).

This shows that the sensitivity of the PCR analysis is comparable to its analogues. Using the developed diagnosticum, one can detect cDNA infections in the amount of 100 copies in 100 μ l of a clinical sample.

To determine the specificity of the test kit, the following experiment was conducted. 8 positive samples with hepatitis C virus, 4 samples with negative control, 2 positive samples of viral hepatitis B, 2 positive samples of HIV were taken.

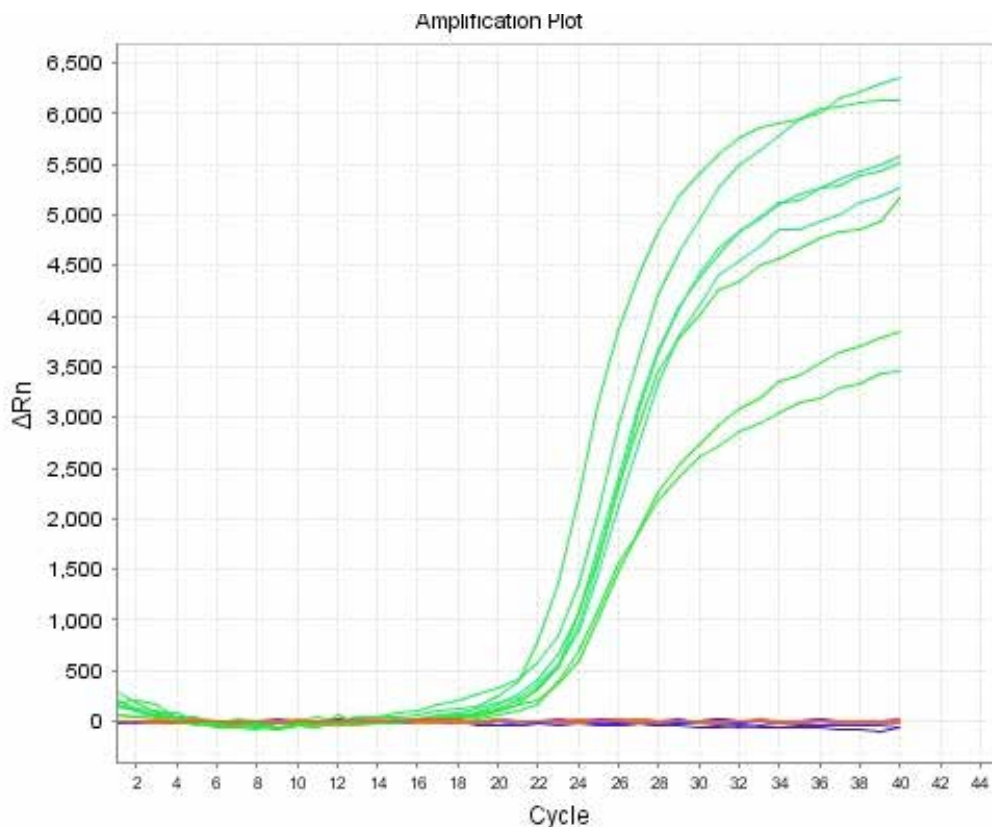


Figure 3. Test for the specificity of the diagnosticum. Green color – positive samples for hepatitis C, blue color – positive samples for hepatitis B and HIV, red color – samples of negative control

As can be seen from the test results, positive samples with viral hepatitis C (green on the graph) showed a significant increase in the fluorescence signal during PCR cycles, while at the same time when testing positive images for viral hepatitis B and HIV (blue on the graph) and negative control (on the graph is red) received a signal at the level of negative control, therefore, we can conclude that the de-

veloped diagnosticum has the necessary specificity, comparable with analogues.

Thus, we analyzed a database of nucleotide sequences of six viral hepatitis C genotypes in the NCBI. Based on the analysis, a genetic site suitable for the synthesis of primers was identified: 5' – NC – non-coding region. Design and synthesized primers for amplification of DNA fragments by PCR were

developed. To develop real-time PCR, a fluorescent probe was developed and synthesized. The composition of the reaction mixture and the conditions for the PCR reaction were also selected. The tests for sensitivity and specificity for this set of reagents. This analysis is quick and practical for determining HCV in the patient's plasma and can be used to screen, identify and control the treatment of this disease.

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OBTAINING OF MORPHINE-BSA CONJUGATE FOR USING IN ELISA AS AN ANTIGEN FOR SORBSION

Abstract. Morphine-hemisuccinate / BSA conjugate was synthesized and specification of this conjugate was confirmed with ELISA method. Seventy blood samples of drug addicts were analyzed by ELISA method using the synthesized morphine-BSA conjugate as sorption antigens. According to the results of the ELISA, anti-opioid antibodies were determined in the 88.5% samples of tested opioids addicts.

Keywords: morphine, BSA, conjugate, ELISA, Drug addicts, HPLC.

Introduction

Drug addiction is one of the important health problems in the world. This pathology results in the death of about 500000 individuals annually around the globe. Opioids continue to cause the most harm, accounting for 76 per cent of deaths where drug using disorders were implicated [1; 2]. The current situation requires the creation of new methods of analysis of identification of drug addictions. It is known that the most widespread methods for the

diagnosis of drug addiction are immunochemical and HPLC–MS methods for the determination of narcotic substances. These include: immunochromatographic, immunofluorescence, radioimmunoassay methods of analysis [3; 4]. The listed diagnostic methods of drug addiction are based on the determination of the metabolic products of the used narcotic substances in the human biological fluid. However, at the 1st stage of drug addiction, when people rarely take drugs (1–2 times in a month), these methods

cannot determine metabolites of drugs in biological fluids of drug users, because the narcotic substances saved very short period (24–48 h.) in the body. This is unacceptable for the early detection of drug users with a period of more than 2 days. Therefore, enzyme-linked immunosorbent assays (ELISA) based on the determination of specific antibodies to drugs were used in the early diagnosis of drug addiction, because, antibodies circulate and retain in the bloodstream for a long time (2–3 months). Hapten-protein conjugates are considered the main components of the ELISA test kits of the determination of anti-hapten antibodies. There were works used from bovine serum albumin, ovalbumin, lysozyme, human serum albumin, tetanus toxoid protein and fibrinogen as a carrier protein to obtain protein-hapten conjugates for developing vaccines to drug addicts [5; 6].

The aim of this work, obtaining of morphine-bovine serum albumin (BSA) conjugate for using ELISA test in order to detecting the antibodies to opiates in human blood serum.

Materials and methods

Materials: The following reagents were used for synthesis of morphine-BSA conjugates: morphine HCl, succinic anhydride (Sigma-Aldrich, USA), pyridine, ethyl alcohol, benzene, N-Ethyl-N-(3-dimethylaminopropyl)-carbodiimide hydrochloride (AppliChem, Germany), BSA fraction V (Himedia, India.), dimethylformamide.

The following materials were used for performing ELISA test: 96 well ELISA plate (Nunc maxiSorp, ThermoFisher Scientific), Anti-Human IgM, IgG (μ -chain cpecific)-Peroxidase antibody produced in goat (Sigma, USA), 3,3',5,5'-Tetramethylbenzidine (TMB), H_2O_2 , tween 20 and sulfuric acid.

Methods: *Synthesis of morphine hemisuccinate.* Obtaining of morphine-hemisuccinate was performed as follows: 0.2 gr morphine and 0.4 gr succinic anhydride was added to reaction solutions (7 ml benzene and 3 ml pyridine). Reaction mixture was warmed up to 80 °C during 4 hours, after heating the reaction mixture was cooled slowly at

room temperature then benzene and pyridine were evaporated by vacuum pump. The reaction product was washed 5 times with 99% ethanol for recrystallization of morphine-hemisuccinate. The obtained morphine-hemisuccinate was identified by thin-layer chromatography (TLC) and high performance liquid chromatography (HPLC) methods.

Identification of morphine-hemisuccinate by TLC. The obtained morphine hemisuccinate was identified by TLC on silica gel (5/40 μ) with chloroform, methanol and ammonia (40 : 10 : 0.5ml) as a solvent system and tested by the reagent of Dragindorf. Morphine was used as a standard substance.

HPLC analysis of morphine-hemisuccinate. The synthesized morphine hemisuccinate was identified by reverse phase high performance liquid chromatography (HPLC). The HPLC system consisted of Agilent 1100 series equipment and Zorbax-Eclipse XDB-C18 reversed-phase column (3.0 \times 150 mm, particle size 3.5 μ m). The UV detector wavelength was set at 226 nm. HPLC was performed under the following conditions: Mobile phase: acetonitrile-water, 1 min: 5:95 (v/v); 10 min: 95:5 (v/v); 15 min: 5:95 (v/v). Fluid flow rate – 0.5 ml /min. Injection volume: 20 μ l. Concentration of samples: 1 mg/ml.

Synthesis of morphine-hemisuccinate/BSA conjugate. Morphine/protein conjugates are considered important components of ELISA kits of drug addicts. Synthesis of morphine-hemisuccinate/BSA conjugate was performed on the following condition: a solution of 25 mg of BSA in 2.5 ml of distilled water was mixed with 1 ml of dimethylformamide containing 7.5 mg of morphine-hemisuccinate and 5 mg of water-soluble carbodiimide in 1.5 ml of distilled water. The reaction mixture was incubated for 5 hours at 4 °C. The resulting conjugate was dialyzed in 0.02 M carbonate buffer pH 9.5.

ELISA analysis of drug addictions. In this study examined the blood of 70 opioid addicts and 10 blood samples of healthy people. These blood samples were delivered from republican center of narcology of Uzbekistan. The analysis was performed

as follows: the morphine-BSA conjugate was absorbed at 30 μg to holes of ELISA well plates within 48 hours at 4 $^{\circ}\text{C}$, then free pores of plate was blocked over night with 2% BSA solution and the ELISA plate was washed twice with a washing buffer (1-PBS pH 7.4; 0.05% Tween-20). The blood serum of people was diluted (1:100) with washing buffer, added to holes of ELISA plate into 100 μl and incubated at 37 $^{\circ}\text{C}$ for 1 hour. After that, it was washed 5 times with a washing buffer and second conjugates (Anti-Human IgM, IgG (μ -chain specific)-Peroxidase antibody produced in goat) were added to 100 μl to ELISA holes and incubated 37 $^{\circ}\text{C}$ for 30 minutes. ELISA plate was washed again 5 times with a washing buffer then 3,3',5,5'-tetramethylbenzidine (TMB) in 0.05 M phosphate-citrate buffer and H_2O_2 into 100 μl were added as

the peroxidase substrate. The reaction was stopped approximately 10 minutes later by the addition of 2 M sulphuric acid to reaction mixture by 50 μl and result of ELISA was spectrophotometrically read at 450 nm and expressed as optical density.

Results and discussion

Morphine cannot bound to surface of ELISA well plate, therefore, it was connected with carrier protein (BSA) for adsorbing to well plate. First, morphine-hemisuccinate was obtained to bound with amino group of amino acids. The authors have developed numerous methods for obtaining morphine-protein conjugates, such as the carrier proteins were bounded to second carbon atom of morphine and nitrogen atom of morphine [7]. In the present study, morphine-hemisuccinate was synthesized by the method of succinic anhydride (figure 1).

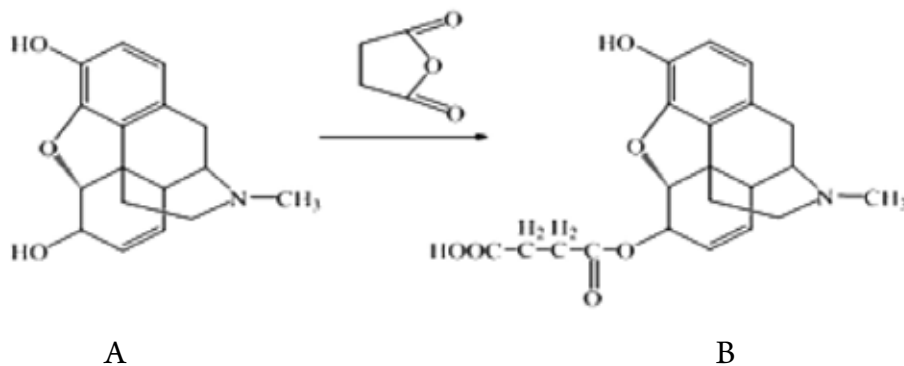


Figure 1. A. morphine B. morphine-hemisuccinate

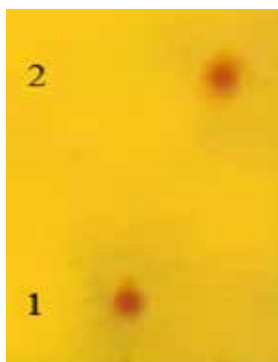


Figure 2. Result of TLC analysis. 1. Obtained morphine-hemisuccinate. 2. Morphine

It was found that the melting temperature of the obtained morphine hemisuccinate was 237–239 $^{\circ}\text{C}$ [8]. TLC analysis of morphine hemisuccinate was per-

formed and morphine was used as standard substance. According to the TLC results, morphine hemisuccinate remained at the starting point, but morphine moved and its R_f point was been 0.4 (figure 2).

According to the picture, the product of reaction did not contain free morphine.

HPLC is considered an effective analytical method and it is often used for drug analysis and standardization of substances. In this work, morphine-hemisuccinate was also standardized using HPLC method. According to HPLC results, morphine-hemisuccinate formed a peak at 5.99 min in the selected HPLC conditions. It indicates that the reaction was finished and product was individual (figure 3).

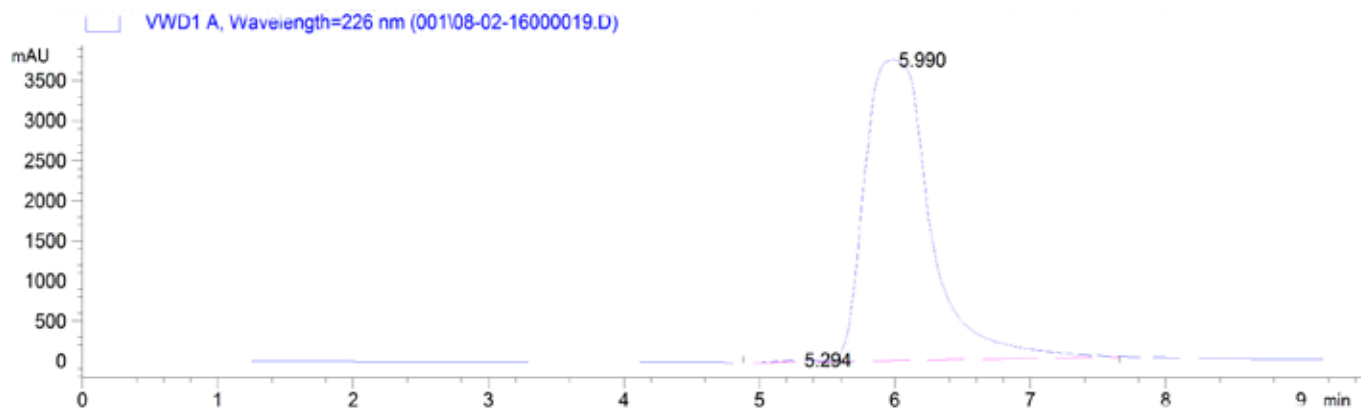


Figure 3. HPLC analysis of obtained morphine-hemisuccinate

Conjugate was synthesized by creating a covalent bond between the carboxyl group of morphine-

hemisuccinate and the free amino groups of amino acids of BSA (figure 4).

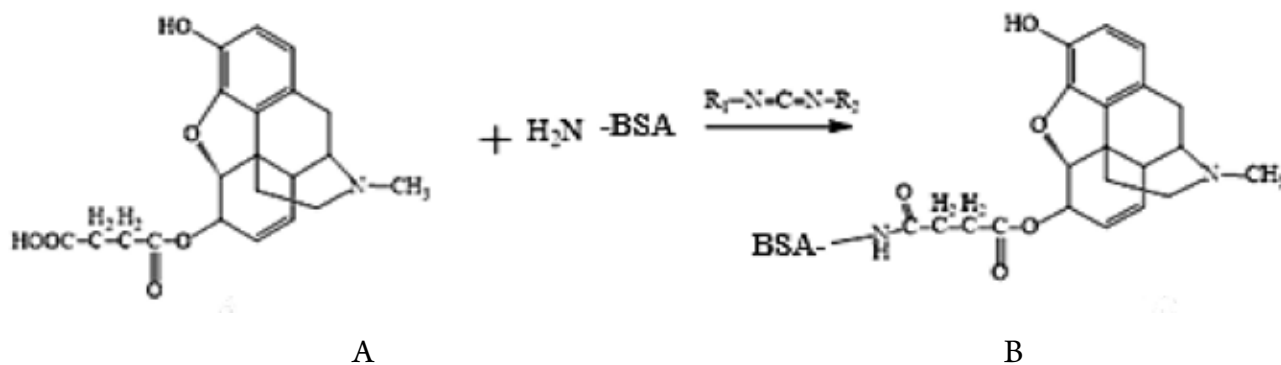


Figure 4. Reaction of conjugation. A. morphine-6-hemisuccinate. B. obtained morphine/BSA conjugate

Authors used different proteins as a carrier protein for the synthesis of morphine-protein conjugates. In this study, BSA was chosen as a carrier protein for a number of reasons such as price, and easy dissolving in ordinary solvents.

Obtained morphine-BSA conjugate was used in the ELISA analysis of blood samples of drug addictions and healthy people. According to results of ELISA, optic density of all blood samples of healthy people did not exceed than 0.3. As the result, 0.3 optic densities were chosen as a cutoff point of ELISA analysis. The optical density of 62 samples was higher than 0.3 (between 0.4 and 1.2 optic densities), but the optical intensity of the other 8 drugs

was below than 0.3. It is appropriate 88.5% specification of ELISA analysis and it is considered that the obtained morphine conjugate appropriate to use on the ELISA analysis of opioid addictions.

In conclusion, the synthesized morphine-hemisuccinate and morphine-BSA conjugate were standardized using the methods described above and confirmed by ELISA analysis. The specificity of the ELISA analysis performed was sufficiently high (88.5%). The obtained morphine-BSA conjugate appropriate to use as the main component (sorption antigen) of ELISA test kits to firstly identification (common monitoring) of opioid addictions.

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Section 3. Study of art

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GEORGIAN GASTRONOMIC DIVERSITY TO PROMOTE CULTURAL HERITAGE AND SUSTAINABLE DEVELOPMENT OF TOURISM IN THE COUNTRY

Abstract. The article claims to relate the findings of the researches on culinary tourists and international visits 2019 in Georgia to the considerable gastronomic diversity of the country in order to promote cultural heritage and sustainable development of tourism.

Keywords: Gastronomy, diversity, cultural heritage, tourism, sustainable development, international visitors.

Gastronomy has become one of the most important segments of tourism market as a facility used for attraction. It is a vital tool for place marketing and a strategic element for a brand image for tourist destination. With food so deeply connected to its origin, this focus allows destinations to present and sell themselves as truly unique, appealing to those travelers who look to feel part of their destination through its flavors.

One of the significant trends is the connection of the consumption of local products to their place of origin – the idea that a specific food or wine can be fully enjoyed and perceived only if it is prepared on the territory of its origin, by people from that community, using local ingredients. Also wine tasting

should take place increasingly in the same area of production, at the same time providing an opportunity to deepen the knowledge of the technology used for the production and preparation [1, 15].

A variety of Ethnography automatically creates a unique national cuisine. Georgian cuisine is an obvious manifestation of the oldest and richest culture of the country. Each historical-ethnographic region has its own natural and agricultural specificity, which leads to the peculiarity of the ethnic group feeding (food type, cooking procedure, eating frequency). Historically, the authenticity of each region was expressed by a dressing style, architecture and gastronomy, but nowadays the most preserved is gastronomy. Each Georgian knows

that delicious walnut sauce can be found in Samegrelo, wine and bread in Kakheti, the best Khachapuri can be tried in Imereti, while the tastiest Lobiani is baked in Racha, etc. Tourists try not only familiar dishes in well-known touristic places but millions of them travel in order to discover new and unique culinary sensations.

A great Georgian historian and scientist I. Javakhishvili asserted that Georgians created diversity of food and drink on the basis of natural variety, so that they protect their health as well as satisfy their feeding needs [2, 227]. Majority of foreign tourists, who try Georgian traditional dishes for the first time, acknowledge their best taste and aroma at once.

Nowadays a lot of tourism destinations set their marketing strategy based on gastronomy tourism. Majority of experts believe that touristic places can be significantly advanced within the borders of an international market with the help of wine places and national cuisine. Georgia is a unique country in both prioritized directions – as a homeland of wine and a country which is distinctive for its plenty of ethnographic regions.

The shift from traditional economic sectors is especially important for rural communities, many of which have struggled in the face of rapid urbanization. With their proximity to food-producing lands, rural communities often enjoy a comparative advantage when it comes to serving up traditional fare. Tourism, particularly gastronomy tourism, allows these communities to generate income and employment opportunities locally, providing jobs for vineyard tour guides or for local chefs, while fueling other sectors of the local economy such as agriculture.

A number of projects, created in favor of the revival of old Georgian gastronomic traditions, contribute to the promotion of cultural heritage. For instance, any interested person will have an opportunity to gain the experience of baking in “Bread House”- in the Satone (hall with Georgian bakery). The project “Treasure of Georgian Feast” – The tradition well preserved in the cuisine of Georgia, which is a historical flavor brought back to Georgian feast as a result of a search expedition conducted by M/Group. Wine, beer, bread, cheese,

honey festivals are often held in Georgia. It should be noted that most of them are thoroughly fixed into annual events of the country as well as of the certain regions, while some of them are not yet developed. The reason of this is a lack of experience not a lack of interest.

Eastern Georgia welcomes visitors who are interested in tasting the best Kakhetian wine from the oldest cellars kept in a Traditional Qvevri (large egg-shaped earthenware vessels used for the fermentation, storage, and ageing of traditional Georgian wine). Archaeological evidence of their use goes back to 8.000 years ago [3]. They are typically buried in the floor of the cellar or Marani, a semi-sacred place to most Georgians and found in almost every house. Qvevri wine making method is inscribed on UNESCO’s Representative List of the Intangible Cultural Heritage of Humanity.

Georgian cheese making technology is in the Registry of Intangible Cultural Heritage of Georgia. Cheese production in Georgia has a centuries-old history. Each region has its own cheese that stands out for its particular taste and texture. The main thing that unites all sorts of Georgian cheese is that they are organic and extremely delicious.

Originally from the region of Meskhети, Tenili (see Pict. 1 and 2) is made of threads of rich cow’s or sheep’s milk cheese briefly brined before being pressed into a clay pot. There is nothing like Tenili cheese in the world. Only the Mexicans prepare something similar. This is thermally processed cheese threads, which are very hard to prepare. The producers make sure the threads are of a hair’s thickness. After that, they are placed in a pot and boiled, then put in brine and stretched on ropes to dry. Finally, tenili cheese is dipped in cream and put in pots. These pots are covered and put upside down so that all the water left in them is leaked out. The pots are kept like that for several weeks. Well-dried cheese is kept for more than a year. Meskhetians (people living in Meskhети Region) like aged cheese. They keep it for a long time and eat it only during celebrations. They say if a Meskhetian doesn’t like someone, he will not serve the cheese for him.



1



2

Picture 1 and 2.

Originated from Mtiuleti and Pshavi regions of north-eastern Georgia, Dambal'khacho (see Pict. 3) is a mildewed cheese made of quark. In the old days, it was buried in the ground, but today it is no longer prepared that way. It is kept wrapped in a paper and kept in clay pots, hence it is called Dambal'khacho

that stands for 'moistened quark' in Georgian. As a rule, dambal'khacho is cooked in melted butter before eating. It is also referred to as Erbo-Khacho (boiled butter quark). Dambal'khacho is granted the status of intangible culture monument.



Picture 3.



Picture 4 and 5.

We cannot escape introducing a unique, typically Georgian Dessert called “Tatara” or “Pelamushi” (see Pict. 4 and 5) made of the sweet condensed juice of grape must mixed with wheat flour (the version of Eastern Georgia) or corn flour (the version of Western Georgia). It has mild sweet taste and looks like jelly, is usually served with various types of nuts or chocolate paste, is basically made in the fall at vintage time.

Georgian gastronomic diversity is a great resource for gastronomy tourism development in the country particularly if we consider the following data of the year 2019 (See charts 1, 2, 3, 4) published by the Georgian National Tourism Administration [4] provided below:

Table 1. – International Visitors (Top Countries)

| No. | Country | 2018: 9 months | 2019: 9 months | Variable | Variable in % |
|-----|------------------------|----------------|----------------|----------|---------------|
| 1. | Russia | 1.109.706 | 1.205.974 | 96.268 | 8.7% |
| 2. | Azerbaijan | 1.094.847 | 1.169.831 | 74.984 | 6.8% |
| 3. | Armenia | 956.076 | 993.144 | 37.068 | 3.9% |
| 4. | Turkey | 891.751 | 907.350 | 15.599 | 1.7% |
| 5. | Georgia (Non-resident) | 363.766 | 371.702 | 7.936 | 2.2% |
| 6. | Ukraine | 141.181 | 164.825 | 23.644 | 16.7% |
| 7. | Israel | 121.548 | 150.997 | 29.449 | 24.2% |
| 8. | Iran | 242.739 | 109.102 | -133.637 | -55.1% |
| 9. | Kazakhstan | 47.813 | 74.794 | 26.981 | 56.4% |
| 10. | Germany | 52.288 | 72.074 | 19.786 | 37.8% |
| 11. | Poland | 55.142 | 69.924 | 14.782 | 26.8% |
| 12. | Saudi Arabia | 47.431 | 69.074 | 21.643 | 45.6% |
| 13. | Belarus | 51.088 | 56.098 | 5.010 | 9.8% |
| 14. | India | 37.936 | 39.995 | 2.059 | 5.4% |
| 15. | USA | 32.951 | 36.966 | 4.015 | 12.2% |

Source: Ministry of Internal Affairs of Georgia, Information-Analytical Department

Table 2. – Classification of International Visitors

| Visit Type | 2018: 9 months | 2019: 9 months | Variable | Variable in% | Share in% |
|-------------------------|----------------|----------------|----------|--------------|-----------|
| International Travelers | 6.788.377 | 7.237.560 | 449.183 | 6.6% | 100.0% |
| International Visitors | 5.647.109 | 5.982.811 | 335.702 | 5.9% | 82.7% |
| Tourist Visits | 3.772.102 | 3.990.796 | 218.694 | 5.8% | 66.7% |
| One-day Visits | 1.875.007 | 1.992.015 | 117.008 | 6.2% | 33.3% |
| Other (Non-tourist) | 1.141.268 | 1.254.749 | 113.481 | 9.9% | 17.3% |

Source: Ministry of Internal Affairs of Georgia, Information-Analytical Department

Table 3. – International Visits (Regions)

| Region | 2018: 9 months | 2019: 9 months | Variable | Variable in% | Share in% |
|--------------|------------------|------------------|----------------|--------------|-------------|
| 1 | 2 | 3 | 4 | 5 | 6 |
| Total | 5.647.109 | 5.982.811 | 335.702 | 5.9% | 100% |
| Europe | 4.762.500 | 5.165.377 | 402.877 | 8.5% | 86.3% |
| America | 43.227 | 48.584 | 5.357 | 12.4% | 0.8% |

| 1 | 2 | 3 | 4 | 5 | 6 |
|------------------------------|----------|----------|----------|----------|----------|
| Eastern Asia/Pacific Oceania | 356.713 | 248.514 | -108.199 | -30.3% | 4.2% |
| Africa | 6.016 | 6.965 | 949 | 15.8% | 0.1% |
| Middle East | 110.803 | 136.365 | 25.562 | 23.1% | 2.3% |

Source: Ministry of Internal Affairs of Georgia, Information-Analytical Department

Table 4. – International Visits (Border Types)

| Border | 2018: 9 months | 2019: 9 months | Variable | Variable in% | Share in% |
|---------------|-----------------------|-----------------------|-----------------|---------------------|------------------|
| Land | 4.167.486 | 4.412.358 | 244.872 | 5.9% | 73.8% |
| Air | 1.398.397 | 1.473.606 | 75.209 | 5.4% | 24.6% |
| Railway | 56.927 | 66.777 | 9.850 | 17.3% | 1.1% |
| Sea | 24.299 | 30.070 | 5.771 | 23.7% | 0.5% |

Source: Ministry of Internal Affairs of Georgia, Information-Analytical Department

The data is also partially stipulated by the events of June 2019, when the president of Russia V. Putin banned flights from Russia to Georgia in the frames of the sanction proceeded by civil protests in Georgia against Russia trying to enforce its influence on Georgia, a bunch of young entrepreneurs launched an online campaign on Facebook called “Spend Your Summer in Georgia” which went viral on the spot and attracted a considerable number of international visitors to the country. Currently, we are running a new campaign “Spend 4 seasons in Georgia” and everybody willing is welcome to visit this extraordinarily unique country with its diverse nature, history, culture and cuisine.

Georgia is able and happy to attract and host culinary tourists with their variety-seeking tendency towards food, identified as the ones who frequently dine and purchase local food at the destination, consume local beverages, and rarely eat at franchise restaurants. In addition, the culinary tourist segment is researched to be more educated, with earned higher income than the other two segments, and is characterized by its variety-seeking tendency towards food.

Hopefully, the abovementioned provides an appropriate platform for sustainable development of tourism in the country of Georgia.

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Section 4. Medical science

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CHANGES OF INDICATORS OF MICROCIRCULATION AT BAZALNOKLETOCHNY CANCER OF SKIN

Abstract. Work is based on the analysis of a course of a disease at 185 patients with various formations of skin, most of patients were male and 50 years are more senior. From total number of patients good-quality formations of skin were established at 74(40%), malignant – at 111 (60%). As a result of the conducted research it is established that at patients with skin tumors prior to operation statistically reliable increase in all indicators behind an exception the relative volume of fraction of erythrocytes, in comparison with the data obtained in group of rather healthy people was registered. In the course of the dynamic research, for the tenth postoperative day, it was established that in group of patients with a skin horn indicators of microcirculation were restored and began to correspond to the data obtained in group of rather healthy people. At the same time in group of the patients operated concerning bazalnokletochny cancer of skin of significant changes in the analyzed indicators it was not revealed, all studied indicators, except for the relative volume of erythrocytes, were statistically authentically raised.

Keywords: microcirculation, bazalnokletochny cancer of skin.

Introduction. According to literary data 11–12% fall to the share of malignancies of skin. At the same time sharp increase in incidence of bazalnokletochny cancer from 75 to 96.8% of all malignant the epithelialnykh of new growths of skin is noted recently. Bazalnokletochny cancer of skin is a malignant epithelialny tumor with the metnodestruiruyushchy growth and rare metastasis. This type of a tumor is localized on head skin and necks (98.3%), at the same time on a nose in 39.0% of cases, on

skin of cheeks – in 16.5%, on skin of an auricle and parotid area – 11.4%. An etiologicheskyy factor refer impacts of ionizing radiation and other factors to the major, this zabovaniye develops against the background of changes both a haemo rheology, and immune system. According to the data provided in modern literature, malignant tumors render a trend on contents the matriksnykh metalloproteinaz blood serums. These changes can indirectly lead to changes in a mikrotsirkulyation.

Research objective. To study influence of bazalnokletochny cancer on microcirculation indicators.

Materials and methods. Work is based on the analysis of a course of a disease at 185 patients with various formations of skin who were on out-patient and hospital treatment in medical institutions of Engels and Saratov during the period from 2015 to 2017, most of patients were male and 50 years are more senior. From total number of patients good-quality formations of skin were established at 74(40%), malignant – at 111(60%). The design of a research included researches in three main groups where patients with bazalnokletochny cancer of skin – 111(60%) patients and group of comparison where patients with good-quality formations of skin – a skin horn at 74(40%) patients entered entered. Besides, the second group of comparison consisting of 17 rather healthy donor volunteers comparable on age and a floor to patients of the main group was included. At the same time with educations on the lower extremities 25% of the total number of all patients addressed, concerning educations on a face 15% of patients addressed. It should be noted that at the vast majority of patients of this group malignancies were revealed. For installation of the diagnosis were used as clinical data (collecting the anamnesis, the analysis of the main complaints), and application of histologic researches (cytology and histology of data after histology).

Researches included patients with skin malignancies in stages of oncological process of T1–2N0M0. Patients to whom were executed chemical and/or radiation therapy did not join.

Condition of microcirculation it was estimated with use of a method of a laser Doppler floumetriya. The diagnostic LAKK-M complex was applied (Russia, 2010). This device allows to estimate microcirculation indicators: average value of perfusion (M, перфузион. unit), a saturation of capillary blood (SO_2 ,%), the relative volume of fraction of erythrocytes (Vr ,%), the index of a perfusion saturation of oxygen in microcurrent ($SOM = SO_2/M$, having sent

away. piece), the index of a saturation of oxygen in a blood-groove ($U = SpO_2/SO_2$, having sent away. piece), a saturation of arterial blood (SpO_2 ,%) in skin of fingertips of the right hand.

According to the requirement to carrying out researches, the shown Helsinki declaration of the World Medical Association (WMA Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects, 2013) before the research all patients gave the written consent for participation in a research. Performance of a research was coordinated and got the approval of the commission dealing with bioethics issues.

Statistical data processing was carried out with use of the Statistica 6.1 program with application of the multidimensional discriminant analysis.

Results. As a result of the carried-out analysis of the indicators characterizing microcirculation the following results were received: in group of rather healthy patients of M made 16.2 ± 0.4 , перф. Unit; $SO_2 - 86.3 \pm 0.3\%$; $Vr - 16.2 \pm 0.2\%$; $SpO_2 - 98.1 \pm 0.2\%$; $SOM = SO_2/M - 6.2 \pm 0.4$ c.u.; $U = SpO_2/SO_2 - 1.6 \pm 0.5$ c.u.; frequency of beating of the pulse – 76 ± 3.1 , blows in min. In group of patients with a skin horn prior to operation the following results were received: M – 8 ± 0.5 , перф. Unit; $SO_2 - 101 \pm 0.7\%$; $Vr - 16.7 \pm 0.6\%$; $SpO_2 - 98.1 \pm 0.2\%$; $SOM = SO_2/M - 12.4 \pm 0.4$ c.u.; $U = SpO_2/SO_2 - 5.6 \pm 0.3$ c.u.; frequency of beating of the pulse – 88 ± 2.1 , blows in min. From the provided data it is visible that at patients of the analyzed group prior to operation statistically reliable increase in all indicators behind an exception the relative volume of fraction of erythrocytes, in comparison with the data obtained in group of rather healthy people was registered. In group of patients with bazalnokletochny cancer prior to expeditious treatment the following indicators of microcirculation were received: M – 12.1 ± 0.1 , перф. Unit; $SO_2 - 94 \pm 0.4\%$; $Vr - 17.1 \pm 0.3\%$; $SpO_2 - 112 \pm 0.7\%$; $SOM = SO_2/M - 8.4 \pm 0.7$ c.u.; $U = SpO_2/SO_2 - 3.4 \pm 0.4$ c.u.; frequency of beating of the pulse – 91.3 ± 2 , blows in min. The

provided data show that bazalnokletochny cancer of skin, also, as well as the skin horn, leads to statistically reliable increases in all indicators of peripheral microcirculation, except for the relative volume of erythrocytes. At the same time, it should be noted that this pathology led to more expressed changes, than a skin horn.

In the course of the dynamic research, for the tenth postoperative day, it was established that in group of patients with a skin horn indicators of microcirculation were restored and began to corre-

spond to the data obtained in group of rather healthy people. At the same time in group of the patients operated concerning bazalno cellular cancer of skin of significant changes in the analyzed indicators it was not revealed, all studied indicators, except for the relative volume of erythrocytes, were statistically authentically raised.

Conclusion. Bazalnokletochny cancer of skin leads to changes of indicators of microcirculation, at the same time performance of operation does not lead to correction of these changes.

Section 5. Pedagog

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METHODOLOGICAL FEATURES OF THE DEVELOPMENT AND APPLICATION OF MONITORING AND TESTING PROGRAMS

Abstract. The article discusses a review of the development and application of monitoring and testing programs, the stages of its implementation and the benefits of using these programs in didactic testing, and the elements of activation of the learning process are listed according to the results of the monitoring and testing survey.

Keywords: monitoring and testing program, training motivation, certification, self-certification, learning dynamics, didactic test, input control, current control, mid-term control, final control,

The diagnostic value of the didactic test is determined and ensured by the quality of the test tasks. In the psychological and pedagogical literature there are only unsystematic recommendations on the main aspects of the use and empirical analysis of tests, the formulation of test items, but unfortunately, objective methods for assessing the quality of the test items themselves are not given, and therefore there are no standardized didactic tests [1–4].

With the existing system of teaching chemical disciplines, the teacher spends a significant part of the study time on interviewing students in order to identify their degree of readiness to perform laboratory – practical classes. Therefore, the development of monitoring and testing programs that allow monitoring the student’s knowledge in a few minutes and determining the possibility of their admission to laboratory and practical work is an important component of didactic systems oriented to the use of computers in the educational process [5; 7; 8].

The methodically developed features of controlling and testing programs allow using the didactic capabilities of computers in the formation of training motivation (acquiring knowledge and skills on a computer, certification and self-certification, modeling situational tasks in the context of future professional activities, etc.), increasing the frequency and quality of feedback with the trainee, to register the dynamics of learning and to develop appropriate corrective measures of pedagogical impact.

Controlling and measuring tools in such programs are subject didactic tests of various difficulty levels (mainly I–II level according to V.P. Bespalko), type (normative, criteria-oriented, success or “achievements”, combined, etc.), forms (open, closed, with the substitution of the answer, matching sets, with insufficient or excessive information) and purpose (input, current, foreign and final control) [4; 6; 8].

A common drawback of these control-training and testing programs is the lack of a block for

analyzing student errors, without which the diagnostic value of the tool is reduced. Another characteristic feature is the weak scientific and methodological support, apparently due to the fact that almost all the developers of the “techies” do not have the necessary psychological and pedagogical training.

The following features are characteristic of computer didactic testing:

- high-quality restructuring of the entire system of training and control, strengthening and creative development of the methodological functions of the teacher, aimed at developing, adapting and testing packages of software and pedagogical tools;

- a high degree of automation, intensification and objectivity of the process of control of knowledge, skills of students;

- the didactic process becomes more dynamic as a result of the speed and reliability of feedback, which creates the possibility for the student to self-correct the assimilation of information based on the promptly identified and corrected errors, to strengthen the motivation of learning in general;

- the development of personal computer skills and the gradual increase in the level of computer literacy of teachers and students. In this case, the individualization of the process of assimilation and consolidation of educational material occurs, the process of conscious self-regulation and self-management of cognitive activity is activated;

- an increase in initial training costs (according to the magazines PC World, Bate, IMM, Apple, Dell, Microsort, Microinform, Computer Press and the price catalog of firms manufacturing computer equipment and software, the cost of the computers themselves compared with the cost of their software and methodological support is a small part and tends to decrease);

Based on the authors’ data [1,7,9,10] and taking into account the above, we have developed a controlling and testing didactic testing program.

The assimilation of educational material is determined by the results of a test-training test survey,

which contains a number of elements to enhance the learning process:

- accounting of the rational use of control time, accrual of bonus or penalty points;

- the ability to automatically and arbitrarily return at the request of the student to the theoretical (training) part of the program;

- “coercion” – the impossibility of exiting the cycle of monitoring and testing programs until the student scores the minimum passing score – the computer asks to continue working: “Repeat again”;

- Estimated scaling of test tasks by measure of difficulty and the provision of advisory assistance – transition to a control-training system with analysis of mistakes made and a link to the educational literature, indicating the appropriate chapters, pages.

Automatic recording of all information and statistical processing of the parameters of the didactic process allows you to register the dynamics of the learning process, individualize the educational process and adjust the main directions of organization and independent work of students.

As the leading theorists of pedagogical psychology of the CIS (Tikhomirov, O.K., Talyzina N. F., Liaudis V. Ya, Mashbitz S. I., Mikheev V. I., Mikhaylychev E. A., Shmelev A. G. and others note) the effectiveness of computer and computerized training at present (according to V. Ya. Laudis, the third stage of computerization of education, which began in the early 80’s) is characterized by an active approach to the cognitive activity of the personality of students (innovative learning) [1; 4; 8].

“The organization of innovative training on the principles of personal-value management greatly enhances the contribution of the communicative functions of computers, thereby increasing their role as intermediaries in the development of new ways of cognitive activity. Actually, this is why only the third stage in the history of computerization of education sets the foundation for innovative teaching with the help of computers that exceeds in terms of effectiveness, machine-less learning, “says

one of the leading theorists in educational psychology, Liaudis V. Ya.

Consequently, the most complete psychological and pedagogical features of the monitoring and testing programs and software and methodological tools (PMS) based on them are identified when testing them in the educational process, and

are mainly associated with the preparation of test tasks in accordance with didactic goals, the optimal selection of color schemes, a musical pause, the amount of one-time information issued and rationally placed on the computer display screen, the duration of the display, the “durability of the interface” [3; 4; 5; 6; 7; 8].

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TEACHERS' TRAINING SYSTEM OF NATURAL AND MATHEMATICAL DISCIPLINES OF UKRAINE IN STEM-EDUCATION

Abstract. The analysis of scientific works and directions of researches of scientists in the context of STEM education are defined. Changes, taking place in future teachers' curricula and activities that allow teachers to improve their skills and gain knowledge in innovative technologies are analyzed.

Keywords: STEM-education, future teachers, natural and mathematical disciplines.

Problem formulation in general and its connection with important scientific and practical tasks.

Educational reforms in Ukraine require a new approach to teacher's training for both practitioners and future teachers. The community of educators to implement STEM education as an integrated course in Natural Sciences and Mathematics has been formed. In particular, a new specialty "014.15 Secondary education (Natural Sciences)" was added. But the question is the systematic training of future teachers in integrated courses.

Analysis of basic researches and publications.

Promoting of education in the fields of Science, Technology, Engineering and Mathematics (STEM-education) is a promising direction for addressing labor market demands. It creates the conditions for a balanced harmonious formation of science-oriented education based on the modernization of mathematical-natural and humanitarian education profiles. The technologicalization of production processes has increased the interest of scientists in the development of STEM education and increasing of STEM literacy.

The problem of STEM education development, its implementation and theoretical and methodological research in Ukraine has been giving a lot of attention

lately. First of all, it should be noted that the abbreviation "STEM" was first used in native publications since 2015 (issue of "Scientific Notes of the MAN" № 8). Officially, this acronym has appeared in Ukraine since 2016, when the Commission for the Establishment of STEM Education was created by the Ministry of Education and Science of Ukraine and the corresponding department at the Institute for Modernization of Education Content was established.

A review of the publications identified the areas of researches on the topic that have already been made by scientists. Most of the works are devoted to methodical developments and practical issues of STEM technologies application. Some scientists study the methods of teaching using STEM-education technologies in all levels of education (Bilyk Z. I., Botuzova Y. V., Vostrikova V. V., Dereza I. S., Kuzmenko O. S., Slipukhina I. A., Sebalo L., Chernetsky I.). The set of general knowledge, built in STEM education, was considered in the works of Balyk N. R., Gribyuk O. O., Kuzmenko O. S., Polihun N. I., Sharko V. D., and many others. Problems of STEM education tools and technologies were studied by Morse N. V., Menderecky V. V., Martyniuk O. O., Kushnir N. O., Osipova N. V., Osadchyi V. V., and others [1–8]. The analysis of scientific

works on STEM-education revealed the process of training of teachers of natural and mathematical disciplines in the field of STEM-education insufficiently explained.

Main research. The purpose of introduction and development of STEM-education in Ukraine is the innovative development of subjects of the natural-mathematical cycle and research work in educational institutions [9]. STEM education is seen as an amalgamation of sciences that promotes the development of innovative technologies and the formation of creative thinking. In the applying of the integrated approach to learning, the formation of key competences, defined in the concept of “the New School” program, implemented in all schools of Ukraine since 2018 is taken place. It also emphasizes an integrated approach to the teaching of disciplines with the use of engineering tools as the basis of STEM learning [3].

The basis of students' motivation for conscious choice of profession in the fields of natural and mathematical sciences is the formation of STEM-literacy of society through integrated study of STEM-disciplines and the use of STEM-competences in future professional activity [6]. Special attention is paid to the curriculum of the specialty “014.15 Secondary education (natural sciences)” of teachers' training for conducting integrated courses in educational institutions. It requires the development of practically oriented teaching methods, curricula and programs within the discipline of the training courses. There is a modernization of training programs in technology development.

The issue of science-based methodological learning system is also relevant. An example of the structural-logical scheme of the STEM-education model and the structure of the technical and technological picture of the world, as a means of integrating and systematizing the professional knowledge of different specific pictures of the world, are given in [7].

Many works are devoted to practical application of STEM technologies in educational activity. Positive practical results of STEM learning application are given in [6]. They have developed didactic and meth-

odological materials for conducting field studies in Biology and Chemistry within the framework of classes at the Small Academy of Sciences. In [2], the authors share the experience of using STEM-modeling of physical phenomena in the vocational disciplines of teaching in higher education institutions.

Effective management of the development of professional competencies and the promotion of teachers' STEM competencies require the dissemination of experience and achievements in STEM education:

- development of an innovative technological environment as a basis for research work in order to realize innovative ideas;
- interaction of teachers and students in the issues of conducting research work for the purpose of scientific and methodological development and preparation of personnel reserve;
- organizing and conducting presentation events (festivals, competitions, hackathons, conferences) in order to disseminate innovative experience and realize the motivational component of research activities and attract business investment.

The level of professional skill of scientific and pedagogical workers is the main factor in the introduction of educational innovative forms. Increasing the pace of STEM education should be promoted at all levels.

The development of technologies influences the formation of curricula of educational specialties. Disciplines dedicated to the study of digital technologies have become part of the curriculum of all specialties in the educational field. To teach future teachers, curricula should include integrative disciplines; the use of modern technology in the learning process. The directions of study of students of natural and mathematical disciplines are determined by the curricula of specialties. Disciplines such as 3D modeling and printing, robotics, Internet of things like data analysis and machine learning, robotics

modeling and programming, cloud computing and digital marketing are emerging in curricula.

Training of teachers in the advanced training system in the centers of postgraduate education and higher education institutions, short courses, webinars, conferences, availability of technologies, their number, facilitates their involvement in the use of technologies in their activities. Also, the new teacher's certification system motivates the teacher to acquire new skills, to undergo training and to participate in innovative technology activities.

Conclusions and prospects for further research. Thus, today, a system of teacher training in

the field of STEM education is formed in Ukraine, based on cooperation and interaction at all stages of educational activity. There are educational programs that support the integrated teaching of subjects in the natural and mathematical disciplines, the training of teachers using digital technologies. There has been a development of the advanced training system in short-term courses with innovative learning programs and legislative support. A promising area of further researches is the development of a methodological system of teaching future teachers on the principles of STEM education and innovative teaching methods.

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Section 6. Technical sciences

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ALGORITHM FOR USING THE RULE OF THREE SIGMS IN PROCESSING RESULTS OF MEASUREMENTS AND INCREASING THE RELIABILITY OF EXPERIMENTAL DATA

Abstract. Practical computations per unit of measurement deviation of a random variable from the true value are considered. The basic formulas are shown for checking on normal law-and-extremal data and the corresponding reliability is given $P(\sigma) = 0.6826$, $P(2\sigma) = 0.9524$, $P(3\sigma) = 0.9972$. As well as specific examples, a detailed order and algorithm for using the three sigma rule is shown.

Keywords: three sigma rule, processing of measurement results, standard deviation, scattering, center scattering, random variable, mathematical expectation, normal distribution law, reliability of measurements, true value, real value.

In practical calculations, the standard deviation σ is taken as the unit of measurement of the deviation of a random variable subject to the normal law

from its scattering center. Then, on the basis of the formula, we obtain the equalities useful in various calculations

$$P(-\sigma < \bar{x} < \sigma) = \Phi\left(\frac{1}{\sqrt{2}}\right) = 0.6826,$$

$$P(-3\sigma < \bar{x} < 3\sigma) = \Phi\left(\frac{3}{\sqrt{2}}\right) = 0.9972.$$

$$P(-2\sigma < \bar{x} < 2\sigma) = \Phi(\sqrt{2}) = 0.9544,$$

These results are geometrically depicted in (Figure 1).

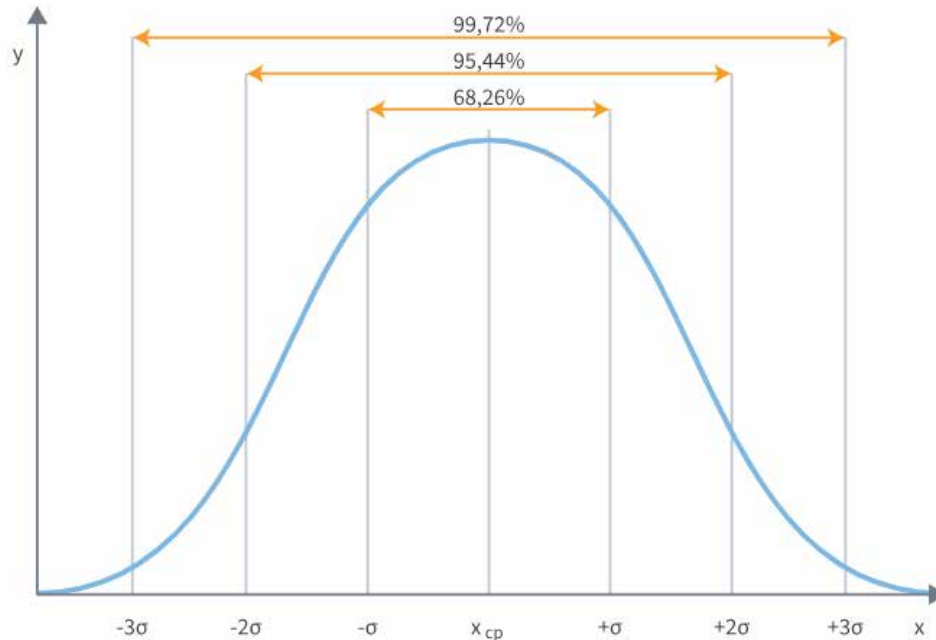


Figure 1. Scattering of measurement results under normal distribution law

The figure shows that within one standard deviation lies 68.26% of the values taken by a normally distributed random variable (corresponds to the fraction of the area under the distribution curve). Within two standard deviations – already 95.44%, and within three – 99.72%. This means that the probability that a random variable takes a value deviating from the mathematical expectation by more than three standard deviations does not exceed 0.28%, i.e. negligible.

The “three sigma” criterion is applied to measurement results distributed according to the normal law.

This criterion is reliable with the number of measurements $n > 20 \dots 50$. The arithmetic mean \bar{X} and the standard deviation σ are calculated without taking into account the extreme (suspicious) values of X_i . In this case, the gross error (miss) is the result of X_i , if the difference $|\bar{X} - X_i|$ – exceeds 3σ .

Table 1 shows the experimental work in measuring the moisture content of materials. According to a priori information, the measurement result obeys the normal law of probability distribution. Checks the source data before processing the measurement results.

Table 1. – The results of experimental work in measuring the moisture content of materials

| № | $W_{i,\%}$ | $W_{\text{ср.в.},\%}$ | $\Delta = W_i - W_{\text{ср.в.}}$ | $\Delta^2, 10^{-4}$ |
|----------|------------|-----------------------|-----------------------------------|---------------------|
| 1 | 2 | 3 | 4 | 5 |
| 1. | 17.80 | 17.88 | 0.08 | 64 |
| 2. | 17.65 | | 0.18 | 324 |
| 3. | 17.70 | | 0.18 | 324 |
| 4. | 17.88 | | 0 | 0 |

| 1 | 2 | 3 | 4 | 5 |
|-----|-------|-------|------|------|
| 5. | 17.90 | 17.88 | 0.02 | 4 |
| 6. | 18.15 | | 0.27 | 729 |
| 7. | 18.25 | | 0.37 | 1369 |
| 8. | 17.95 | | 0.07 | 49 |
| 9. | 17.65 | | 0.23 | 529 |
| 10. | 17.75 | | 0.13 | 169 |
| 11. | 18.70 | | 0.82 | 6724 |
| 12. | 17.70 | | 0.18 | 324 |
| 13. | 17.98 | | 0.10 | 100 |
| 14. | 18.28 | | 0.40 | 1600 |
| 15. | 18.25 | | 0.37 | 1369 |
| 16. | 18.20 | | 0.32 | 1024 |
| 17. | 17.60 | | 0.28 | 784 |
| 18. | 17.50 | | 0.38 | 1444 |
| 19. | 17.35 | | 0.53 | 2809 |
| 20. | 17.40 | | 0.48 | 2304 |

Checking the normal law of distribution of moisture measurement results.

Estimated standard deviation (σ_{15}).

$$\sigma_{15} = \sqrt{\frac{(64 + 324 + 324 + 4 + 729 + 1369 + 49 + 529 + 169 + 6724 + 324 + 100 + 1600 + 1369 + 1024 + 784 + 1444 + 2809 + 2304)}{15 \cdot 14}} \cdot 10^{-4} = 0.10$$

We calculate $3\sigma_{15} = 0.30$. More than $3\sigma_{15}$ from the arithmetic mean differs 7, 11, 14, 15, 19, 20 th value. Therefore, it is erroneous and should be discarded. Validation continues until three sigma runs.

We define the numerical characteristics of the normal distribution with density

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-m)^2}{2\sigma^2}}$$

Mathematical expectation and variance

$$M(X) = \int_{-\infty}^{+\infty} xf(x)dx = \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{+\infty} xe^{-\frac{(x-m)^2}{2\sigma^2}} dx = \begin{cases} \frac{x-m}{\sigma\sqrt{2}} = t & dx = \sigma\sqrt{2}dt \\ \frac{1}{\sigma\sqrt{2}} dx = dt & x = m + \sigma\sqrt{2}t \end{cases}$$

$$\left. \frac{x}{t} \right|_{-\infty}^{+\infty} = \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{+\infty} (m + \sigma\sqrt{2}t) e^{-t^2} \sigma\sqrt{2}dt = \frac{\sigma\sqrt{2}}{\sqrt{\pi}} \int_{-\infty}^{+\infty} te^{-t^2} dt + \frac{m}{\sqrt{\pi}} \int_{-\infty}^{+\infty} e^{-t^2} dt$$

As

$$\int_{-\infty}^{+\infty} te^{-t^2} dt = -\frac{1}{2} \int_{-\infty}^{+\infty} e^{-t^2} d(-t^2) = -\frac{1}{2} e^{-t^2} \Big|_{-\infty}^{+\infty} = 0$$

$$\int_{-\infty}^{+\infty} e^{-t^2} dt = 2 \int_0^{+\infty} e^{-t^2} dt = \sqrt{\pi}$$

is the Poisson integral, then we finally obtain

$$M(X) = \frac{m}{\sqrt{\pi}} \sqrt{\pi} = m.$$

The quantity m is a normally distributed random variable X, called its “center of dispersion.”

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DEVELOPMENT OF THE METHOD OF CALCULATION OF UNCERTAINTY OF MEASUREMENT RESULTS AND EVALUATION OF ACCURATE CHARACTERISTICS IN THE FIELD OF ANALYTICAL MEASUREMENTS

Abstract. The issues of assessing the uncertainty of the results of analytical measurements in modern laboratory practice are considered taking into account the requirements of international standards in the field of metrology. The results of the development of a methodology for calculating the uncertainty of measurement results and evaluating the accuracy characteristics, the main content, procedure and calculation sequence according to the requirements of the international document GUM (Guide to the expression of measurement results) are presented.

Keywords: uncertainty of the measurement result, sources of uncertainty, calculation algorithm, standard uncertainty, total standard uncertainty, expanded uncertainty, quality of measurements, quantity, coverage factor, measured quantity.

The developed methodology consists of the following sections: purpose of the methodology; statement of the measuring problem; measurement model; measurement results; analysis of input quantities; correlation; total uncertainty; expanded uncertainty. This technique is designed to calculate the measurement uncertainty when

determining the mass concentration of aldehydes in vodka.

The methodology is developed in accordance with the requirements of GUM (Guidelines for the Expression of Uncertainty of Measurement Results), EURACHIM / SITAC CG 4 Guidelines (Quantitative Description of Uncertainty in Analytical

Measurements), ILAC G17: 2002 Presentation of the concept of measurement uncertainty in tests in conjunction with the application of ISO / IEC17025 and other existing regulatory and methodological documents on the concepts of uncertainty.

The method is based on the chromatographic separation of microimpurities in a sample of vodka and their subsequent detection by a flame ionization detector (PID). The analysis takes 15–25 minutes. The operating principle of the chromatograph used is based on the application of gas adsorption and gas-liquid chromatography methods in the isothermal mode and the linear programming mode of the temperature and (or) flow rate of the carrier gas of chromatographic columns. Chromatographs are an analytical unit in the form of a monoblock with a medium or large column thermostat, on which an analytical module with detectors, injectors, dosing devices, chromatographic columns is installed. The chromatograph also includes a personal computer, NetChrom V2.1 chromatographic information processing software, and chromatographic analysis techniques. The increased volume of the column thermostat allows you to place in it, in addition to several columns, both packed and capillary longer, input devices and switch columns. Chromatograph devices have a high inertness to the analyzed compounds.

Chromatographs are available in two versions: version 1 with a column thermostat volume of 6 l, version 2 with a column thermostat volume of 14 L. Chromatographs are equipped with a wide range of detectors, both single and multi-detector (up to three detectors, both universal and selective): flame ionization detector (PID), thermal conductivity detector (DTP), electron-capture detector (ECD), flame pho-

tometric detector (PFD), thermionic detector (TID), photoionization detector (PID), thermochemical detector (TCD), gas ionization detector (HID). The Kristallux-4000M gas chromatograph is fully automated, from the input of the sample to the processing of the chromatographic information, including the functions of automatic control of the temperature of thermostats, flow rates and pressure of the carrier gas (EUPG system), auxiliary gases, automatic ignition of detectors, control of flame burning during operation, measuring detector signals using a 24-bit ADC.

A gas chromatograph includes more than 30 basic models, each of which can be adapted to a specific consumer task. The chromatograph consists of an analytical unit, a control station, control and processing of chromatographic information, which is used as a personal computer, and the program “NetChrom”, running in Windows. In addition, additional programs are supplied: calculation of the calorific value of natural gas, diagnostics of transformer oil, calculation of Shekhar control charts, identification of multicomponent mixtures (for example, vegetable oil, cognac, hydrocarbon fuel, etc.), data output to an external monitor.

One computer can work in real time with several analytical units (up to eight), and in addition, control the work and process signals from the Crystal 2000 and Crystallux 4000 gas chromatographs, and process signals from other brands of chromatographs through ADCs. Information is exchanged between a computer, analytical units and a chromatograph via standard interfaces such as RS-232C, USB. It is possible to control the chromatograph from a distance of up to 3000 m. To set modes and process information without using a computer, there is a remote control panel for the chromatograph based on a microcomputer with OC Windows.

Table 1.– Values Contributing to Uncertainty

| № | Influencing value | Designation | Unit of measurement |
|----------|---|--------------------|----------------------------|
| 1 | 2 | 3 | 4 |
| 1. | Hamilton CO., Reno Nevada, Microliter™ # 701 Made in USA 10 ml syringe, 0.2 ml scale (mm ³) | U_{ii} | ml |
| 2. | 2 ml micro vial, Agilent scale [0.5–1.5], scale division 0.5 ml | $U_{.m}$ | ml |

| 1 | 2 | 3 | 4 |
|----|--|------------|---|
| 3. | Chromatograph Crystallux-4000 M | U_x | % |
| 4. | Mechanical stopwatch, type SOS pr 2b, error 1.1% | U_s | S |
| 5. | Convergence of measurement results and arithmetic mean | σ_c | % |

Since the measurement is the product and the ratio of the uncorrelated input quantities, the total uncertainty is presented as the relative total uncertainty by the formula

$$u_c(X) = X \sqrt{\left(\frac{u(m_{\text{нир.}})}{m_{\text{нир.}}}\right)^2 + \left(\frac{u(V_{\text{p-ранир}})}{V_{\text{p-ранир}}}\right)^2 + \left(\frac{u(V_{\text{кислоты}})}{V_{\text{кислоты}}}\right)^2 + \left(\frac{u(V_{\text{водки}})}{V_{\text{водки}}}\right)^2 + \left(\frac{u(V_{\text{нир}})}{V_{\text{нир}}}\right)^2 + \left(\frac{u(D)}{D}\right)^2 + \left(\frac{u(\sigma_c)}{1}\right)^2}$$

Where $u(m_{\text{нир.}})$, $u(V_{\text{p-ранир}})$, $u(V_{\text{кислоты}})$, $u(V_{\text{водки}})$, $u(V_{\text{нир}})$ calculated by the formula:

$$u(m_{\text{нир.}}) = \sqrt{u(m_{\text{нир.лин.}})^2 + u(m_{\text{нир.в.}})^2 + u(m_{\text{нир.сч}})^2} = 4.330 \cdot 10^{-3}$$

$$u(V_{\text{p-ранир}}) = \sqrt{u(V)^2 + u(V_t)^2} = 4.127 \cdot 10^{-2}$$

$$u(V_{\text{нир}}) = \sqrt{u(V_3)^2 + u(V_{t3})^2} = 8.254 \cdot 10^{-3}$$

$$u(V_{\text{кислоты}}) = \sqrt{u(V_1)^2 + u(V_{t1})^2} = 8.254 \cdot 10^{-3}$$

The expanded uncertainty of the presented methodology is calculated by substituting the calculated values in the formula.

$$u(V_{\text{водки}}) = \sqrt{u(V_2)^2 + u(V_{t2})^2} = 2.063 \cdot 10^{-2}$$

$$u_c(X) = 1.351 \cdot \sqrt{\left(\frac{4.330 \cdot 10^{-3}}{0.100}\right)^2 + \left(\frac{4.127 \cdot 10^{-2}}{100}\right)^2 + \left(\frac{8.254 \cdot 10^{-3}}{2.00}\right)^2 + \left(\frac{2.063 \cdot 10^{-2}}{5.00}\right)^2 + \left(\frac{8.254 \cdot 10^{-3}}{1.50}\right)^2 + \left(\frac{2.887 \cdot 10^{-3}}{0.125}\right)^2 + \left(\frac{0.025}{1}\right)^2} = 0.0646$$

Calculation of extended uncertainty. The expanded uncertainty U is obtained by multiplying the standard uncertainty of the output quantity $u_c(y)$ by the coverage factor k .

$$U = k * u_c(y)$$

When choosing a coverage factor value, consider:

- the required level of confidence;
- any information on the intended distribution;
- information on the number of observations used to estimate random effects.

The coverage factor when evaluating the expanded uncertainty is chosen in accordance with the following recommendations.

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SOURCES AND METHODS FOR CALCULATING UNCERTAINTY OF MEASUREMENTS

Abstract. The article considers the types and contents of the standard uncertainty of the measurement results. It also shows the main steps in calculating extended uncertainty. Recommendations are given for determining the coverage rate.

Keywords: measurement uncertainty, measurement result, sources of uncertainty, reference value, measuring instruments, expanded uncertainty.

There are various sources of measurement uncertainty, including:

- incomplete determination of the measured value;
- imperfect implementation of the definition of the measured value;
- a non-representative sample – the measured sample may not represent a definable measurable quantity;
- Inadequate knowledge of the effects of environmental conditions affecting the measurement, or imperfect measurement of environmental conditions;
- subjective systematic error of the operator when taking readings of analog measuring instruments;
- final resolution of measuring instruments or threshold of sensitivity;
- inaccurate values attributed to the standards used for measurement and standard samples of substances and materials;
- Inaccurate values of constants and other parameters obtained from external sources and used in the data processing algorithm;

An unknown systematic effect cannot be taken into account in estimating the uncertainty of a measurement result, but it contributes to its error.

The components of uncertainty are grouped into two categories in accordance with their assessment

methods “A” and “B”. These categories relate to uncertainty and are not a substitute for the words “random” and “systematic”.

The estimated variance u_2 , which characterizes the uncertainty component obtained as a result of type A estimation, is calculated from the series of repeated observations, and it is a familiar statistical estimate of the variance s^2 . The estimated standard deviation u , which is the positive square root of u_2 , is thus the standard deviation of s , and it is sometimes called the standard uncertainty of type A for convenience. For the component of the uncertainty obtained from the type B estimation, the estimated variance u_2 is calculated, using the available data and the estimated standard deviation u , and sometimes called the standard uncertainty of type B.

Thus, the standard uncertainty of type A is obtained from the probability density function obtained from the observed frequency distribution, while the standard uncertainty of type B is obtained from the estimated probability density function based on the degree of confidence that the event will happen (this probability is often called subjective probability).

NOTE An estimate of the type B uncertainty component is generally based on a relatively reliable information fund.

The standard uncertainty of the measurement result, when the result is obtained from the values of a number of other quantities, is called the total standard uncertainty and is denoted as uc . It is the estimated standard deviation associated with the result and is equal to the positive square root of the total variance obtained from all components of the variance and covariance.

To satisfy the requirements in some areas of industry and commerce, as well as the requirements in the field of health and safety, the expanded uncertainty U is obtained by multiplying the total standard uncertainty uc by the coverage factor k . The value U shows the interval near the measurement result, within which, as you might expect, there is a large part of the distribution of values that could be reasonably attributed to the measured value.

The coverage factor should always be specified so that, if necessary, the standard uncertainty can be obtained again.

If all the quantities on which the measurement result depends are changing, their uncertainty can be estimated by statistical means. However, since in practice this is rarely possible due to limited time and resources, the uncertainty of the measurement result is usually estimated using the mathematical measurement model and the law of distribution of uncertainty.

Since the mathematical model may be incomplete, all the values mentioned should be changed to the fullest practical degree, so that the estimation of uncertainty, as far as possible, could be based on the observed data. The mathematical model should be reviewed whenever the observed data, including the results of independent determinations of the same magnitude, indicate that the model is incomplete. A well-designed experiment can significantly improve the reliability of uncertainty estimates and is part of the art of making measurements.

In order to decide whether the measuring system is functioning normally, the experimentally observed variability of its output values, estimated by their observed standard deviations, we can compare

it with the predicted standard deviation obtained by summing the various uncertainty components that characterize the measurement. In such cases, only those components should be considered that can contribute to the experimentally observed variability of the output quantities.

In some cases, it is not necessary to include the uncertainty of the correction for a systematic effect in the estimation of the uncertainty of the measurement result.

1. Express mathematically the relationship between the measured value of Y and the input quantities X_i , on which it depends:

$$Y = f(X_1, X_2, \dots, X_n).$$

The function $f(X_i)$ must contain every value, including all corrections and correction factors, which can add a significant component to the uncertainty of the measurement result.

2. Determine x_i – the estimated value of the input quantity X_i , either based on statistical analysis of the series of observations or other means.

3. Estimate the standard uncertainty $u(X_i)$, of each input estimate x_i . For the input estimate obtained from the statistical analysis of the series of observations, the standard uncertainty is estimated by type A. For the input estimate obtained by other means, the standard uncertainty is estimated by type B.

4. If the values of any input values are correlated, evaluate their covariance.

5. Calculate the measurement result, ie estimate y of the measured quantity Y from the functional dependence $f(X_i)$, using the estimates x_i obtained in step 2 for the input quantities X_i .

6. The total standard uncertainty $uc(y)$ of the measurement result y is determined from the standard uncertainties and covariances associated with the input estimates. If the measurement procedure allows you to simultaneously determine more than one input quantity, calculate their covariance.

7. If you want to give expanded uncertainty U , whose goal is to provide an interval from $(y - U)$ to $(y + U)$, within which, presumably, there is a large

part of the distribution of values that can reasonably be attributed to the measured value of Y , multiply the total standard uncertainty $uc(y)$ per coverage factor k , usually in the range of 2 to 3, to obtain

$$U = k \cdot uc(y).$$

The coefficient k is selected based on the desired level of confidence required for the interval.

8. The y measurement result is written together with its total uncertainty $uc(y)$ or extended uncertainty U . Describe how y and $uc(y)$ are obtained.

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QUANTIFICATION OF THE UNCERTAINTY OF MEASUREMENT RESULTS

Abstract. The article discusses the main stages of development of uncertainty and types of uncertainty. It also shows the quantitative characteristics of the results of uncertainty in the concepts of uncertainty.

Keywords: measurement uncertainty, measurement result, sources of uncertainty, reference value, measuring instruments, expanded uncertainty.

In the late sixties of the twentieth century, among specialists associated with measurements and interpretation of their results, a new concept arose – measurement uncertainty.

The system for assessing the quality of measurements that existed up to that time was based on the concept of “true value” of a measured quantity. However, metrology, as a science, has never operated with a similar concept. As a source, the “real value” of the measured value was taken. Thus, not knowing the true value of the quantity, metrologists allowed themselves to argue that the deviation from it (error) is equal to a certain number, and it does not matter how this deviation was found – theoretically or experimentally. How true this statement is is unknown!

In real life, metrologists and practitioners who are not related to standards have no such questions. For them, the true (or real) value was the value reproduced by a measuring instrument of higher accuracy.

And suddenly there appears not so new, but with a completely different meaning, the concept of “uncertainty”. What it is?! How necessary is this concept and how is it related to those provisions of metrology as a science with which one is already accustomed to operate. Nowadays, no “suddenly” can arise. There were, and they could not be, objective reasons that made us think about the question: “What is the er-

ror? If this is a deviation from the truth, then what is the truth? ”The true meaning of the measured quantity, like truth in a broad, philosophical sense, is not given. Neither materialistic nor idealistic philosophies allow themselves assertions about a complete knowledge of the essence of things, including the “true values” of measured quantities. That is, using the concept of “measurement error”, they usually operate with values that include not only a deviation from a certain value of a value conventionally accepted as true (real), but also with a number of Unknowns, namely with a capital letter Unknown, of the value, within which the “true value” of the measured quantity can be.

When presenting the measurement result, it is necessary to quantify its quality so that the person to whom this measurement result is intended can evaluate its reliability. Without this, it is impossible to compare the results of measurements with each other or to compare them with the norms indicated in regulatory documents. Therefore, it is necessary to have an easy-to-use, accessible to understanding and universally recognized methodology for characterizing the quality of the measurement result, that is, for assessing and expressing its “uncertainty”.

The concept of uncertainty as a characteristic of the quality of the measurement result is relatively

new. The traditional, long-used in metrology terms are “error” and “error analysis”. It is now generally accepted that even after all known or suspected error components have been evaluated and corresponding corrections have been made to the measurement result, there is still doubt about how accurately the measurement result represents the value of the measured quantity.

As already noted, in the context of market globalization, the task of creating a single method for assessing and expressing uncertainty is becoming more and more relevant, so that the results of measurements carried out in different countries can be easily compared with each other. In this case, the method should have been universal, i.e., applicable to all types of measurements and to all types of input data used in measurements, and the value directly used to express uncertainty should be internally consistent (should be directly derived from the components that make it up, and also be independent of how these components are grouped and from dividing the components into subcomponents) and allowing transmission (there should be the possibility of direct use of uncertainty about one result as component uncertainties in the evaluation of another dimension, wherein the first result) is used.

In many cases – in industry, trade, healthcare, security – it is necessary to present the measurement result with an indication of the interval within which, it can be assumed, is the majority of the distribution of values that can reasonably be attributed to the value to be measured.

Consequently, the method for assessing and expressing measurement uncertainty should be able to indicate such an interval, in particular, an interval, probability of coverage or level of confidence that actually matches the required one.

Based on the above assumptions, in 1978, recognizing the lack of international unity on the issue of expressing measurement uncertainty, the highest world authority in the field of metrology, the International Committee of Weights and Measures (CIPM),

requested the International Bureau of Weights and Measures (BIPM) to consider this a problem. As a result of complex painstaking work, to which the national metrological laboratories of 32 countries were involved, the authoritative international organizations BIPM, ISO, IEC, OIML, IUPAC, IUPAP and IFCS developed in 1993 a “Guide for the expression of measurement uncertainty” (hereinafter referred to as the Guide).

To correctly understand issues related to the assessment and expression of uncertainty, we consider a number of terms given and used in the Guide:

- measurement uncertainty – a parameter associated with the measurement result, which characterizes the variance of values that could reasonably be attributed to the measured quantity. The parameter may be, for example, standard deviation.

- standard deviation – mean square error (or standard deviation of standard deviation) of the measurement result (or arithmetic mean);

- standard uncertainty – the uncertainty of the measurement result, expressed as a standard deviation;

- estimation of (uncertainties) by type A – method for estimating uncertainty by statistical analysis of a number of observations;

- estimation of (uncertainties) by type B – a method of estimating uncertainty in a different way than the statistical analysis of series of observations;

- total standard uncertainty – the standard uncertainty of the measurement result, when the result is obtained from the values of a number of other quantities, equal to the positive square root of the sum of the terms, the terms being the variances or covariances of these other quantities, weighted according to how the measurement result changes depending on the change these quantities;

- expanded uncertainty – a value that determines the interval around the measurement result, within which, as you might expect, there is a large part of the distribution of values that could reasonably be attributed to the measured value.

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Section 7. Transport

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JUSTIFICATION OF THE METHODOLOGY FOR THE FORMATION OF THE STRUCTURE AND CHARACTERISTICS OF THE TRUNK ROUTES DRIVING CYCLE OF TRUCKS IN A HOT-DRY CLIMATE

Abstract. In this Article the results of experimental investigations to determine the influence of factors-speed properties and fuel efficiency of cars of category N_2 and N_3 are investigated. The results of tests of road trains on selected main routes are analyzed.

Keywords: driving mode, operation, temperature, route, testing, driving cycle, speed, fuel consumption.

It has been established that when determining the compliance of given road sections with standard operational routes, the most objective is the assessment of their statistical performance.

With this in mind, the Tashkent Institute of Design, Construction and Maintenance of Automotive Roads has conducted a loading control of trunk line

roads and routes that meet the trunk-line operating conditions. The different road and route sections under study are the samples that contain the most typical properties of almost the entire general totality of the Republic's roads [1].

The study was done in order to have the necessary statistical characteristics of random processes

at different speed modes of cars, as well as fuel consumption. The data obtained have been used to select speed rate, taking into account fuel consumption, when developing physical and mathematical modeling methods of car testing for speed properties and fuel efficiency, in order to test compliance of their parameters with the specified operating conditions.

Road train tests for generating statistical data on traffic modes were performed on different routes in the region with a total length of 2000 km.

Schemes and characteristics of the trunk routes are given in works [1; 2].

By processing the test results of the road train KamAZ 54112 with a semi-trailer OdAZ-9385, statistical characteristics of the driving mode given in works [1; 2] are obtained.

According to experimental data, the trunk-line conditions of road trains movement are characterized by objective driving speed-distribution law. At the same time, the average road train speed in these conditions is described by an empirical correlation

$$v_{av} = K_v \cdot v_{max} \quad (1)$$

where $K_v = 0.645 \dots 0.76$ (constant coefficient).

Taking abovementioned into account, two routes were selected from among the examined that are closest to the main conditions: 1) Tashkent-Jizzakh and; 2) Tashkent-Almalyk.

Statistical indicators of driving modes and fuel consumption of a road train on selected routes are given in (Table 2).

It is known that there is a certain relation between the parameters of the operating modes of the

units and the driving modes of the road train, and therefore it is of interest to trace the influence of the increased ambient temperature on the transmission operation mode.

An analysis of the data on the distance traveled on each transmission of the gearbox shows that at an ambient temperature of + 21 °C in V transmission, about 96% of the distance was covered, and at + 30 °C – about 90%.

The number of gear changes per 100 kilometers is 36.2 times at + 20 °C, and 42.1 times at + 30 °C.

The data obtained indicate that an increase in ambient temperature leads to an increase in the path traveled in low gear modes, and the nature of the course of the distribution curves remains constant.

The influence of the ambient temperature on the temperature conditions of the engine and ATS transmission units was determined according to the procedure [2].

The average temperatures of the units and systems of the truck KamAZ-54112 when driving along the Tashkent-Jizzakh route are given in (Table 3), and the graphs of the thermal regimes of the units are given in [2].

The dynamics of changes in the temperature of the units along the route shows that the rate of temperature increase for different zones of the engine compartment and units is different.

At the same time, these factors to varying degrees have an effect on the temperature conditions of units and road train systems.

Table 1 – Test results of the KamAZ-54112 and OdAZ-9385 road trains on the routes of the Central Asian region

| Routes | Travel time, h, min. | Distance, km | Average speed, km/h | Fuel consumption, l | Fuel consumption, l/100 km |
|--------------------|----------------------|--------------|---------------------|---------------------|----------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 |
| Tashkent – Jizzakh | 3.30 | 223 | 67.5 | 82.9 | 37.16 |
| Jizzakh – Tashkent | 3.09 | 223 | 61.1 | 65.9 | 29.59 |
| Tashkent – Piskent | 1.00 | 42 | 42.5 | 13.9 | 32.33 |
| Piskent – Tashkent | 0.55 | 43 | 46.2 | 13.4 | 31.20 |

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|----------|----------|----------|----------|----------|
| Piskent – Pungan | 5.22 | 199 | 37.1 | 86.2 | 43.30 |
| Pungan – Piskent (to Ahangaran) | 4.59 | 165 | 33.1 | 72.9 | 44.20 |
| Tashkent – Chardara | 3.27 | 209 | 54.8 | 73.8 | 35.20 |
| Chardara – Tashkent (to Makhtazhan) | 2.03 | 120 | 58.5 | 37.8 | 31.50 |
| Chardara (from Makh- ta-zhan) – Tashkent | 1.44 | 98 | 56.4 | 32.7 | 33.37 |
| Piskent – Ahangaran | 0.51 | 39 | 45.7 | 14.6 | 37.40 |
| Ahangaran – Piskent | 0.42 | 39 | 54.5 | 10.3 | 26.40 |
| Piskent – Angren | 1.26 | 89 | 62.0 | 33.5 | 37.70 |
| Angren – Ahangaran | 0.70 | 40 | 56.4 | 20.9 | 52.14 |
| Tashkent – Pungan | 6.25 | 232 | 37.1 | 239.2 | 55.50 |

Table 2. – Statistical parameters of driving modes and fuel consumption of the KamAZ-54112 and OdAZ-9385 road trains on selected routes

| Parameter | Route No. 1 | Route No. 2 |
|--|--------------------|--------------------|
| Mathematical expectation of speed, km/h | 67.449 | 62.414 |
| Standard deviation, km/h | 12.935 | 12.983 |
| K_v | 0.766 | 0.726 |
| v_{\min} km/h | 22.3 | 24.0 |
| v_{\max} km/h | 85.6 | 88.7 |
| Mathematical expectation of fuel consumption, l/100 km | 37.162 | 43.942 |
| Standard deviation of fuel consumption, l/100 km | 16.592 | 15.032 |

Table 3. – The average oil temperature (°C) in the units of the KamAZ-54112 truck when driving on the Tashkent-Jizzakh route

| Units | Section 0–100 km | | Section 100–200 km | Whole route | |
|--------------|-------------------------|--------------|---------------------------|--------------------|--------------|
| | 25 °C | 33 °C | 33 °C | 33 °C | 23 °C |
| Engine | 70 | 80 | 83 | 82 | 81 |
| Gearbox | 67 | 79 | 79 | 98 | 76 |
| Middle axle | 56 | 69 | 66 | 74 | 69 |
| Rear axle | 53 | 66 | 63 | 65 | 64 |

For example: a change in ambient temperature most affects the temperature of the engine compartment, a change in the grade affects the temperature of the oil in the crankcases of the gearbox and engine assemblies, and finally, a change in the speed of movement affects the temperature of all units and zones of the engine compartment.

Analysis of the results of experimental studies according to the above methodology [2] showed that the temperature of the units of the road train transmission does not exceed the established specifications of the manufacturer.

The results of the experimental data show that when the KamAZ-54112 + OdAZ-9385 road train

moves along the Tashkent-Jizzakh route, the temperature of the air entering the engine cylinders varies within 42 ... 67 °C. This change has a significant impact on fuel consumption [2].

Therefore, to assess the effect of various factors on the temperature of the air entering the engine cylinders, a correlation analysis was performed using a PC.

The test data are included in the matrix of input data entered into the PC, during which the values

$y = t_b$ and the following factors were recorded: x_1 – air temperature at the radiator front, °C; x_2 – air temperature behind the radiator, °C; x_3 – air temperature in the middle of the engine compartment, °C; x_4 – air temperature at the outlet of the engine compartment, °C; x_5 – coolant temperature at the radiator inlet, °C; x_6 – oil temperature in the oil pan in the engine, °C.

Table 4 shows triangular symmetric matrix of pair correlation coefficients. The lower half of the matrix is not given, because $r_{x_1x_2} = r_{x_2x_1}$, etc.

Table 4. – Matrixes of pair correlation coefficients

| | y | X₁ | X₂ | X₃ | X₄ | X₅ | X₆ |
|----------------------|----------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| y | 1 | 0.731 | 0.786 | 0.008 | 0.699 | 0.409 | 0.502 |
| X₁ | | 1 | -0.648 | -0.015 | -0.712 | -0.557 | -0.754 |
| X₂ | | | 1 | -0.046 | 0.693 | 0.493 | -0.416 |
| X₃ | | | | 1 | -0.249 | -0.250 | -0.013 |
| X₄ | | | | | 1 | 0.414 | -0.625 |
| X₅ | | | | | | 1 | -0.415 |

Using graph theory methods, a table is constructed that clearly shows the number of statistically significant

relationships between the response function (y) and factors (x_j) (Table 5).

Table 5. – Vertex adjacency matrix

| | y | X₁ | X₂ | X₃ | X₄ | X₅ | X₆ | Local degrees |
|----------------------|----------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| y | X | 1 | 1 | 0 | 1 | 1 | 1 | 5 |
| X₁ | 1 | X | 1 | 0 | 1 | 1 | 1 | 5 |
| X₂ | 1 | 1 | X | 0 | 1 | 1 | 1 | 5 |
| X₃ | 0 | 0 | 0 | X | 1 | 1 | 0 | 2 |
| X₄ | 1 | 1 | 1 | 1 | X | 1 | 1 | 6 |
| X₅ | 1 | 1 | 1 | 1 | 1 | X | 1 | 6 |
| Local degrees | 5 | 5 | 4 | 2 | 6 | 6 | 5 | |

Such table is called the vertex adjacency matrix.

The significance of paired correlation coefficients was checked by Student’s t-test.

The presence of a statistically significant relation in Table 5 is marked as 1, and the absence of such

a relation is 0. According to this table, it is easy to calculate the number of relations (local degrees) and rank the factors by the number of such degrees.

Table 6 shows the ranking of factors by the number of local degrees.

Table 6. – Ranking by the number of local degrees

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------------------------------|----------------|----------------|----------|----------------|----------------|----------------|----------------|
| Factors or function | X ₄ | X ₅ | y | X ₁ | X ₆ | X ₂ | X ₃ |
| Number of local degrees | 6 | 6 | 5 | 5 | 5 | 4 | 2 |

Table 6 shows that the studied factors differently affect the temperature of the air entering the engine cylinders (t_6).

To determine the tightness of the relationship between the response function y and factors $x_1, x_2, x_3, x_4, x_5, x_6$ the multiple correlation coefficient (R) was used.

In this case, $R = 0.72$. Significance of R is tested by F -test (Fisher's). The calculated value \hat{F}_R does not exceed the one given in table, therefore, the relation is considered statistically significant.

From the above it follows that there is a statistically significant relation between the temperature of the air entering the engine cylinders and the factors studied.

Therefore, it can be considered proven that the temperature of the air that enters the cylinders of the KamAZ-740 engine installed in the KamAZ-54112 truck tractor depends not only on the ambient temperature, but also on the temperature regime of the engine compartment and engine device.

It can be seen from the diagram (Fig. 1) that the temperature of the oil in the transmission units changes exponentially over time. Given this, we propose the following methodology for predicting the limiting temperature values in units and ATS systems.

The temperature has an initial value t_0 and the limit to which it goes to infinity t_{lim} (Fig. 1).

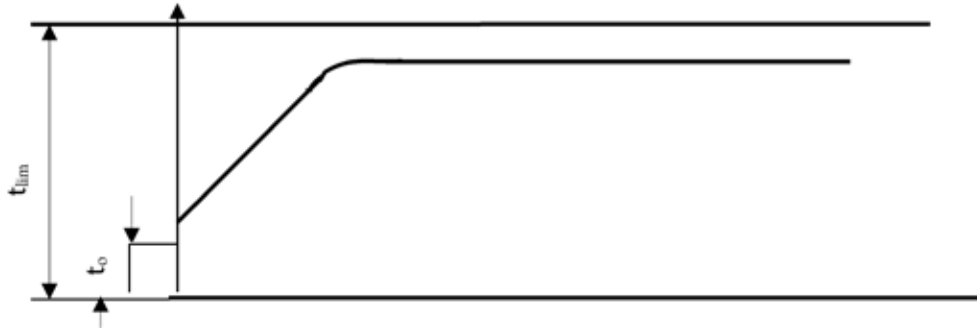


Figure 1.

The curve shown in (Fig. 1) is analytically expressed by the equation, if we introduce the notation $t_{lim} = b_0$:

$$t = t_0 + b_0(1 - e^{-b_1 t}) \quad (2)$$

The finishing sections of such a curve are well approximated by a hyperbolic dependence:

$$t = \tau / (b_0 + b_1 \tau)$$

Dividing the numerator and denominator of the right-hand side of expression (2) by τ , we obtain:

$$t = 1 / (b_0 / \tau + b_1) \quad (3)$$

When $t \rightarrow \infty$ the curve tends to the asymptote and $t \rightarrow t_{lim}$

$$t = 1 / (b_0 / \tau + b_1) \rightarrow t_{lim} = 1 / b_1 \quad (4)$$

We transform formula (3) as follows:

$$t = -b_0 / b_1 + (1 / b_1) \cdot (\tau / t) \quad (5)$$

We introduce a linearizing change of variables

$$t = x'; \quad \tau / t = y'; \quad -b_0 / b_1 = b'_0; \quad 1 / b_1 = t_{lim}$$

As a result, we obtain:

$$x' = b'_0 + t_{lim} y'$$

According to the available experimental data x' and y' it is possible to determine the value of the steady-state temperature:

$$t_{lim} = Q_{x'y'} / Q_{y'y'}$$

where

$$Q_{x'y'} = \sum x'y' - (1/n) \cdot (\sum x') \cdot (\sum y')$$

$$Q_{y'y'} = \sum y'^2 - (1/n) \cdot (\sum y')^2$$

The results of the analysis of experimental data showed that under the main conditions, the steady-state oil temperatures in the units and systems do not exceed the allowable limit, and do not affect fuel consumption and driving mode.

An analysis of the driving modes of the road train was made according to the speed distribution curves, which are presented in [2].

At $T_{amb} = 20$ °C, the movement is carried out mainly in the speed ranges from 50 to 80 km/h (about

88%), and at $T_{amb} = 30\text{ }^{\circ}\text{C}$ in the speed ranges from 40 to 70 km/h. In both cases, the maximum value of the distance traveled corresponds to a speed range from 60 to 70 km/h. For example, at $T_{amb} = 20\text{ }^{\circ}\text{C}$, in this case, about 9% of the path was traveled with a speed above 80 km/h, and at $T_{amb} = 30\text{ }^{\circ}\text{C}$ – about 3.5%.

In general, the nature of the distribution of the ATS driving modes at both temperatures is similar. However, the quantitative parameters of the distributions are significantly different.

The obtained statistical characteristics make it possible to approach the selection of typical high-speed modes of ATS driving modes with great reliability.

Tests have shown that the ATS driving mode at high ambient temperatures differs significantly from the driving mode under standard conditions. This is a consequence of the influence of ambient temperature on the operation of units of ATS.

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Section 8. Philology

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ANGLICISMS IN SPORT TERMINOLOGY OF THE UZBEK LANGUAGE AND ITS DIFFICULTIES IN TRANSLATION

Abstract. This article deals with borrowing vocabulary in the field of sports from English to Uzbek. It is established that in the Uzbek sports terminology there is a large number of anglicisms, which is explained by the development of appropriate technology for various sports in the English-speaking world. In the course of the study, a lexico-semantic analysis of Uzbek sports terms of English origin is carried out, and also the peculiarities of their word formation are revealed.

Keywords: sports terms; borrowing; anglicisms; affix word formation.

I. Introduction

In the process of globalization and the dominance of the English language in the status of the language of international communication, it seems logical to penetrate Anglicisms into other languages, for example, into Uzbek. Borrowing from the English language covers various areas of human activity: economics, information technology, gastronomy. Sport is not an exception, since *“the modern stage in the development of sport, especially sport of higher achievements, is characterized by its internationalization”*.

In this paper, we will adhere to a broad understanding of sport, i.e. as some physical or mental activity based on certain rules, requiring the presence of specially equipped places or special equipment and aimed at developing and strengthening the body and getting pleasure or vivid emotions. Such an approach makes it possible not to be limited only to institutionalized kinds of big-time sports and top-level sports.

II. Method of research

In this article we use comparative typological method which show us features of Uzbek and English sport terminology in translation.

III. Main part

In addition, sports are divided into groups based on distinctive features. E. I. Gureeva gives a detailed classification and allocates dynamic (*winter, summer and air*) and static (*self-intellectual and technical-model*) sports. The researcher also cites the conceptual **microsystem** of a separate sport, which includes the concepts of *“place”, “athlete”, “technical and tactical methods”, “projectile”, “ammunition”, “quality”, “quantity”* [1].

All of the above constitutes the conceptual content of the concept “sport”. Sport as such and its conceptual system consist of many components and conceptual subsystems. Moreover, sport borders, and sometimes merges with other conceptual macrofields. In the language of sports, you can find

terms that simultaneously refer to the concepts of both physical and medical nature (for example, the designations of injuries, chemicals, features of physical development); terms included in the term “sport” and “law” (names of violations of the regulations, rules, anti-doping legislation, etc.), etc. A natural question arises: what language signs are considered sports terms? More precisely, what concepts sports terminology refers to?

N. A. Shafranova understands sports vocabulary as a layer of the vocabulary of the language, reflecting professional and recreational human activity that requires physical and volitional effort [2]. A. A. El-istratov writes that “*sports terms include concepts on the most common sports, as well as on the theory and methodology of physical culture, related scientific and academic disciplines (biomechanics, psychology, pedagogy, hygiene, sports physiology, sports medicine and biochemistry)*” [3]. In sports dictionaries, vocabulary, denoting common concepts for many sports, is marked as sports-wide or is allocated to a separate group. In specific sports, as already mentioned, the terms refer to places of activity, athletes, technical and tactical techniques, projectiles, ammunition, quantitative and qualitative concepts [1].

Thus, the terminology of sports activities in a specific natural language can be divided into three conditional categories: the terms of the science of sports, sports terms and industry (used in one or more sports) terms. Recognizing the blurring of boundaries between these layers of sports vocabulary, in our work we will focus, first of all, on the last group. Considering the above, we define a sports term as a linguistic sign (noun, adjective, adverb, verb or phrase) correlated with one of the concepts of a complex and open conceptual system “sport” and having a definition (existing or potential) that allows to identify the concept as sports, and the term as an element of the language of sports.

One cannot but agree that in some cases borrowed words have more specific, precise semantics. However, Uzbek researchers believe that the process

of penetration of foreign words is a “**clogged language**”. *Uzbek researchers are alarmed by the fact that the emergence of Anglicisms in the Uzbek language is happening all the time, and this gives rise to concerns that the transformation of their language into a certain one will not happen.* In connection with this ministry of sports the need for their publication is not in doubt, since English is the official language of the Olympic Committee, and the media, athletes, and spectators speak the language of sports.

A vivid example of the concern of Uzbek linguists about maintaining the “purity” of a language is the description of the meaning of the word *fitness* in the explanatory dictionary of sports terms: a set of exercises designed to maintain physical *fitness* with the help of sports equipment. The authors of the dictionary offer the Uzbek equivalent with the same semantics with the use of the word *fitness* recommendation. An interesting remark is found when explaining the word *challenge* (a sports test, overcoming which the athlete receives the title). In the explanatory dictionary there is a special recommendation that it is necessary to refrain from the English pronunciation of its equivalent with the same semantics of the challenge. The same recommendation is also present when interpreting the single-root word *challenger*, derived from the English *challenger* (a person claiming any sporting title). The aim of our work is a lexico-semantic study of some sports terms, which appeared in the Uzbek language by borrowing from the English language, as well as the word-formation analysis of anglicisms in the field of sports.

The material for the study was the Uzbek dictionaries [4]. Often borrowings in the field of sports in the Uzbek language appear from English. This is because many sports have appeared or are popular in the USA and the UK. In tennis, for example, the following English expressions began to be used in Uzbek all the time: *top spin* (a type of racket strike, in which the ball is hit from the bottom up, giving a strong rotation in the direction of the blow), *passing shot* (full stroke), *full ace* (feed to departure), *let* (uncounted

feed), **break** (*win the game on the opponent's serve*), **grip** (*special tape wrapped around the racket handle*).

In the field of golf, we refer to Englishman **putter** (*club with a light head*), **snooker** (*snooker*), **pars** (*the number of strokes during which the golfer must go through the hole according to the rules*), **birdies** (*holding the ball into the hole with one less stroke than with "pairs"*), **bogeys** (*the number of strikes on the ball is one more than "pairs"*), **double bogeys** (*the number of strikes two more than "pairs"*). In this kind of sport, like **surfing**, which is very popular in Europe, the following anglicisms can be noted in Uzbek: **roller** (*rise on the wave during its increase*), **bottomside** (*find the shortest path on the wave*), **cutback** (*slide on the inside of the wave*), **deep surf** (*glide at depth*), **body surfing** (*the body of the surfer with short flippers on the legs acts as the sliding surface*). The list of sports terms that appeared in the Uzbek language through borrowing from English is numerous: **bodyboard** (*surfing while lying on a short soft board*), **body dynamics** (*body dynamics*), **speedway** (*track motor racing*), **skateroller** (*roller-skating*), **barefoot ski** (*water skiing*), **short track ski** (*short distance skiing*). In morphological terms, we meet nouns in the modern Uzbek language with the suffix characteristic of English **-ing**: **tumbling** (*an acrobatic gymnastics exercise consisting of a series of jumps performed quickly one after another on a narrow long path*), **trekking** (*moving on foot region*), **stretching** (*gymnastics based on stretching of muscle fibers*), **rafting** (*a sport that consists of running down a river with a strong current on a special boat*), **jogging** (*running at an average pace at special sites or kind of; warm clothing that is worn over sportswear*), **coaching** (*sportsman or team training*), **bodybuilding** (*a set of exercises designed to simulate the body*), **footing** (*fast paced exercise*), **pressing** (*a form of protection that limits action the enemy within the rules*), **forcing** (*in the box, the enemy's reinforced attack*), **bowling** (*bowling*). Comparison of the meaning of the same sports terms in the English and Uzbek languages revealed some cases in which Anglicisms in the Uzbek language have a broader semantics or a completely different meaning. For example, jogging in the Uzbek language, unlike Eng-

lish, means not only sports jogging, but also clothing for this type of sports activity. Coaching in a sport like rugby means a bench. The well-known word **tennis** in the Uzbek language has a double semantics: *sport and sports shoes (sneakers)*. The term dancing from the English "dance process" means in Uzbek language "the place where people dance". Interestingly, the word footing, which translates from English as "pillar", was borrowed from Uzbek with the meaning of "walking". Among the Uzbek sports terms, we can distinguish a common group of verbs and verbal nouns with the suffix typical for English **-er**: **coacher** (*to train, guide the team, athlete*), **roller** (*roller skates*), **jogger** (*to run; man who runs; low sports shoes with thick grooved soles, fastened with the help of laces or velcro*), **surfer** (*surf*). It should be noted that in Uzbek the above-mentioned verbs have the ending **-er** and belong to the first conjugation group. Analyzing the noun roller, we conclude that it is formed by the substantivization of a verb borrowed from English.

The study revealed another group of sports terms formed by affixing, **-er**, expressing in the Uzbek language belonging to any profession: **jogger** (*the person who runs*), **the rafter** (*the person who rafts*), **snowboarder** (*snowboarder*), **surfer** (*surfer*), **player** (*player*), **basketball player** (*basketball player*). The next group of Anglicisms in the field of sports is composed of compound words corresponding to the structure of *noun + noun*: **boxer-short** (*boxing sports shorts*), **home-trainer** (*sports exerciser at home*), **horse-ball** (*sport, which has two teams, each of which has six riders on horseback, trying to score a special ball to the opponent*), **tie-break** (*in tennis, a kind of shortened game with a different account management system compared to other games*), **a mountain bike** (*a bicycle designed for uneven surfaces*).

The following Uzbek sports terms are combined with a common root token **board** (*board*): **skateboard**, **snowboard**, **snowboard**, **funboard** (*short board, equipped with a sail for gliding and jumping on the waves; an acrobatic sport with various tricks on the waves using the board sail*).

Linguists call Uzbek words hybrids, formed by adding two words borrowed from different languages, for example: **autocross**, **autostart** (*auto* from *Greek*, *cross*, *start* from *English*). Hybrids also include the words **tennismen** (*tennis player*), **rugbyman** (*rugby player*), which appeared recently in the Uzbek language, the synthetic method of education *tennis + man*, *rugby + man*, instead of English expressions *tennis player*, *rugby player*. The terms **recordman** (*record holder*), **crossman** (*participant in the cross*), **racingsman** (*race car driver*) are formed in the same way. Among the sports terms can be found words that are historically borrowed from Latin from English, and later translated into Uzbek.

In lexical terms, the language is more vulnerable to borrowing than in the field of grammar. This is due to the frequency of repetitions of new foreign words, which leads to their assimilation in the Uzbek language. We share the opinion of A. P. Sedykh, S. S. Sosoyenko that "... thanks to the efforts of "amateurs", professional language is popularized and adapted to the realities of ordinary people's life, begins to actively influence their thinking, enters into the practice of everyday life" [5, C. 187].

The profession of a journalist, a sports commentator often requires the earliest transmission of

information to the viewer, the listener, immediate translation from a foreign language, which also leads to borrowing, thanks to the media, when new words and expressions are picked up and begin to be used by fans. According to A. A. Elistratov, sports vocabulary is only partially professional, as physical culture and sports as human activities go beyond the narrow professional interests. [6, C. 122]. Indeed, the media enrich the terminological composition with anglicisms: **drop** (*fall*), **goal** (*goal*), **dribble** (*dribble*), **penalty** (*penalty*), **score** (*score*), **corner** (*corner kick*).

VI. Conclusion

According to L. Derou, there is a significant influence of the English language in relatively new sports, such as football, rugby, golf, tennis, water polo, while in the earlier forms (wrestling, fencing, billiards) there are almost no anglicisms in Uzbek.

As a conclusion, the analysis revealed that the majority of borrowings in Uzbek sports terminology was due to anglicisms. Among them are several groups formed in an affixal way, sports terms with a common root lexeme, as well as complex named constructs. It should be noted that some Anglicisms, going over to the Uzbek language, expand their meaning or acquire new semantics.

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FORMATION OF THE BASICS OF SAKHA TERMINOLOGICAL VOCABULARY (1920–1940s)

Abstract. From the beginning of the 20s to the second half of the 30s a lot of work was done to develop the theoretical foundations, principles for creating Sakha terms, and most importantly, a large number of terms were created in the field of various knowledge, primarily socio-political and in all subjects of secondary school. As linguists note, this was achieved relatively quickly because terminology construction leaders came out from among the Yakut intellectuals, who correctly understood the enormous importance of this work, undertook it themselves and led others.

Keywords: Yakut language, terminology, terminological vocabulary, A. E. Kulakovsky, S. A. Novgorodov, P. A. Oyunsky.

The development of the Yakut terminology system initially had two main ways of forming terminological vocabulary: the use of internal resources of the language and borrowing terms from other languages, in particular, the Russian language.

The massive integration of Russianisms and internationalisms into the vocabulary of the Yakut language created the issue of term-borrowing from the Russian language which was widely discussed. Aspects of the entry of Russian vocabulary into the Yakut language in the 1920s, the lexical-semantic and functional characteristics of borrowed words of that time are investigated in the work of P. A. Sleptsov [8, P. 254].

According to the linguists of the Yakut language, this stage in the formation of terminology is characterized by “the desire for the optimal establishment and acquisition of the necessary terms designed to express concepts and phenomena inherent in the cultural and historical situation that developed in the post-revolutionary period” [1, P. 9].

Linguistic works of A. E. Kulakovsky looked into many important issues of the development of

the Yakut literary language, including the issue of formation, development of terminology. The most complete systemic idea of the significance of the linguistic works of A. E. Kulakovsky in the implementation of the language policy of the 1920s in Yakutia was shown by N. A. Sivtseva in her dissertation “A. E. Kulakovsky and the problems of language policy of the 1920s in Yakutia”. She, on the basis of linguistic and concrete historical approaches, analyzed the works of A. E. Kulakovsky, examined his lexicographic research, identified the characteristic aspects of his linguistic research [6, p. 9–11].

One of the significant works of A. E. Kulakovsky “Russian words adopted and integrated by the Yakuts (except for proper names and titles)” is a dictionary consisting of 2396 words borrowed from the Russian language in pre-revolutionary times. The dictionary is accompanied by the rules by which borrowed words are transcribed according to the phonetic laws of the Yakut language, as well as the alphabet developed by A. E. Kulakovsky based on the Cyrillic alphabet, describes the pronunciation of Yakut

sounds. As noted by prof. P. A. Sleptsov, “this work is the most complete collection of borrowed words used in the pre-revolutionary colloquial Yakut language” [7, P. 76].

In this dictionary, most of the vocabulary is made up of nouns, and it also contains adjectives, verbs, adverbs and interjections. The dictionary often contains derivative nouns with affixes *-чыт*, *-һыт*, *-сык*, *-чык*, *-һык*, which in the past have been traditionally used to designate occupations and trades, such as *болкуобунньук* ‘colonel’, *болуотунньук* ‘carpenter’, *бэдэрээчит* ‘contractor’, *дакылааччыт* ‘speaker’, *сэбиэтинньик* ‘advisor’, *чонуобунньук* ‘public servant’. This model of term formation, as E. I. Okoneshnikov writes, may have a tendency toward universalization in the long term [5, P. 110].

The first Yakut linguist scientist and initiator of mass writing literacy S. A. Novgorodov, as far back as 1919, put forward in his report a provision according to which “the possibility of developing scientific knowledge in the language of a given tribe entirely depends on the internal merits of this language and only partly on external circumstances”. However, S. A. Novgorodov as A. E. Kulakovskiy considered the borrowed terminology absolutely inevitable “approaching the Yakut language from this point of view, you can recognize it as quite proper and suitable. It goes without saying that the terminology will have to be borrowed. In the rest, the language of the Yakuts is quite flexible, clear, accurate and expressive” [3, P. 42].

In his professional activities, S. A. Novgorodov proved himself as a true explorer and thoughtful philologist; this is, above all, due to the desire to creatively use the internal resources of the language itself, to reveal the nuances and shades of a living word. In his textbook, rich in subject matter and content, he quite consciously and purposefully worked on the activation of the passive vocabulary. In short stories about the origin of the Yakut people, the resettlement of the Yakuts, military equipment of an ancient Yakut and others, the author was able to interpret the meaning of many archaisms and pas-

sive terminological vocabulary such as *үһүү*, *батас*, *батыһа*, *болот*, *кураахтаах саа*, *дуулаба*, *барымта*, *лаппыһа*, *хотохоон*, *кылыс*, *кустук ох*, *саадах*, etc.

In developing the principles for creating terms from the language’s own resources, the activity of G. V. Baishev (also known as Altan Saryn) is historically important. He was a supporter of a new method, which was used in term-creation in the late 1920s. In an effort to somehow prevent the Yakut language vocabulary from unjustified, excessive clogging with foreign terms, he once advocated the creation of terminology using the internal capabilities of his native language and, pursuing such a goal, proposed the following principles of term creation: 1) the revival and use of archaisms like *табык* ‘chicken’, *кудук* ‘well’, *хой* ‘ram’, *тэбиэн* ‘camel’; 2) assignment to words that, in his opinion, have unclear semantics, of clear terminated meanings, for example: *дьылба* ‘fate’, *номох* ‘novelet’, *хоһоон* ‘poem’, *кут* ‘soul’; 3) the creation of terms due to artificial affixes, which are given a conditional abstract meaning, for example, with the help of *-наат*: *дойдунаат* ‘fraternity’, *киһинээт* ‘humanity’, *ийэнээт* ‘motherhood’; 4) the formation of terms by the word-forming means of the language, while making extensive use of unproductive and dead affixes like *-(ы)к*: *көрүк* ‘picture’, *-лаба көрүлгэ* ‘sight’, *ытылба* ‘propeller’, etc.

P. A. Oyunsky, as a linguistic scientist, well understood that terminology is a property of the spheres of intellectually organized activities of people; its formation is a conscious matter, not a spontaneous one. “Term-spelling dictionary” by P. A. Oyunsky introduced the following in the formation of terms: 1) The form of nouns in certain conditions is lexicalized and acquires a terminological function: *circumjacentce* ‘төгүрүмтэтэ’, *vegetation* ‘үүнээһитэ’, *decisiveness* ‘сорунуулааба’; 2) The Dictionary has neologism terms that are formed as a result of lexical and semantic shifts of their meanings, such as *fuel* ‘убатык’, *volume* ‘сабардам’, *split* ‘хайдьыһы’, *body* ‘эттик’; 3) The multivariate methods of term formation recorded in the Dictionary can be divided

into two groups: a) original synonymous terms like *palm* 'ытыс, баппабай', *power* 'күүс, кыях'; б) along with Russian borrowing, the Yakut equivalent such as *метод* (*method*) 'миэтэт, ньыма', *секретарь* (*secretary*) 'сэкэритээр, суруксут'; 4) showed an example of affix terminology such as *nation* 'тутуунньу', *art* 'урамньы', *image* 'дьүһүмэр', *level* 'таһым', etc; 5) A large number of terminological phrases consisting of complex and composite elements are presented in the Dictionary: *livestock* 'сүөһү иитиитэ', *gold* 'кыһыл көмүс', *pupil* (*of the eye*) 'харах иччитэ', *cross-bill* 'ымьы чыгычааба', *harrier* 'хаар эбэ' etc.

Therefore, prominent figures in the language construction of the Yakut ASSR of the 1920–1940 s, S. A. Novgorodov, A. E. Kulakovskiy, G. V. Baishev (Altan Saryn) and P. A. Oyunsky were among the first in Russian terminography to take part in substantiating the theory and practice of creating terminological dictionaries in national languages. It is their achievement that the terminology of the Sakha language arose again in many branches of knowledge

and developed under the direct influence of the Russian language.

It can be noted that during this period a lot of attention was paid to both the development of the principles of terminology and the creation of terms from the resources of the language. The principles developed during this period with some changes and additions formed the basis of all terminological methods. Russian words were borrowed, in general, in one specific meaning, basically denoting realities, concepts that were absent in the Yakut language itself. Therefore, a lot of borrowed words in a certain sense can be considered terminological. Some borrowed words with abstract meaning denote concepts that are well known to the Yakuts and have their own Yakut equivalents. However, such borrowings nevertheless have a strong place in the lexical system of the language, since their Yakut synonyms had insufficiently accurate, differentiated meanings, were contextually conditioned and polysemantic, and Russian borrowings were perceived precisely as unambiguous terms.

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Section 9. Philosophy

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CONFLICTOLOGY: CURRENT STATE AND DEVELOPMENT PROSPECTS

Abstract. In the article from a historical perspective, the process of the origin and development of the idea of conflictology is studied.

Keywords: conflict, contradiction, social conflicts, pessimistic and optimistic approach, level of violence in the conflict, structural functionalism, dialectical concept.

Modern conflictology is one of the fastest growing branches of humanitarian knowledge and socio-psychological practices demanded by society. It differentiates by areas and areas, the ranks of conflict experts are steadily growing, more and more new international professional associations and organizations are appearing, specialized journals are being published, and the number of training courses and textbooks is increasing annually. There is no doubt that the growth is obvious, but to what extent is this growth development, that is, intensive, not extensive growth of the professional community and the development of new jurisdictional territories?

What is a modern conflictology? This is actually not one, but two questions: one about what conflict management is “here and now”, the other about trends in its evolution and development programs.

Conflicts, as an essential aspect of social ties, interactions and relationships of people, their behavior and actions, from time immemorial attracted inquiring attention of a person. Evidence of this is the mythology and religions of different people, folklore

and monuments of ancient literature, the judgments of ancient and medieval thinkers, the achievements of social and human sciences.

The conflicts were paid attention to such outstanding minds of antiquity as Plato and Aristotle, who lived in the 5th–4th centuries BC. They believed: man by nature is a social being; an individual person is only part of a wider whole – society; the social principle inherent in a person gives him the ability to understand and cooperate with other people [1, P. 356]. At the same time, a tendency to hostility, hatred and violence was not excluded. In his treatise Politics, Aristotle pointed to sources of strife (conflict), which, in his opinion, consist in the inequality of people in possession of property and in receiving honors, as well as in arrogance, fear, neglect, machinations, dissimilarity of characters, excessive elevation of some and humiliation of others [2].

In the Middle Ages, Thomas Aquinas developed the idea that wars are permissible in the life of society, defined yet another condition for a just war: sanction must be given by the state.

During the Renaissance, famous humanists – T. Mor, E. Rotterdam, F. Rabelais and F. Bacon made a sharp condemnation of social conflicts and social conflicts.

During this period, English democrats and French educators of the eighteenth century spoke openly criticizing armed conflicts, condemning conquests and violence. – S. Montesquieu, D. Didro, J.J. Russo, Voltaire. They regarded armed conflicts as a relic of the “barbarian era” and believed that the elimination of feudal foundations would lead to “eternal peace.” In the works of this period, much attention was paid to the search for rational forms of organization of public life, the elimination of the causes of social conflicts.

As follows from the foregoing, the predominantly empirical perception of conflicts has been held for a long time. A truly scientific approach to them appeared only in the second quarter of the XIX century. Since that time, conflicts have advanced in a number of subjects for social study. The formation of conflictology as a special area of this kind of research took place along with the development of sociology, law, ethics, psychology and other social sciences.

Georg Simmel, a contemporary and compatriot of Weber, was specially engaged in the development of a theory of conflict, proceeding not only from its social significance, but also from its positive value as a stimulating factor. It was Simmel who introduced the scientific term “sociology of conflict” [3, P. 356] in his fundamental work “Social differentiation”. It thoroughly analyzes the “pure forms of socialization”, the whole process of assimilation by the human individual of a certain system of knowledge, values and norms. Among the “pure forms”, conflict is also listed as one of the manifestations of disagreement uniting the opposing and at the same time interrelated parties [4, P. 383].

Unlike sociologists, psychologists, explaining the nature of conflict behavior, made it dependent on psychological factors. For example, it is well known that this served as the basis for Sigmund Freud in order to

highlight certain drives, primarily sexual ones, in the development of an individual, in the formation of a person's character, to propose the idea of dividing a person into three instances, i.e. steps – “It”, “I”, “Super-I”.

Most of the followers of S. Freud, developing his theory, believe that the source of the conflict lies in a person's desire for security, on the one hand, and, on the other, to realize his own desires. The main causes of the conflict, in their opinion, are:

- in the contradiction between the values of the individual and his real situation in society;
- between overstated, artificial stimulation of needs and the inability to satisfy them.

The conflict, as a rule, finds its solution in certain models of human behavior:

“Desire for people”, the search for affection, love, ownership, belonging to a particular social group (community);

“Striving from people”, the dominance of a sense of alienation, narrowing the sphere of contacts with the social environment;

“Striving against people”, confrontation, struggle with the social environment [5, P. 321].

The major Austrian psychologist Alfred Adler, in contrast to Freud, gave unconditional preference in human behavior to social factors, unity, and not dismemberment of personality. He argued that a person should not be taken in isolation from society, for man is, above all, a social being.

The typology developed by the Swiss psychiatrist and sociologist, the founder of analytical psychology, Carl Jung, helped to better navigate human characters. In his well-known book “Psychological Types” (1921), on the one hand, the general prevailing orientation of the personality towards the external or internal world (extraverted and introverted types) was taken into account, and on the other, the allocation of the mental function that dominates the personality (thinking sensations, intuition) [6, P. 336].

A deeper understanding of the complex processes of social development and thereby the role of social conflict in society is objectively dictated by

the very course of the historical process. In the 19th century, rapid changes took place in the economic, political, and spiritual fields of public life. This could not but affect the content of social theories. Fighting, conflicts and clashes in these theories seem not just possible, but inevitable phenomena of social reality.

A significant contribution to a relatively new area of scientific knowledge was made by Piter Sorokin. He emphasized: without knowledge of the society and culture in which the individual is born and grows, none of his personal traits – beliefs, ideas, beliefs, tastes, addictions and what causes hostility – cannot be understood. Without such knowledge, human behavior, the way of his thoughts, manners and mores are incomprehensible [7, P. 448]. In other words, the conflict is inevitably connected with the satisfaction of the needs of people, its source lies precisely in the suppression of certain, mainly basic human needs.

Thus, it can be stated that by the beginning of the twentieth century, the interest of scientists, primarily sociologists and psychologists, in the study of conflicts was clearly defined. The conflict was recognized as a normal social phenomenon. A number of biological, psychological, social and other factors were pointed out that inevitably give rise to conflicts. It was noted that, in turn, conflicts can play a positive role when, through them, it is possible to mutually balance the diverging interests of social groups and social forces.

Conflictology began its journey in the United States, then developed in Western Europe and was a field of sociological research. Today, both Western and Russian conflictology are increasingly gravitating towards psychology, to a psychological understanding of conflict.

It should be emphasized that in recent times, the theory of conflict has gained additional concretization.

So, in the book “Fundamentals of Management” a model of conflict as a process is demonstrated [8, p. 522–524]. American researchers rightly point out that management actions in relation to con-

flict can entail both functional and dysfunctional consequences. Moreover, both affect the nature of future conflicts, exacerbating or smoothing them. K. Boulding proceeds from the premise that the conflict is omnipresent, a person’s desire to fight his own kind is insurmountable and follows from his nature [9, P. 336]. At the same time, he emphasizes that the conflict arises and develops according to a common pattern regardless of the sphere of manifestation; for it is inherent in a single set of components that are not separable from social conditions, it can be prevented and resolved. And for this it is necessary:

- understanding of the causes of the conflict;
- selection of agreed ways to address them;
- moral perfection of individuals.

Modern problems of conflict resolution development in the literature are presented ambiguously, which requires a creative approach to their consideration. To clarify modern conflict management problems, it is necessary to study the following most relevant areas of research in the field of conflict management:

- the main applied aspects of conflicts of various types that make up the subject of a special conflict resolution;
- analysis of information relating to different fields of science dealing with the problem of conflict, with the wide involvement of mathematical models and computer technologies;
- development of systems for monitoring and diagnosing the development of conflicts and options for resolving them;
- definition of the subject and content of the very concept of conflict;
- analysis of the causes, sources and conditions of conflicts, their impact on the level of organization of interdependent relationships.

Conflict management is not the first humanitarian discipline to face the methodological problems of becoming an “integrated” discipline. The formulation and solution of theoretical and methodological problems associated with the design and establishment of “complex” disciplines in the humanitarian sphere

already have their own tradition. They remain a stumbling block in the design of cultural studies as an independent discipline [10]. Relatively recently, they were intensively discussed in ergonomics [11]; they were discussed, as noted above, by L. S. Vygotsky in his program of “general” psychology. At the beginning of the 20th century, they were a stumbling block for psychotechnics and pedagogy [12, p. 47–56].

With all the obviousness, we can say that it is not by chance that these two directions intertwined: conflict and tolerance. At first (in antiquity) they replaced each other, and today they were close by, as if presenting to humanity a choice – where to go, how to develop, to understand that although the conflict plays a very important role in our life, it cannot be the goal of our life, the norm existence.

Conflictology throughout its formation and development has constantly turned to psychology in search of opportunities to understand the nature of conflicts and ways to work with them. In their works, the classics of conflict studies, regardless of belonging

to a particular direction, constantly appealed to mental phenomena, such as: hostile feelings, thoughts and attitudes. Modern conflictology experiences a greater influence of psychology due to the recognition of the role of psychological factors in the emergence and development of social conflicts, as well as the significant possibilities of using psychological methods to resolve and mitigate conflicts [13].

It should be emphasized that the development of sociological views on the nature of the conflict, its place and role in society has had an undeniable and significant impact on the theory and practice of working with conflicts in various fields, including in psychology. As for the overall understanding of such paradigms as conflict management and conflict management, they gradually provide a solution to a more important and broader task – the introduction of a qualitatively new conflictological culture into the public consciousness, the absence of which makes it difficult for our state to move towards the most civilized social relations.

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Section 10. Chemistry

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SURFACTANTS BASED ON THE COTTONSEED OIL AS PROBLEM RESOLVING REAGENTS FOR ECOLOGICAL PROBLEMS OF OIL INDUSTRY

Abstract. The colloidal-chemical parameters, surface-active properties including interfacial tension of the Na^+ , K^+ , NH_4^+ , $\text{NH}_3^+-\text{CH}_2-\text{CH}_2-\text{OH}$ and $\text{NH}_2^+(\text{CH}_2-\text{CH}_2-\text{OH})_2$ salts of sulphate-derivatives of higher carboxylic acids ethanolamides have been studied. These surfactants also investigated as inhibitors of hydrogen sulfide corrosion, petroleum-collecting and petroleum-dispersing reagents. The results showed that complex salts could be used as effective corrosion inhibitors and reagents for removing petroleum films from water surface.

Keywords: cottonseed oil, ethanolamides, surfactant, hydrogen sulfide corrosion inhibitors, oil slicks, petroleum-collecting, petroleum-dispersing.

The current stage of development of the oil and gas industry in the world is characterized by a decrease in the proportion of light non-sulphurous crude oil and gas condensate reserves in contrast to a signifi-

cant increase in the consumption of hydrocarbons. The increase in the proportion of oil and gas raw materials with a high content of organic sulfur compounds was noted in various oil-producing regions of the world. Features of the composition of high-sulfur oils are expressed in high content of total sulfur, toxic and corrosive hydrogen sulfide and mercaptans. They contribute to corrosion damage to equipment due to sulphide corrosion, which leads not only to great direct losses, but also to environmental problems, as oil and petroleum products spills at all stages of production, processing, storage and transportation, and posing a considerable threat to the surrounding and environment, especially to world water basin [1–4].

The fate of the oil which has got to the sea can't be described in all details. The oil which has got to a reservoir quickly spreads. Even the thinnest oil film isolates water from air oxygen, thereby reducing its aeration. Small fractions quickly evaporate, and remained turn into a stable water oil emulsion. As the hydrocarbons evaporate, density and viscosity of an oil film increase, the surface tension decreases and spreading stops. Waves and currents break a film into separate drops [5].

It is established that the final fate of oil in the sea is defined by activity of microorganisms. The microorganisms that exists in sea water first of all consume n-alkanes, and then aromatic compounds. The complexity of composition of oil and oil products demands a variety of the microorganisms capable to attack both oil components, and metabolism products. Therefore oil is more effectively destroyed not by individual strains, but by a mixed bacterial population [6–8].

Also it is known that the World Ocean plow tankers which transport by sea of the produced oil. When a tanker has accident near the coast, sea birds perish, coastal flora and fauna suffers, beaches become covered by a layer of viscous oil. The emergency tanker is usually surrounded with bonds from floating hoses which interfere spreading of the oil slick and allow collecting the spilled oil by pumps [9–10].

Among methods against oil spills on the water surface, which has recently received widespread use,

rather is use of special chemical reagents that allow during a short period of time to liquidate film oil on a large surface of reservoirs. They constrain spreading of oil and collect it on the smaller square, promoting considerable reduction of the area of a flood and increase in thickness of a layer of a floating film of oil and oil product [11–14].

Authors [15] recognize that passages of oil, in particular, at crashes of tankers, occur systematically and application of a way at which oil spills are processed previously by special reagents is advisable. Under their action there is a coagulation of oil products to formation of dense floating agglomerates. The following stage is their removal from a reservoir surface.

Authors [16] have offered a way for cleaning of a water surface from oil pollution consisting in addition to surface oil films of small amounts surfactant like fatty acids, alkylsulphatic pitches, alkylamines and other connections of this class.

In this work results of research as inhibitors of hydrogen sulfide corrosion of anion surfactants synthesized by the author [17] on the basis of cottonseed oil, which show rather high activity collecting of oil spills on a surface of the water are presented.

Experimental

Cottonseed oil (purity 99.5%) was supplied by "Shirvan Oil Factory" (Azerbaijan). Monoethanolamine (MEA) and diethanolamine (DEA) were used as reagents of the pure grade of Olaynen Factory of chemical reagents (Latvia). Ammonium hydroxide was from the Kazanorgsintez Joint Stock Company (Russia). Sulfuric acid (96% wt solution) was product of Moscow's Component-Reactant Joint Stock Company (Russia). Isopropyl alcohol (IPA) was used as an industrial product of the factory "Organic sythesis" (Azerbaijan). NaOH and KOH (pure) were the products of Merck (Germany). The Pyral-lahy, Balakhany and Naphtalane crude oils were obtained from different oil companies located in Azerbaijan. Fresh water and sea water from the Caspian sea with following $\rho_{20} = 1.0098$ g/mL and pH = 7.7 physico-chemical characteristics and contents of ions and other species

(g/kg): Na⁺ 2.99, K⁺ 0.09, Ca²⁺ 0.34, Mg²⁺ 0.70, Cl⁻ 5.18, SO₄²⁻ 2.98 were used in the experiments.

Measurements of the interfacial tension were carried out using deionized water to make the solutions. The solutions kept at the desired temperature were measured 45 s after transfer to the thermostated measuring dishes. The actual temperature within the dishes was controlled prior to and after the measurement by means of a thermocouple. Deviations from the desired temperature were ± 0.3 °C. The interfacial tension as a function of concentration was measured at 20 °C using a drop volume stalagmometer. Interfacial tension values from the three measurements varying by no more than 0.3 mN/m were averaged and reported.

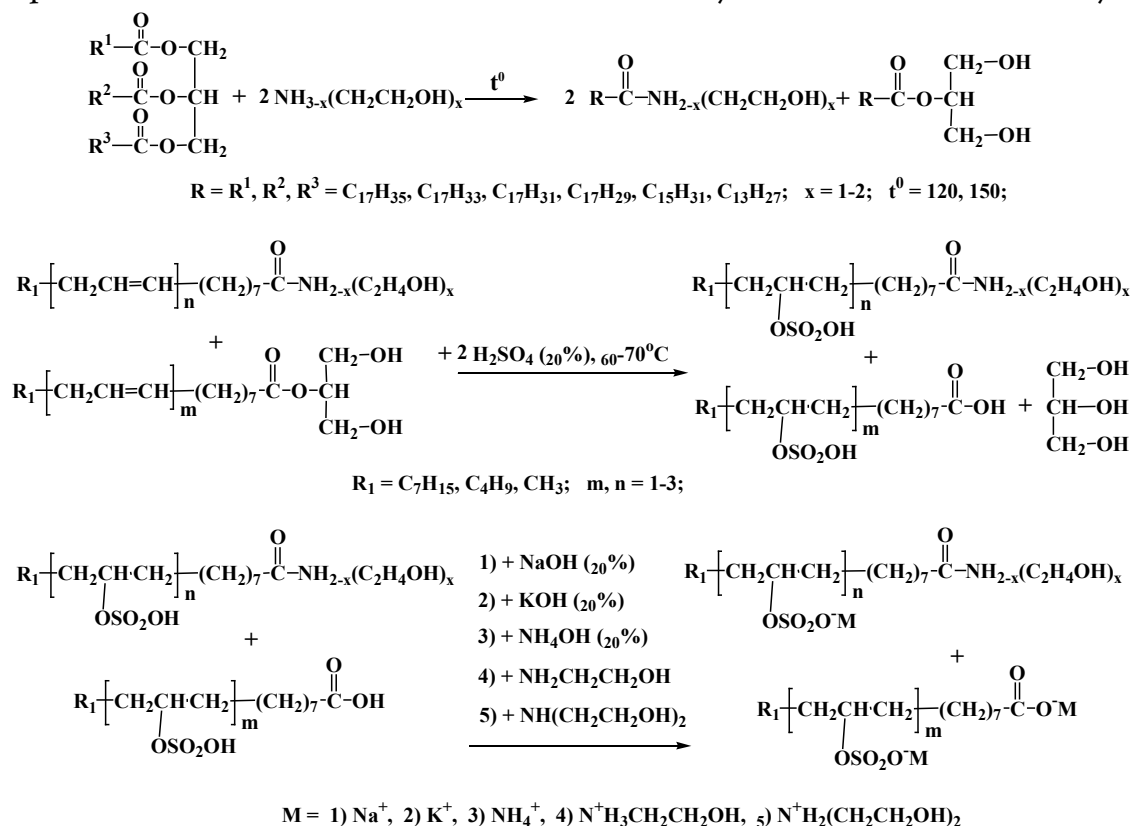
A study of influence on petroleum-collecting and dispersing properties of the synthesized compounds has been performed according to the following procedure. Into Petri dish 40 mL of water were placed and onto it 2 mL of petroleum was added. The formed petroleum slick has a thickness ~0.255 mm. After formation of the slick a necessary amount of surfactant 5.0% wt. aqueous solution was added to a thin film

of this petroleum on the surface of fresh water and the Caspian Sea water (separately) in Petri dishes. The maximum values of the petroleum collecting coefficient (K) are calculated using the formula $K = S_0/S$, where S_0 is an area of the surface of initial petroleum film and S is an area of the surface of accumulated petroleum (as a thickened spot). Since the moment of the surfactant application observations are carried out with measurement of the spot surface area and determination of the K values at fixed time intervals. When the petroleum film is dispersed, the percentage of the water surface cleaning (K_d) is found at the appropriate times of measurements. K_d is calculated as the ratio of the surface area cleaned from the petroleum and the surface area of the initial petroleum slick [18].

Results and discussion

Synthesis of surfactants

On the basis of cottonseed oil and the nitrogen-containing bases as which used monoethanolamine and diethanolamine according to the following reactionary scheme surface-active sulphatederivative salts of highest carboxylic acids ethanolamides were synthesized:



Intermediate products of synthesis are characterized by physical and chemical indicators as acid and iodine number and also identified by IR-spectra [17]. Final products-solids are generally viscous liquids and completely soluble in IPA and partially soluble in water, and also readily soluble in water: IPS mixture in different ratios. They are marked as: CM_I , CM_{II} , CM_{III} , CM_{IV} , CM_V , CD_I , CD_{II} , CD_{III} , CD_{IV} and CD_V . C is the index as cottonseed oil, M – aminolysis of cottonseed oil, carried out in the presence of MEA, D – aminolysis of cottonseed oil, carried out in the presence of DEA, I- Na^+ , II- K^+ , III- NH_4^+ , IV- MEA^+ , V- DEA^+ .

Surface-active properties of the synthesized surfactants

Surface-active properties of synthesized sulphate-derivative salts of highest carboxylic acids ethanolamides have been studied at the kerosene-water interface at 24 °C using stalagmometric method. The interfacial tension of distilled water at the border with kerosene at 22–24 °C was found to be 46–46.5 mN/m and is attributed to the attraction forces between water molecules at the water interface due to the hydrogen bonds. If any foreign molecules are present at the water surface there is a disturbance in the force, leading to a decrease in the interfacial tension.

Aqueous solutions of surfactants contain in their composition molecular-dispersed and micelle parts of surfactants, which are in reversible balance. Formation of a new phase in system happens after saturation of the adsorptive layer on an interface at a certain concentration surfactant, so-called critical micelle concentration (CMC). The CMC value is concentration of saturation for everyone separately taken surfactant. It is also necessary to note that the water solubility surfactant is expressed through the CMC parameter. The values of CMC were taken as the concentrations at the point of intersection of the two linear portions of the γ -lnC plots. Plots of the surface tension (γ) at 24 °C of sulphate-derivative salts of highest carboxylic acids ethanolamides vs. the ln of their bulk phase concentration in $mol\ dm^{-3}$ (lnC) in water showed that the interfacial tension for

all synthesized surfactants decreases by increasing the concentration of surfactant up to the steady state that varied according to the type of surfactant.

The obtained products demonstrate high surface activity at the water-kerosene interface and the CMC values are rather close $(2.29-3.65) \times 10^3\ mol/dm^3$. It may also be noticed that the values of π_{CMC} (37.08–44.39 mN/m) are relatively higher for surfactants. As is known, spreading pressure for crude oils is in the interval 30–35 mN/m. Therefore, the values of π should exceed 35 mN/m for exhibition of high petroleum-collecting and dispersing capability by surfactants. Also one of the main requirements for surfactants as the collector of oil is a low value of CMC. Namely for these reasons it was of great interest to study petroleum-collecting and petroleum-dispersing properties of surfactants.

Petroleum-collecting and dispersing properties of the synthesized surfactants

Oil collecting and dispersing abilities of reagents synthesized on the basis of cottonseed oil on the crude oils of Pyralahy, Balakhany and Naphtalane on the surface of the tap water and sea water were investigated. The optimal selection of compositions of petroleum-collecting reagents is defined by interrelation a structure surfactant and their colloidal and chemical properties. The paper [19] establishes the main provisions that allow to optimize a choice of surfactants for the development of collectors. The reagents CD_{IV} and CD_V have shown high collecting activity of Pyralahy oil in the both water environment, so that in the sea water environment $CD_{IV} - K = 22.2$, $\tau = 0-24$ hours, $CD_V - K = 22.2$, $\tau = 24$ hours; in the tap water environment $CD_{IV} - K_{max} = 25.0$, $\tau = 0-48$ hours; $CD_V - K_{max} = 25.0$, $\tau = 24$ hours. Also in the sea water environment maximum oil collecting activity has been shown CM_{IV} ($K_{max} = 25.0$, $\tau = 24-96$ hours), which is dispersing thin layer of Pyralahy oil in the moment of the introducing reagent ($K_d = 95.2\%$, $\tau = 0$ h).

In the sea water environment after 3 days impaction, reagent CM_V ($K_{max} = 44.4$, $\tau = 72-96$ h) has shown very strong collection activity of Balakhany

oil, which was dispersing in the first introduction moment and next 24 hours duration ($K_d = 93,7\%$, $\tau = 0$ h; $K_d = 95.5\%$, $\tau = 24$ h; $K = 25.0$, $\tau = 48$ h; $K_{max} = 44.4$, $\tau = 72-96$ h) and has mixed effect with this. In tap water environment the reagents CD_{III} ($K_{max} = 25.0$, $\tau = 24$ h) and CD_V ($K_{max} = 25.0$, $\tau = 24$ h) show maximum collecting ability with Balakhany oil.

The reagent CD_V ($K_{max} = 21.0$, $\tau = 24$ h) collects the thin layer of Naphtalane oil over the sea water with high coefficient. Same high collecting ability was shown by CD_{IV} ($K_{max} = 18.0$, $\tau = 24$ h) and CD_V ($K_{max} = 18.0$, $\tau = 0$ h) in tap water environment.

The synthesized salts were investigated as anticorrosive reagents inhibiting hydrogen sulfide corrosion.

Anticorrosive properties of the synthesized surfactants

The study of the protective efficiency of reagents from hydrogen sulfide corrosion of steel grade St3 was carried out by gravimetric method at room temperature using polished samples in a two-phase system kerosene-water (1:9) with stirring during the whole experiment with a magnetic stirrer. Water saturated with hydrogen sulfide was used as the aqueous phase. Hydrogen sulfide

500 mg/1 in the solution was formed by the reaction of the calculated amount of Na_2S with an excess of HCl. The duration of the experiment was 5 hours. Intensive mixing of the corrosive environment causes an increase in the corrosion rate in hydrogen sulfide-containing environments by 5 times. The test results are shown in (table 1).

The degree of protection (IE,%) salts were calculated in accordance with the following equation:

$$IE, \% = (CR_0 - CR_1) \times 100 / CR_0$$

where CR_0 is the corrosion rate without an inhibitor and CR_1 is the corrosion rate in the presence of an inhibitor.

It is seen from the date of the (Table 1), hydrogen sulfide corrosion rate is lowered in the presence of all reagents and the effectiveness of protection is increased with increasing concentration of the inhibitor. The inhibitory effect of reagents can be attributed to the adsorption of these molecules on the metal surface. With increasing inhibitor concentration, adsorption and coating of the surface increased, as a result of which the metal surface is effectively protected from environmental exposure.

Table 1. – Protective effects of synthesized surfactants in H_2S containing water-kerosene solution

| Surfactants | Hydrogen sulfide corrosion | | |
|--------------------|----------------------------|-------------------------------------|----------------------|
| | Concentration, ppm | Corrosion rate, g/sm ² h | Inhibition effect, % |
| I | 2 | 3 | 4 |
| Without surfactant | 0 | 3.6 | |
| CM_I | 200 | 1.6452 | 54.3 |
| | 500 | 0.8568 | 76.2 |
| CM_{II} | 200 | 1.2852 | 64.3 |
| | 500 | 0.4284 | 88.1 |
| CM_{III} | 200 | 0.7848 | 78.2 |
| | 500 | 0.216 | 94.0 |
| CM_{IV} | 100 | 0.5004 | 86.1 |
| | 150 | – | 100.0 |
| CM_V | 50 | 0.2844 | 92.1 |
| | 100 | – | 100.0 |
| CD_I | 100 | 2.412 | 33.0 |
| | 400 | 1.008 | 72.0 |
| | 100 | 2.088 | 42.0 |

| I | 2 | 3 | 4 |
|-------------------|----------|----------|----------|
| CD _{II} | 200 | 1.368 | 62.0 |
| | 400 | 0.756 | 79.0 |
| CD _{III} | 100 | 2.16 | 40.0 |
| | 300 | 1.152 | 68.0 |
| CD _{IV} | 100 | 0.504 | 86.0 |
| | 150 | 0.072 | 98.0 |
| CD _V | 50 | 0.288 | 92.0 |
| | 100 | 0.144 | 96.0 |

Conclusion

In the present work, some salts of sulphate-derivatives of higher carboxylic acids ethanalamides synthesized on the basis of cottonseed oil were investigated. Most of them have high petroleum-collecting and dispersing effects of thin petroleum slicks

off on the surface of the tap and Caspian Sea waters. MEA⁺ and DEA⁺ complex salts are able to ensure effective steel protection against hydrogen sulfide corrosion in water-kerosene solution containing C_{H₂S} = 500 mg/l providing strong protection IE = 86–100% at 50–150 ppm.

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INVESTIGATION OF ADDITION REACTION OF DIALKYL(ARYL) SILANES TO β -CYANOETHYL ETHER OF DIMETHYLACETYLENE CARBINOL IN THE PRESENCE OF PLATINUM HYDROCHLORIC ACID

Abstract. The addition reaction of dialkyl(aryl)silanes to β -cyanoethyl ether of dimethylacetylene carbinol in the presence of platinum hydrochloric acid has been investigated. It has been established that the reaction proceeds easily and exothermally leading to the corresponding unsaturated organic-silicon mono- and dinitriles. The structure and composition of the prepared nitriles has been established with use of the modern physical-chemical methods of analysis and methods of counter synthesis.

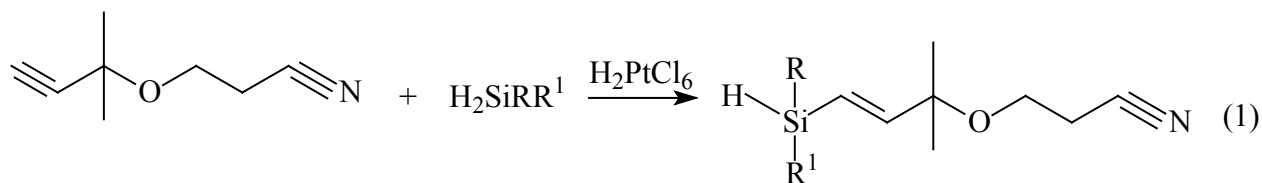
Keywords: addition, β -cyanoethyl ether of dimethylacetylene carbinol, platinum hydrochloric acid, exothermally, mixtures of isomers, unsaturated, organic-silicon, mono- and dinitriles.

It has been known that a direction of the catalytic hydrosilylation reaction of unsaturated hydrocarbons and their functional derivatives depends both on composition and structure of substrate and reagent and on nature of using catalyst and catalytic systems. For ex., the nitrogen-containing catalysts and catalytic systems containing metal chlorides favor formation of only β -adduct, whereas the catalysts on the basis of nickel and rhodium lead to α -adduct (1–5).

With the aim of synthesis and study of properties of the organic-silicon compounds containing high-

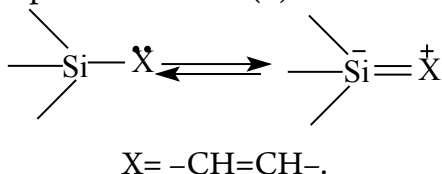
polar and reactive nitrile group in molecule, we have in detail studied the addition reaction of dialkyl(aryl) silanes to β -cyanoethyl ether of dimethylacetylene carbinol in the presence of catalyst of platinum hydrochloric acid.

It has been established in this case that the studied reaction in contrast to 2-cyanobicyclo[2.2.1]hept-5-ene and β -cyanoethyl ether of allyl alcohol proceeds easily and exothermally leading to the corresponding unsaturated organic-silicon nitriles:



$R = \text{CH}_3$, $R^1 = \text{C}_6\text{H}_5$ (I), C_3H_7 (II), *iso*- C_3H_7 (III), C_4H_9 (IV), $\text{CH}_2\text{C}_6\text{H}_5$ (V), $\text{CH}_2\text{CH}_2\text{C}_6\text{H}_5$ (VI), $\text{CH}_2\text{CH}_2\text{CH}_2\text{C}_6\text{H}_5$ (VII); $R = R^1 = \text{C}_2\text{H}_5$ (VIII). (1)

The structure and composition of unsaturated organic-silicon mononitriles prepared on reaction (1) has been established with use of the modern physical-chemical methods of analysis of GLC, IR- and NMR-spectroscopy and in some cases by a method of counter synthesis. So, for ex., in the IR-spectrum of mononitrile VIII, a purity of which on data of GLC was 99.6% in the field of C-H valence ($2800\text{--}3000\text{cm}^{-1}$, prism LiF) and deformation ($1300\text{--}1500\text{cm}^{-1}$, prism NaCl) there are a peak of average intensity 2250cm^{-1} , indicating to availability of $\text{N}\equiv\text{C}$ -group and a peak 2105cm^{-1} , characterizing a bond Si-H (6). Maximum of absorption at 1610cm^{-1} corresponds to the valence vibrations of $-\text{CH}=\text{CH}-$ group of fragment $\text{Si}-\text{CH}=\text{CH}-$. A displacement of this maximum in 1610cm^{-1} to the side of low frequencies in comparison with two-substituted ethylene of type $\text{X}-\text{C}=\text{C}-\text{Y}$ ($1680\text{--}1640\text{cm}^{-1}$), apparently, is the result procrastination of π -electrons of $-\text{CH}=\text{CH}-$ bond to vacant 3d-orbital of silicon atom in this fragment. Such interaction is referred to $d_\pi-p_\pi$ type and can be shown by means of resonance structures presented below (7):

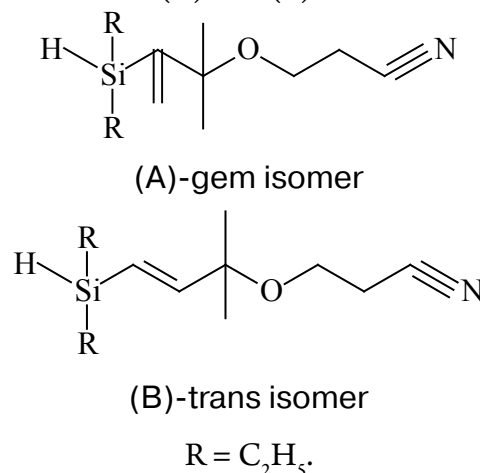


However, a complexity of these spectral data does not allow to judge unambiguously the order of addition of dialkyl(aryl)silanes to the investigated unsaturated nitrile. Therefore, we have also studied the PMR spectra of the reaction products (1).

Badly resolved signals of two $\text{Si}-\text{CH}_2-$ groups of ethyl substituents of organic-silicon nitrile VIII are ap-

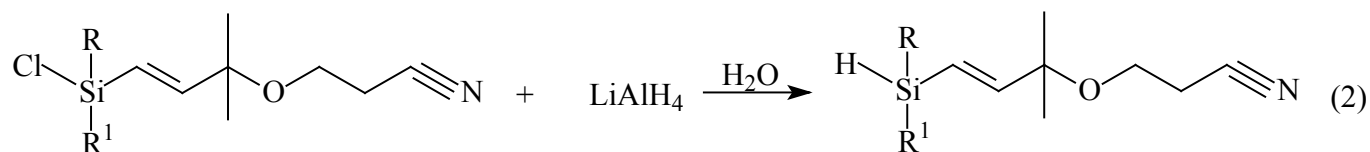
peared in the field of strong areas of PMR-spectrum and have a center at $\delta = 0.8$ ppm. The adjusted triplets of two terminal CH_3 groups of the same substituents are appeared at $\delta = 1.10$ ppm. Two triplets with $\delta = 2.68$ ppm and $\delta = 3.70$ ppm are the signals of $-\text{CH}_2\text{CN}$ and $-\text{O}-\text{CH}_2-\text{C}-\text{CN}$ groups with vicinal mutual SSIC=7.0 Hz. The adjusted overlapping proton signals of $-\text{O}-\text{CH}_2-\text{C}=\text{C}$ groups of both isomer (A) and (B) are appeared as the unresolved multiplet at $\delta = 4.11$ ppm. The broadened proton signal Si-H has $\delta = 4.75$ ppm. In the field of weak areas of this spectrum the broadened singlet of $-\text{C}=\text{CH}_2$ group of isomer (A) with $\delta = 5.62$ ppm and multiplet of $-\text{CH}=\text{CH}-$ group in isomer (B) with $\delta = 6.10$ ppm are appeared.

All this unambiguously indicates that the investigated compound VIII consists of a mixture of two structural isomers (A) and (B):

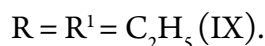
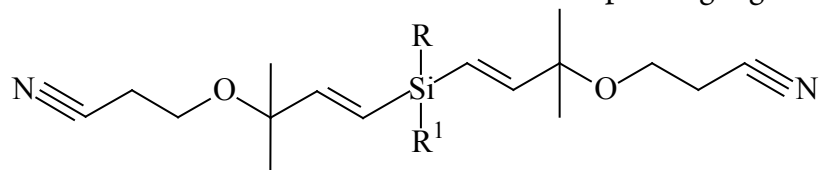


Judging on integral intensity of protons in double bonds and chromatographic (GLC) analysis data, a ratio of isomers is A: B = 1: 3, respectively.

The formation of a mixture of these isomers is confirmed by the fact that the isomer (B) prepared by counter synthesis by reduction of 1-diethylchlorosilyl-3-methyl-3-(2¹-cyanoethoxy)-1-butyne knowingly structure with LiAlH_4 and on reaction (1) had the same yield time at their chromatography:



Thus, the hydrosilylation reaction of β -cyanoethyl ether of dimethylacetylene carbinol with dialkyl(aryl)silanes in the conditions accepted by us lead to the mixture of isomeric unsaturated organic-silicon nitriles (A) and (B) with predominance of the latter ones.



Experimental

The purity of the synthesized compounds was controlled by gas-liquid chromatography (GLC) on apparatus "Khrom-3".

The IR-spectra of thin layer of the substances were taken on apparatus "Specord-75" or on two-beam infrared spectrophotometer UR-20 in the field of $600\text{--}2400\text{ cm}^{-1}$ (prism NaCl) and $2400\text{--}3600\text{ cm}^{-1}$ (prism LiF).

The initial β -cyanoethyl ether of dimethylacetylene carbinol has been prepared by cyanoethylation of dimethylacetylene carbinol with acrylonitrile in the presence of concentrated KOH solution on known procedure (8). B.p. $125\text{--}126\text{ }^\circ\text{C}$ (25 mm merc.c.), n_D^{20} 1.4460, d_4^{20} 0.9932. Yield – 62.5%.

Dialkyl(aryl)silanes have been prepared by interaction of the corresponding alkyl(aryl)dichlorosilanes with LiAlH_4 in a medium of absolute ether.

Synthesis of 1-dialkyl(aryl)silyl-3-methyl-3-(2¹-cyanoethoxy)-1-butenes

1-dialkyl(aryl)silyl-3-methyl-3-(2¹-cyanoethoxy)-1-butenes have been synthesized by addition of the corresponding dialkyl(aryl)silanes to β -cyanoethyl ether of dimethylacetylene carbinol in the presence of 0.1 ml of 0.1 n. solution of platinum

It should be noted that in all cases at reaction (1) there are also formed the unsaturated organic-silicon dinitriles – products on both Si–H bonds, the isolation of which didn't carry out due to high boiling point. However, in use of diethylsilane as a hydrosilylating agent, we were able to isolate and characterize the corresponding organic-silicon dinitrile:

hydrochloric acid in isopropyl alcohol in a medium of anhydrous benzene.

1-Methylphenylsilyl-3-methyl-3-(2¹-cyanoethoxy)butene-1 (I). The reaction was carried out in a round-bottom flask equipped with reflux condenser. The mixture consisting of 24.4 g (0.2 mol) of methyl phenyl silane, 13.7 g (0.1 mol) of β -cyanoethyl ether of dimethylacetylene carbinol, 50 ml of dry benzene and 0.1 ml of the catalyst was boiled for 48 h. After distillation of the solvent and easily-boiling components, 16.1 g of unsaturated organic-silicon nitrile I, which after repeated distillation had: B.p. $158\text{--}159\text{ }^\circ\text{C}$ (0.5 mm merc.c.), n_D^{20} 1.4966, d_4^{20} 0.9625. Yield: 62.2%. Found: C 69.27, 69.56; H 8.27, 8.35; Si 10.68, 10.75%; MR_D 78.81. $\text{C}_{15}\text{H}_{21}\text{SiNO}$. Calculated: C 69.45; H 8.16; Si 10.82%; MR_D 79.32 was isolated from residue by vacuum distillation. The purity of the prepared product on data of chromatographic analysis was 99.8%. The residue in a quantity 5.4 g was viscous undistillable liquid.

IR-spectrum I (ν , cm^{-1}): 725 (4.1), 840 (4.3), 885 (4.1), 940 (0.9), 1000 (3.1), 1078 (2.6), 1120 (3.9), 1225 (2.6), 1255 (4.8), 1330 (0.9), 1360 (1.2), 1425 (2.7), 1485 (1.9), 1620 (2.6), 2130 (3.9), 2258 (2.5), 2880 (3.6), 2970 (3.4), 3060 (2.1). $R_f = 0.67$.

The following unsaturated organic-silicon nitrile have been prepared similarly:

1-Methylpropyl silyl-3-methyl-3-(2¹-cyanoethoxy)butene-1 (II). B.p. 120–121 °C (0.5 mm merc.c.), n_D^{20} 1.4545, d_4^{20} 0.8969. Yield: 25%. Found: C 63.86, 64.07; H 10.36, 10.44; Si 12.21, 12.35%; MR_D 68.11. $C_{12}H_{23}SiNO$. Calculated: C 63.94; H 10.28; Si 12.46%; MR_{D_6} 8.31.

1-Methylisopropyl silyl-3-methyl-3-(2¹-cyanoethoxy)butene-1 (III). B.p. 122–123 °C (0.5 mm merc.c.), n_D^{20} 1.4551, d_4^{20} 0.8952. Yield: 18%. Found: C 63.71, 63.89; H 10.17, 10.38; Si 12.24, 12.51%; MR_D 68.33. $C_{12}H_{23}SiNO$. Calculated: C 63.94; H 10.28; Si 12.46%; MR_{D_6} 8.31.

1-1-Methylbutyl silyl-3-methyl-3-(2¹-cyanoethoxy)butene-1 (IV). B.p. 134–135 °C (0.5 mm merc.c.), n_D^{20} 1.4590, d_4^{20} 0.897. Yield: 22%. Found: C 65.09, 65.18; H 10.68, 10.75; Si 11.55, 11.67%; MR_D 72.98. $C_{13}H_{25}SiNO$. Calculated: C 65.21; H 10.53; Si 11.73%; MR_{D_7} 3.31.

1-1-Methylbenzyl silyl-3-methyl-3-(2¹-cyanoethoxy)butene-1 (V). B.p. 162–163 °C (0.5 mm merc.c.), n_D^{20} 1.4932, d_4^{20} 0.9511. Yield: 51%. Found: C 70.14, 70.37; H 8.33, 8.52; Si 10.22, 10.31%; MR_D 83.58. $C_{16}H_{23}SiNO$. Calculated: C 70.28; H 8.48; Si 10.27%; MR_{D_8} 4.13.

1-Methyl(2¹-phenylethyl)silyl-3-methyl-3-(2¹-cyanoethoxy)butene-1 (VI). B.p. 170–171 °C (0.5 mm merc.c.), n_D^{20} 1.4921, d_4^{20} 0.9466. Yield: 50%. Found: C 69.87, 69.96; H 8.82, 8.95; Si 9.59, 9.71%; MR_D 88.10. $C_{17}H_{25}SiNO$. Calculated: C 71.03; H 8.76; Si 9.77%; MR_{D_8} 8.37.

1-Methyl(3¹-phenylpropyl)silyl-3-methyl-3-(2¹-cyanoethoxy)butene-1 (VII). B.p. 178–179 °C (0.5 mm merc.c.), n_D^{20} 1.4908, d_4^{20} 0.9421. Yield: 49%. Found: C 71.54, 71.67; H 8.96, 9.12; Si 9.13, 9.22%; MR_D 92.65. $C_{18}H_{27}SiNO$. Calculated: C 71.71; H 9.03; Si 9.32%; MR_{D_9} 3.00.

1-Diethyl silyl-3-methyl-3-(2¹-cyanoethoxy)butene-1 (VIII). B.p. 121–122 °C (0.5 mm merc.c.), n_D^{20} 1.4584, d_4^{20} 0.8999. Yield: 22%. Found: C 64.08, 64.13; H 10.32, 10.37; Si 12.33, 12.41%; MR_D 68.40.

$C_{12}H_{23}SiNO$. Calculated: C 63.94; H 10.28; Si 12.46%; MR_{D_6} 8.52.

Counter synthesis of 1-diethyl silyl-3-methyl-3-(2¹-cyanoethoxy-1 (VIII)

The reaction was carried out in a flask equipped with a reflux condenser, dropping funnel and a mechanical stirrer. The calculated quantity of lithium tetrahydroaluminate in the ether was slowly poured to the mixture of 13.0 g (0.05 mol) of freshly distilled 1-diethylchlorosilyl-3-methyl-3-(2¹-cyanoethoxy)butene-1 prepared by a method (9) and 80 ml of absolute ether with intensive stirring and cooling at a temperature of +5 °C. After pouring the solution of lithium tetrahydroaluminate, the flask contents was stirred for another 8 hours at room temperature and left for the night.

The next day, the reaction mixture was treated with acidified water, the organic layer was separated from water layer and the last one three times was extracted with ether. The ether extracts and organic layer were combined together and dried over calcined $MgSO_4$ for one day.

After distillation of the solvent and easily-boiling components from residue by vacuum distillation it has been isolated 9.1 g of crude VIII, which after redistillation had: B.p. 120–121 °C (0.5 mm merc.c.), n_D^{20} 1.4591, d_4^{20} 0.8995. Found: C 63.78, 63.97; H 10.36, 10.43; Si 12.27, 12.39%. $C_{12}H_{23}SiNO$. Calculated: C 63.94; H 10.28; Si 12.46%.

The IR-spectrum of VIII prepared by counter synthesis (ν , cm^{-1}): 705 (3.6), 820 (3.7), 1025 (2.4), 1120 (3.8), 1230 (2.4), 1360 (1.8), 1420 (2.8), 1465 (1.9), 1625 (2.8), 2115 (4.2), 2260 (2.7), 2885 (3.5), 2920 (3.2), 2980 (2.2), 3060 (2.1).

2,8-Dimethyl-2,8-di(2¹-cyanoethoxy)-5,5-diethyl-5-silanodiene-3,6 (IX). 27.4 g (0.2 mol) of freshly distilled β -cyanoethyl ether of dimethylacetylene carbinol and 0.2 ml of a solution of platinum hydrochloric acid was placed in a three-necked flask, equipped with reflux condenser, dropping funnel and mechanical mixer and then with stirring and heating 8.9 g (0.1 mol) of diethylsilane was

gradually added. The mixture heating continued for 72 h. After distillation of unreacted components and mononitrile VIII, from the residue was isolated 19.2 g of 2,8-dimethyl-2,8-di(2¹-cyanoethoxy)-5,5-diethyl-5-silanonadiene-3,6 (IX) by vacuum distillation. B.p. 196–197 °C (0.5 mm merc.c.), n_D^{20} 1.4718, d_4^{20} 0.9546. Yield: 52.9%. Found: C 66.11, 66.23; H 9.53, 9.62; Si 7.59, 7.66%; MR_D 106.26.

$C_{20}H_{34}SiN_2O_2$. Calculated: C 66.25; H 9.45; Si 7.75%; MR_D 106.48.

IR-spectrum 2,8-dimethyl-2,8-di(2¹-cyanoethoxy)-5,5-diethyl-5-silanonadiene-3,6 (IX) (ν , cm^{-1}): 740 (3.6), 790 (0.9), 840 (4.1), 1010 (2.7), 1110 (2.8), 1245 (4.2), 1330 (1.2), 1360 (2.3), 1415 (2.8), 1470 (1.9), 1620 (2.8), 2260 (2.8), 2885 (3.6), 2915 (3.4), 2960 (2.1).

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Section 11. Economics

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HR MANAGEMENT INNOVATION

Abstract. The article is devoted to the study of innovations in the field of personnel management, which discusses the main stages of the innovation process, areas of innovation in HR management, as well as consideration of innovative HR technologies that are widely used in practice.

Keywords: HR-management, innovative technologies, personnel processes, staff training.

Personnel management is a rather complicated and labor-intensive process, which incurs high costs: financial, time and human resources. The personnel management procedure itself consists of certain technologies, which were subsequently called HR technologies.

In modern conditions, the innovative development of the personnel management system is a key

indicator of the effective management of the organization, since human resources are the capital of the organization.

It is customary to understand innovations as a kind of innovation demanded by the market and embodied in the form of new or improved products or technologies that are practically applied and able to satisfy certain needs.

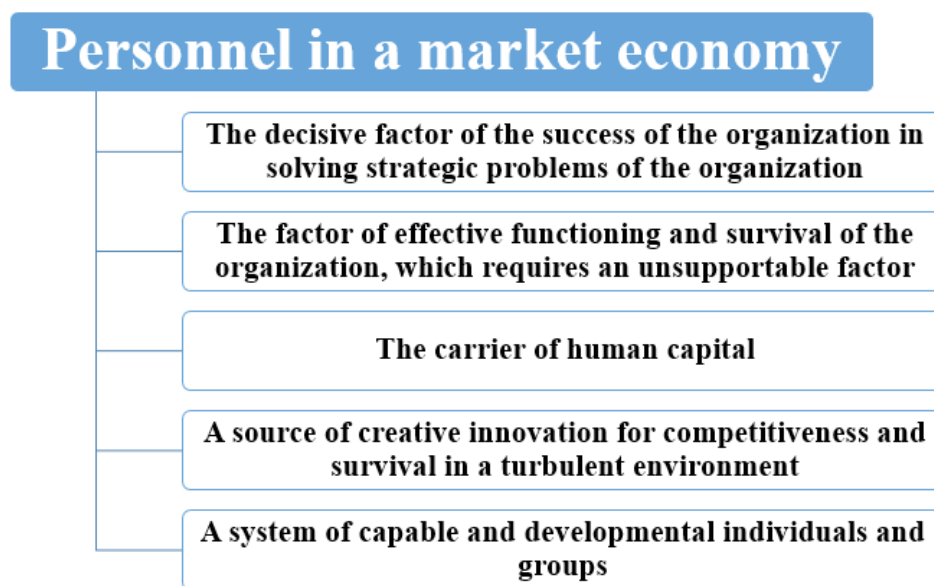


Figure 1. Elements of an Innovation Organization

Therefore, a positive result of the organization's activities lies in the innovative personnel management system. The use of certain technologies in management practice forms an innovative organization (Fig. 1).

Innovative HR-activity has specific features that differ from the general concept of innovation. Any modifications in personnel management are aimed at solving specific problems, in accordance with the development strategy and mission of the organization. But it is impossible to calculate the exact final result that they cannot lead to due to existing risks related to changes in HR management, namely, the provocation of conflict situations, associated with the opposition of employees and their rejection of innovation. Changes in personnel management can also assume a multiplier effect, expressed in counter-changes in other subsystems of the organization, as a result of which they relate to the key component of the organization – personnel.

Any innovation process is determined by directions and consists of the stages:

1) Definition of need. The need for innovation arises depending on external factors (competition, changes in the economy, the emergence of new legislative and by-laws, etc.), and internal ones (decrease in labor productivity, the presence of conflict situations, etc.).

2) Development of an innovation plan. When developing an innovation plan, it is important to determine the changes that can correct mistakes and shortcomings that reduce labor productivity.

3) Implementation. It is advisable to introduce innovations in stages, since there may be resistance to the implementation of innovations among staff. Therefore, in the process of introducing innovations, it is necessary to apply incentive mechanisms for personnel to avoid contradictions to innovations.

In the personnel management system, there are three main innovation areas:

1. Innovative educational management – innovations in the training of specialists in the educational process.

2. Innovative personnel marketing – the formation of highly effective personnel potential of the organization.

3. Innovative technological personnel management – new ways of working with personnel through the use of new technologies and modern technology.

Classical approaches to personnel management are subject to significant changes in the innovative organization. This is especially true for HR technology.

HR-technology is a system of methods, techniques and means of effective human resource management.

Initially, four main HR technologies were distinguished:

1) Personnel planning, including: the selection and selection of personnel, the formation of a personnel reserve;

2) Interview, testing, adaptation and certification of personnel;

3) Staff motivation and incentive;

4) Staff rotation and business career management.

Currently, the most widely used are innovative technologies based on personnel processes (Fig. 2).

Thus, the training and development of personnel technologies, which include the development of training programs, the development of competencies and the assessment of their effectiveness, are widely used in practical applications.

How innovative teaching methods apply the following:

1. Visualization, as a teaching method, has two forms: projective and non-projective. The projective form can be presented in the form of films, presentations, videos, computer animation. But not a projective form – in the form of objects, paintings, blackboards and chalks, interactive whiteboards, maps, and more.

2. The simulation method can be presented in the form of a situation similar to the real one, closest to life problems. This method provides a safe study of the stages, principles and features of any process.

3. The case method, which is a description of the real situation and is offered to students to

analyze the current situation and its result, as well as to make brief and concise conclusions.

4. A role-playing game, which is used to consolidate the knowledge gained and allows participants to try on various roles.

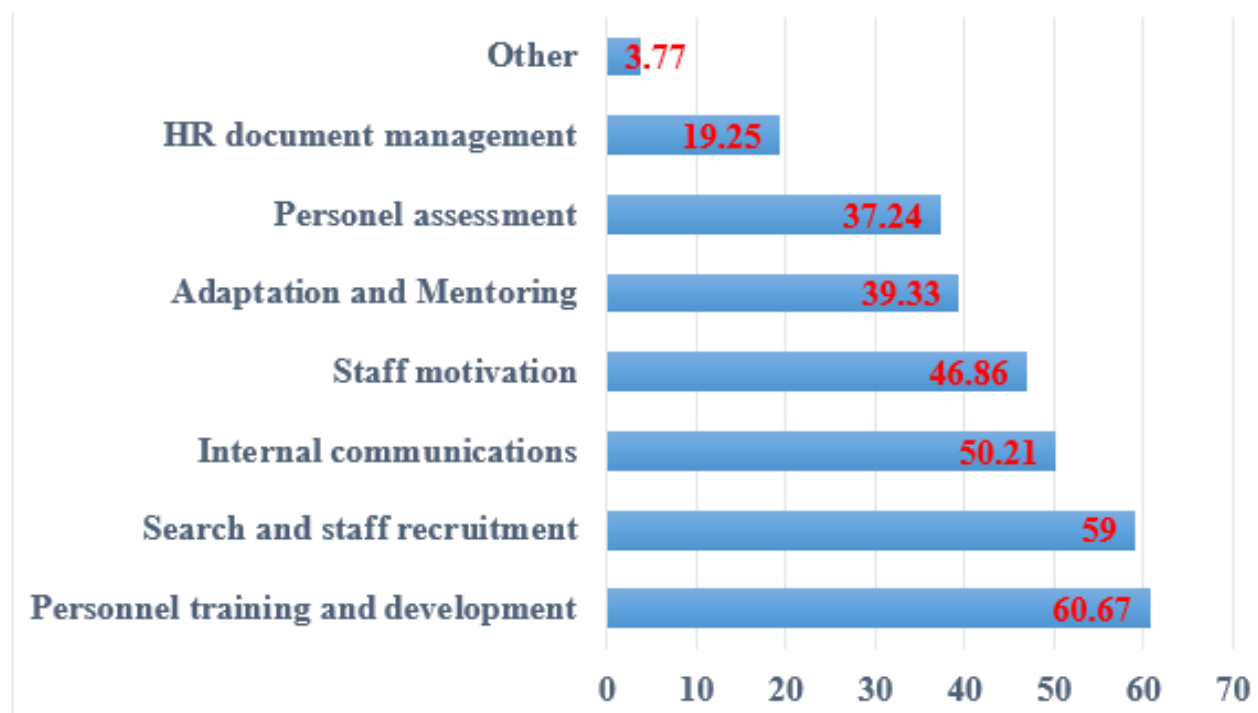


Figure 2. HR technology processes

5. The workshop is an interactive training event, which is built on the participants' own activity. This teaching method focuses on self-study of participants and intensive group interaction. An important objective of the method is the dynamic acquisition of knowledge.

6. Training as a teaching method is a practical component, which is presented in the form of a set of practical exercises and a small fraction of theoretical material. But other personnel technologies that are practically applied in organizations are also subject to innovative changes.

The technology for attracting and selecting personnel consists of monitoring the labor market, the image of the organization and the employer, and the organization of attracting candidates.

The technology for selecting candidates includes the development of a competency map and screening interviews (telephone interviews, stressful, biographical, etc.).

The technology for a candidate to join an organization is to adapt a new employee and pass a trial period.

Motivation technology is divided into moral and material motivation consisting of grades, methods for evaluating posts, qualitative and quantitative indicators of job performance, incentives, and more.

The personnel assessment technology is based on the methods, types and tools of personnel assessment, feedback, as well as the comparative characteristics of assessment methods.

Technology for the development, management and modeling of a business career includes the development of skill and professionalism, knowledge and talent management.

The technology of communication and information flows consists of building channels for these flows from bottom to top and top to bottom, as well as identifying violations and failures in these channels.

The technology of dismissal of personnel consists in the selection of methods of dismissal (directive /

non-directive), the development of rules of conduct for dismissal.

And the last basic technology is the introduction of changes, which consists in integrating personnel into the process of their implementation, accepting changes, and reviewing the successful completion of changes.

Thus, summing up, it can be noted that the effective functioning of the organization lies in the innovative personnel management system, since highly professional personnel are the key to the success of the organization. Therefore, the future lies in innovation in personnel processes.

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CHALLENGES OF THE ALBANIAN ECONOMY WITHIN THE EUROPEAN INTEGRATION

Abstract. EU membership requires the existence of a functioning market economy and the capacity to cope with competitive market forces. Economic integration is about eliminating boundaries between two or more states so that any constraints over which current and future movements of goods, services, factors of production, and the speed and quality of information are relatively low. The economic frontier does not necessarily mean the territorial frontier.

The purpose of the study is to analyze the development of the Albanian economy in the context of Albania's EU integration and customs legislation changes in line with European legislation, the ability of the economy to withstand the competitive pressures of EU countries.

The methodology used is analytical-comparative. Analytical as it analyzes various sectors of the economy, comparative because they will be compared to the EU average and the challenges for the future.

Keywords: European integration, economic criteria, functional economy, European legislation.

Introduction

The EU aims to return not only to a common economic zone, free of customs barriers and to a common monetary policy, but to a community that has a common denominator, a common philosophy and similar vision and values.

The purpose of economic integration is to increase competition in the current and future periods. Economic integration means the integration of markets and the integration of policies. The integration of markets means that all market participants in different regions or countries operate on demand and supply across the European Union. While integration policy does not mean implementing a single policy, as different countries apply different economic policies, but it does mean joint institutions, com-

mon interactions and the abolition of discriminatory policies between countries.

Albania submitted its application for membership of the European Union on 28 April 2009, based on Article 49 of the Treaty on European Union, which states: *'Any European State which respects the values referred to in Article 2 and is committed to supporting these values, can apply to become a member of the Union. Whereas, Article 2 states that 'the Union is founded on the values of respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights, including the rights of persons belonging to minorities. These are common values for Member States in a society ruled by pluralism, non-discrimination, tolerance, justice, solidarity and equality between women and men'.*

Economic Criterion for EU Integration

When it comes to EU membership, from an economic point of view, this process is about meeting not only the political criteria (stability of institutions guaranteeing democracy, the rule of law, human rights, and respect for and protection of minorities) and recognition the adoption of common EU legislation – the “Community acquis” (the ability to assume the obligations deriving from membership, including obedience to the goals of political, economic and monetary union), but also the fulfillment of economic criteria – a functioning market economy and the ability to interact with pressures and market forces within the EU. These principles have been enshrined in many basic EU documents dating back to the 50s of the last century and processed step by step in accordance with the specific circumstances of particular countries.

In 1993, the European Council set in Copenhagen the following economic criteria for EU membership:

- The existence of a functioning market economy;
- The ability to cope with competitive pressures and market forces within the EU.

The existence of a functioning market economy

The existence of a functioning market economy requires price and trade liberalization, as well as the establishment of an enforceable legal system, including property rights. Macroeconomic stability and consensus on economic policies enhance the performance of a market economy.

The efficiency of the economy improves if there is a well-developed financial sector and if major barriers to entry and exit are removed. A functioning market economy is better able to withstand the pressures of competition, and in the context of EU membership, its internal market is the market taken as a reference point.

In the early years of transition, there was a drastic output contraction, a galloping budget deficit and three-digit inflation. With the help of the international community, in 1993 Albania launched a program to stabilize the economy, which included fiscal

consolidation, strict monetary targets and structural reforms. Advances in macroeconomic stability came to a halt in 1997, with the collapse of so-called pyramid schemes, which had a very negative effect on the economy and caused civil unrest, during most of the 90s, in line with various adjustment programs and since 2000, a mid-term budget program that is a 3-year spending plan is in place.

The interaction of market forces

The administered prices are set by sectoral regulators (electricity, telephone, water supply) or by state authorities. State participation in the economy has gradually declined, and as a result the private sector today accounts for about 3/5 of GDP and 82% of total employment. This is largely achieved through the extensive privatization process. Sectors still owned or controlled by the State include electricity generation, railways, ports and water utilities.

Significant progress has been made in recent years in facilitating the opening of new businesses. In 2007, the law on the National Registration Center, today the National Business Center, was adopted, which provides simultaneous one-stop-shop registration for the purposes of business administration, tax, social and health insurance, and job inspections. The legal system underpinning the market economy has evolved since the 1990s. However, the legislative process is not fully transparent, as the proposed laws are not always subject to public consultation. Laws and normative acts are not always consistent, complete or lacking implementing legislation, leading to uncertainty.

Customs union and European integration

The Albanian economy has undergone major structural changes in the last two decades and economic policy has been oriented towards macroeconomic consolidation and customs union. The acquis in this sector is made up of the EU Customs Code and its implementing provisions, the Combined Nomenclature, the Common Customs Tariff including trade preferences, tariff quotas and exemptions from customs duties and other legislation related to customs outside the scope of action. Member States

should ensure the implementation of enforcement and enforcement capacities, including links to EU computerized customs systems (tariff systems, NCTS – new computerized transit system), ECS Exports, ICS-Integrated Transport System and EOS-Economic Operator Systems). The customs administration should also ensure the appropriate capacity to implement and comply with the specific rules laid down in the areas of customs related acquis, such as: provisions on foreign trade, health and safety.

In terms of customs legislation, Albania applies the Combined Nomenclature and its classification rules are broadly in line with the acquis, although their implementation is not always consistent. Existing mandatory customs tariff information systems, tariff suspensions, quotas tariffs and duty relief are similar to those of the EU, but are not yet fully harmonized. At the time of EU membership, Albania must ensure the implementation of all EU customs related legislation. Albanian customs legislation does not yet cover security measures or the concept of authorized economic operator (OEA).

The system of administrative fees for customs supervision and control will need to be scrutinized, as some of the fees applied may not be in line with the acquis. Albania will need to align its transit procedures in preparation for membership of the Common Transport Convention. Provisional acceptance into the ATA carnet has been made but is not yet implemented in practice because there are no national guarantors. Albanian customs result in more revenue than taxes, while in other countries the opposite is the case. For countries in transition, such as Albania, the balance of customs and tax revenues is almost the same. However, for developed countries, customs remain the institution, chief of revenue provision for the state coffers. Nevertheless, the normal flow of economic development will lead to an increase in income within the domestic economy, namely taxation, driven by the growth of industries, businesses, etc. At the moment this balance is normal, but for 5–10 years next, the advantage will go to the tax system.

Challenges to be faced

One of the direct impacts of moving towards deeper integration will be the reduction of budget revenues from import customs duties.

For 2018 we have a realization of the state budget of 92%. In 2018, we collected ALL 381.1 billion, about 33.3 billion less than planned at the beginning of the year. Difficulties in implementation were due to tax and customs revenues, where only 92.5% of the plan at the beginning of the year was implemented. Specifically, national tax revenues were 81%, personal income tax was 86%, value added tax revenues were only 93%, customs tax revenues were 96% and excise tax revenues were realized by 98%. Profit tax exceeded forecasts by 6%.

The share of budget revenue from customs duties has steadily declined, from 11.3 percent of tax revenue in 1999 to 9.5 percent in 2009, to 3.2 percent in 2018. Customs revenue, however, remains an important source. In Slovenia and Bulgaria, they account for 0.6 and 0.7 percent of GDP, respectively.

As a result, in the medium term, it is expected that this source of budget revenue will be gradually reduced, requiring measures to be taken for fiscal adjustment. It is necessary that reforms in the country's fiscal system aim at expanding the taxpayer base, not only to compensate for the loss of this source of revenue, but with the aim of achieving budgetary revenue levels in order to deepen the country's fiscal consolidation and increasing levels of public investment to meet the needs dictated by the country's National Strategy for Economic and Social Development.

According to some estimates carried out by World Bank researchers, it turns out that the combined action of the SAAs and FTAs with the region have a positive effect on the welfare indicator at over 3% of GDP (in dynamic terms), an increase of salaries of 5.68%; increase of exports by over 50% and imports by about 6%.

Albania's economic benefits from EU membership

During 2001 and onwards, EU assistance to Albania under the CARDS Program amounted to

approximately €280.000.000. Infrastructure, economic and social development and the promotion of regional co-operation, and focus on several priority areas.

This program aims to help Albania create a modern judicial system that is in line with European standards, through revision of the legal framework, training programs, prison rehabilitation, etc. In addition, efforts are made to increase the professionalism of the civil service, which public administration to be efficient and responsive to EU standards.

Starting in 2014, EU financial support for candidate and potential candidate countries is provided through the new Financial Instrument: IPA II, which will be implemented during 2014–2020. Preparations for this Instrument have started at the end of 2011 and from at that time, there were consultations with all stakeholders involved in the process. The new instrument, different from IPA I, consists of five sectorized areas where each beneficiary country will benefit from all sectorized areas, regardless of status (candidate or potential candidate), will be programmed based on sectorized approach rather than specific projects. In this case, Albania benefits from several areas:

In the area of Police and Public Order.

Albanian police have been provided with strategic advice, training and equipment. Police forces have a fundamental role to play in strengthening the rule of law, internal security and the fight against organized crime, trafficking and corruption.

Cross-border cooperation – is another area related to the improvement of integrated border management between our country and the regional countries involved in this assistance program.

Building administrative capacity – including improving the implementation capacity and sustainability of public administration, focuses on directions that accelerate the Stabilization and Association Process. The Customs Assistance Mission has achieved valuable results in terms of revenue collection, prevention of smuggling and corruption and improvement of customs management and procedures.

Building local administrative capacity's- far as infrastructure development is concerned, the improvement of the energy, transport and water networks, which are essential for economic growth in Albania.

Project Financing – The EU funds the development of several infrastructure development projects. In addition to the substantial assistance our country receives from economic assistance programs, it also enjoys trade preferences with regard to the EU.

Conclusions and recommendations

Albanian customs legislation is partly in line with the *acquis*, but further efforts are needed in some areas, along with overall alignment with EU customs legislation. The administrative and operational capacity of the customs administration will need to be strengthened to improve implementation of existing legislation and respond to future challenges. The capacity of Information Technology needs to be strengthened, with particular attention being paid to interoperability and interoperability with EU computerized systems.

Our country aspires to EU membership and one of the main objectives required by the EU is to reduce all customs barriers. Thus the role of customs will focus more on filtering the economy than on a source of revenue for the state budget.

Reducing the customs burden will bring about lower costs for exporting businesses in Albania, so Albanian businesses will have the opportunity to expand exports which will definitely be a very difficult challenge of facing foreign competition.

Overall, Albania still faces challenges in the areas of harmonization of legislation and administrative capacity.

Albania's policy on industry and small and medium-sized enterprises is broadly in line with EU principles. However, attention must be paid to the remaining challenges that are improving the business environment and removing the remaining barriers to investment.

The tax administration has made great efforts for taxpayers to meet their obligations voluntarily

and it has been able to effectively collect most of its tax liabilities. Current legislation requires full payment of the tax before an appeal against a tax administration decision is made and does not allow the use of a bank guarantee for this purpose. Risk analysis, inspection and co-operation between institutions need to be further strengthened to im-

prove law enforcement and reduce the large informal economy.

There has been some progress in the area of customs cooperation. The Directorate General of Customs has continued good cooperation and information exchange with its counterpart structures in the region, in EU countries and elsewhere.

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Section 12. Science of law

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THE IMPLEMENTATION OF INTERNATIONAL AGREEMENTS IN THE LAW'S SYSTEMS

Abstract. The legal effects of an international agreement within a state party to the agreement are realized in a certain way. International law has accepted the implementation of an international agreement immediately and directly or indirectly, which provides for the performance of certain legal actions to enable direct implementation thereafter. Whatever the form of implementation of an international agreement, it imposes an obligation on the State party to carry out its application in any form based on the rules established by international law.

Keywords: an international agreement, implementation, international law.

International law as a source of law is studied by international law, which we are not studying for reasons because our purpose is to enforce it within the law of a state. Depending on the hierarchy defined in the legal system of a state, the agreement is self-executing or not. Referring to the monist and dualistic systems that aim to identify which will prevail in the implementation, domestic or international law, we see that in many countries the international agreement becomes applicable by performing certain legal actions by on the part of the signatory states.

The way an international agreement is implemented shows the way for it to become part of the domestic law of a state. Regardless of what hierarchy an international agreement resides in the sources of the law of a state, the state itself determines whether

all agreements will be applied in the same way or in two different ways. This is because the international agreement does not occupy the same position within the rule of law in all states. Practice has shown that generally all states in the world today have in their legal systems both ways of applying the international agreement. The relationship between the implementation of an international agreement and the domestic law of a state is studied by international law. On the basis of the ratio and primary application of one compared to the other today we divide the systems of law into monistic and dualistic systems. To refer to the report of the agreement in the domestic law of a state we refer to international law as international agreement is an important source besides international custom.

Every state is free to choose without influence of the other states, the model of system they want. The freedom arising from the exercise of full sovereignty in relation to the application of the norms of international law defining their place in the domestic legal system [1, 1–6]. Regardless of which system the state chooses, it is obliged to implement the international agreement if it has expressed the will to enter into it, applying the principle of implementing the international agreement *pacta sunt servanda* [2, 2–6]. The state itself cannot be deterred from applying the international agreement on the grounds that the agreement is in breach of its domestic law. The change from dualism to monism is followed by the political transition, as evidenced by the practice of Central and Eastern European countries, which incorporate elements of monism into the new laws adopted after the fall of communism in the 20th century.

There is no unified practice in the way international agreements are implemented and states themselves apply different models, which are influenced by factors that are reflected by the legal and political cultures of the state itself.

International law divides them into national factors and international factors. We may mention as internal factors the system of a state's access to the monist or dualistic system, the hierarchy in the normative system, the way it is implemented directly or indirectly, the ratification laws of the international agreements adopted in parliament. International factors relate to the reciprocity and universalization of international agreements on the basis of their object, whether or not the supervisory mechanisms for their implementation are established.

The monist system applies the rule that international law and national law are two components, or norms, of the same system of law. International agreements, customary norms and general principles of international law, may be part of domestic legal orders without the need for their transposition through national legal instruments. Whether they impose individual rights and / or duties and whether the provi-

sions of the agreement can be applied by the domestic courts in making their decisions depends only on their nature and content. Adherence to monism does not automatically bring about the legal superiority of international law, as the monist approach is consistent with different views on the hierarchical relationship between international and national law [3, 3–6]. That is why the internationalist and monist nationalist systems have been adopted [4, 4–6].

The monist system provides in the constitutional norms, the possibility of enforcing and the implementation of the international agreement. An agreement will be part of the internal legal system of a state binding only if it is in accordance with the constitution of the state and does not conflict with it. We think that if a country's constitution bans it then it is impossible for the treaty to become part of the domestic law of that state. Practice has shown that the attitudes of the various states, as we shall note respectively for some states in the issues below, are both self-executing and non-self-executing agreements accepted by the legislation. The monist system is characterized by a number of rules where: The constitution of these countries has clearly defined the duty of the representative body of its people, that the agreement must be ratified by a separate law from parliament [5, 5–6] and in some specific cases it has also provided exceptions to this rule.

Agreements are divided depending on how they become part of domestic law in a self-executing agreement or not, as well as the subjects and facilities where it is forbidden to enter into an international agreement. A self-executing international agreement may have the force of law if domestic legislation is not codified and deficient. These are the rules that we observe in states that belong to the monist system. In international law, practice has shown that states may employ certain legal techniques of incorporating or creating concrete legislation evidenced as clear references to international law provided for by domestic law. Countries that have taken this position and have provided in the constitution or in basic or organic law

how to implement the international agreement and become part of their domestic legislation are Albania [6, 5–6], Bulgaria [7, 6–6], the Netherlands [8, 7–6], Portugal [9, 8–6]. The second legal technique is that of concrete references contained in laws or other domestic legal acts giving binding force within the domestic legal order to a particular international agreement. Even within a monist system, models are not unified because they sometimes define the hierarchy in the legal order and sometimes forget to place them in the order of sources of law without mentioning the sources. According to the Venice Commission, by failing to determine the status of other sources of international law leaves open the question of whether those sources are excluded on the basis of the principle of application of a *contrario* or incorporated on the basis of other constitutional clauses or legal practice. This is because some constitutions contain general norms that proclaim the state's allegiance to international law as provided by the constitution of the Czech Republic [10, 9–6] and Poland's constitution [11, 10–6]. It is sometimes suggested that such a clause serves as a basis for incorporating general principles of international law, customary international law, or all sources of international law. The provision for incorporation is often interpreted as referring to all sources of international law including international agreements. This approach is found in the constitutions of Albania, Austria [12, 11–6], Germany [13, 12–6], the Netherlands [14, 7–6], etc.

The opposite is defined in the dualistic system. Dualism regards as two separate legal systems, national law and international law although these rights may address similar or identical issues. But the fact that they have different subjects of law and different sources cannot be accepted as the same rights, but they are absolutely different. International law also deals in detail with the differences between these rights when categorizing them into different groups of law.

Sources of international law including international agreements are not directly applicable within the domestic legal order. They become part of do-

mestic law only through a law that is the source of domestic law, so that the international agreement can produce the desired effects. International agreements will only be enforced by the domestic courts of the states through the application of the law that has made that part of domestic law. Some countries that have embraced this system are Australia, Canada, New Zealand and the United Kingdom, Finland, Hungary, Israel, Sweden and others.

In these countries the international agreement will be incorporated into domestic law through transformation, adaptation and adoption. Transformation refers to the model in which the text of an international treaty is literally incorporated into a statute or other source of national law. Adaptation, by contrast, involves not only "incorporation" by international law into national law, but substantial modifications [15, 13–6]. Practice has shown that the international agreement fits this way in the United Kingdom where we can illustrate it with the United Kingdom Human Rights Act of 1998, which incorporated parts of the United Nations Charter and certain provisions of the European Convention on Human Rights. Human rights thus did not create a conflict with domestic law. Whereas adoption refers to the use of the provisions of international treaties, or other sources of international law, in the case law of national courts, where such resources have not been transformed or adapted within the domestic legal order.

Under the dualistic system, international agreements have no power over domestic law, and they only apply if there is a law giving it legal force to make it applicable. Where legislation is specifically made for this purpose, then rights and obligations are said to be incorporated into domestic law. This stance clearly demonstrates the executive's constitutional power to conclude an international agreement without the prior consent of parliament and, in turn, the supreme power of parliament under the constitution to make laws. In the dualistic system the provisions of a treaty incorporated in domestic law have the status of domestic law and may be amended or repealed

only by subsequent legislation. States, regardless of what system they belong to, in most cases have clearly defined in their constitutions the position of the international agreement and its superiority over domestic law. The definition in the constitutional law of a state indicates the great importance that international agreements have today in interstate relations. Looking in detail, few are states that apply a stable

monist or dualistic system, most states have elements of both systems. The United Kingdom has the classical form of dualism, while the classical form of the monist system is Switzerland. On the other hand we mention the USA in which the elements of both systems are combined. The effects of an international agreement will only arise after it has been applied in domestic law.

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NATIONAL LEGISLATION AGAINST CHILD ABUSE IN ALBANIA

Abstract. Child abuse is manifested in various forms, such as: physical and emotional abuse, neglecting and sexual abuse. The child abuse does not know any limit, but the children asking help come mainly from poor and risked strata of the society. The roots of this phenomenon stand in the patriarchal mentality that characterises the Albanian family and the entire society in the country as well. Even though there is an increased level of awareness rising on child abuse among the population, it still remains much to do in order to overcome abusive stereotypes and models of parenthood.

Keywords: Child Abuse, Albanian Family, Phenomenon, Model of Parenthood.

1. Introduction

Child maltreatment is a significant public health problem, that has a serious impact on the health on well being of children. It is not a new phenomenon to the modern society. The Roman Law gave the father the absolute right on his child. This right was understood as a right to act on a child by every means. Dealing with the problem of child abuse as a social problem has not a long history in Albania. This problem started to be discussed when the civil movement began to take breathe, as a result of political changes taking place in the country. Child abuse has been addressed by numerous stakeholders including the Government, ministries, public institutions and nongovernmental organizations, which not only organized awareness rising campaigns on the defence of children rights, victims of abuse, but also offered the first specialized psycho-social services and legal support.

2. Types of Child Abuse and Neglect

The World Health Organization defines child abuse and neglect as [16]: “*All forms of physical and/or emotional ill treatment, sexual abuse, neglect or negligent treatment or commercial or other exploitation, resulting in actual or potential harm to the child’s health, survival, development or dignity in the context of a relationship of responsibility, trust or power*”.

Different types of child abuse and neglect have different features. It is important to distinguish between what are commonly regarded as the five main subtypes of child abuse and neglect:

Physical abuse [16] consist in force against a child that results in/or has a high likelihood of resulting in harm for the child’s health, survival, development or dignity. This includes hitting, beating, kicking, shaking, biting, strangling, scalding, burning, poisoning and suffocating. Much physical violence against children in the home is inflicted with the object of punishing.

Sexual abuse [16] consist in the involvement of a child in sexual activity that he or she does not fully comprehend, is unable to give informed consent to, or for which the child is not developmentally prepared, or else that violates the laws or social taboos of society. Children can be sexually abused by both adults and other children who are by virtue of their age or stage of development in a position of responsibility, trust or power over the victim. There is a diversity of perpetrator characteristics, relationships and contexts within which child sexual abuse occurs as: adult abusers with no familiar relationship to the child, adult abusers who are family members of the child, adult abusers who are in a position of power or

authority over the child, sexual abuse that is perpetrated by children and young people, sibling sexual abuse, online child sexual abuse, commercial child sexual exploitation.

Emotional abuse [16] is also sometimes called 'emotional maltreatment', 'psychological maltreatment' and 'psychological abuse'. Emotional abuse refers to a parent or caregiver's inappropriate verbal or symbolic acts towards a child and/or a pattern of failure over time to provide a child with adequate non physical nurturing and emotional availability [16]. It takes five main behavioural forms: rejecting, isolating, terrorizing, ignoring, corrupting.

Neglect includes both isolated incidents, as well as a pattern of failure over time on the part of a parent or other family member to provide for the development and wellbeing of the child where the parent is in a position to do so in one or more of the following areas: health, education, emotional development, nutrition, shelter and safe living conditions.

Exposure to family violence consist on forcing a child or young person to live in an environment where a primary caregiver experiences sustained violence is in and of itself emotional and psychological abuse. Children and young people who are forced to live with violence are at increased risk of experiencing physical and sexual abuse. These children and young people tend to experience significant disruptions in their psychosocial wellbeing, often exhibiting a similar pattern of symptoms to other abused or neglected children.

3. Child Abuse and Neglect Statistics in Albania

Children become direct or indirect victims of abuse. In most of the cases, they have been present during moments in which violence has been exercised on other members of family, mainly their mothers. They have experienced painfully the violation of their dearest person; have tried to become her supporter to relieve ever so little her pain, have hated the abuser but at the same time it has been difficult for them to abandon or despise him. They have passed through moments of difficult dilemmas

for their age and experience. In such violent environment it is not by coincidence that they become direct object of physical abuse exercised on them by the father, mother or elder siblings. Many of these children are abused emotionally too.

The culture of violence against children is largely accepted in the Albanian family, school, and society [9]. Several studies confirm this fact and demonstrate that physical and psychological violence are accepted forms of discipline both in the family and at school. The first study on child abuse in Albania shows that violence is so widespread in Albania that the distinction between upbringing and the use of violence is often blurred in the minds of the respondents [17]. Results of this study confer that only 23.6% of the 643 adults interviewed consider slapping a child as a form of abuse.

A recent study on parents beliefs on corporal punishment of children further shows that 76% of the 195 parents and 57% of the 92 teachers interviewed think that it is acceptable to slap children, but only with a few light slaps [8]. Another report on parents and teachers attitudes towards childrens physical punishment shows that 74.8% of parents and 68.5% of teachers agree with the notion that children learn to respect their caregivers from smacking.

Additionally, physical punishment is seen not only as acceptable but also as needed to educate children. Indeed, 27.6% and 34.3% of teachers included in this study think that severe treatment of children by their parents prepares them to deal with difficult situations later in life. Psychological violence is considered to be less harmful than physical abuse; therefore, the former is believed to be more acceptable and useful for children's education. Moreover, adults also have limited and vague understanding of the negative consequences of physical and psychological violence.

Among children, 41.5% and 6%, respectively, have been abused physically or sexually at least once during their childhood [18]. One in five children in school report that they are subject to verbal bullying. Exposure

to cyber-violence and sexual abuse is also high, documented by a 2017 survey [11] with children of age 13–18 years pointing out that bullying, password theft and unintentional pornography viewings happen every day to 45% of children participating in the survey, while 47% of children were contacted through the Internet by unknown adults. UNICEF latest studies showed that 7.75% of Albanian children of age 5–17 years are engaged in some type of economic activity [12] and 2.000–2.500 children are connected to the street by living or working, or both [10]. As Albania lacks a comprehensive integrated national child protection system interventions in this area are driven by nongovernmental organizations and are mostly inefficient, overlapping, issue-based and fragmented [19]. High expectations are associated with Albania's political aspirations to strengthen the rule of law and (child) rights protection as critical milestones along the path to Europe membership.

4. National Legislation Against Child Abuse in Albania

Albania has ratified, since the 1990s, a number of important international human rights instruments including those on children's rights. The Albanian legal framework on protection of children from sexual abuse is composed of constitutional of 1998 provisions, ratification of the international instruments, domestic law, sub-legal acts and administrative procedures. The Constitution of the Republic of Albania deals with the right of the child in its Article 54 and provides, among others the principle that every child has the right to be protected from violence, ill-treatment and exploitation which may damage his/her health, moral or endanger his/her life and normal development [20].

Law no. 18/2017 dated 23.02.2017 "On the rights and protection of children" is the organic law which provides the overall principles, measures, standards of protection and the institutional framework on children's rights. It should be immediately pointed out that this recently approved law, which repeals and replaces the 2010 law regulating the

same matter, constitutes a significant improvement of the Albanian legislation on this matter. This is due to the fact that it has introduced and regulated in a detailed and systematic way the principles, standards and measures provided for in the Lanzarote Convention and in the other above mentioned international instruments. Having established that, child [2] "is considered every person under the age of 18 and having established the well-known principle of the best interest of the child". Law 18/2017 provides for:

- Preventive measures;
- Assistance and support measures;
- Coordination measures;
- Protection measures.

The Criminal Code guarantees a special protection to children by crimes committed against children. However, based on existing legal norms, the Code guarantees only the protection of the child by sexual abuse in the family, but this protection does not extend to physical and emotional abuse. As a general remark it can be noted that the Criminal Code [3] provides for high penalties for sexual abuse offences consisting in multiple years of imprisonment. At least some of them are consistently higher than the minimum penalties provided for similar offences by Directive 2011/92/EU.

An important development in the Albanian children's rights legislation is the approval in March 2017 of the Code of Criminal Justice for Minors which will enter into force on January 1, 2018. It is for the first time that Albania develops a full set of norms to regulate the position of children within the criminal justice sector and to approve specific rules and procedures needed to treat this delicate category. It is mainly focused on regulating aspects of the criminal liability of children who commit criminal offences but it provides also important dispositions in relation to children victims of crimes, including sexual abuse [3]. In fact, it regulates issues such as: the position of the child victim during investigation and prosecution; interviews with children; protection measures throughout the process in order not to

aggravate their trauma; protection of personal data of child victims and similar issues.

The Criminal Procedure Code [4], guarantees some fundamental rights to children such as: the right of child to testify in the criminal process, the right for free legal assistance etc. In reality much remains to be done, because the trials in support or against the child are not carried out by juvenile judges, meanwhile social workers or psychologists are not allowed to offer their services during the trial.

The Family Code approved by the Parliament entered into force on 21 December 2003, starting its implementation of January 2004. The preparation of the new Code, although it took six years, did not bring the expected outcomes in terms of child protection and respect of his/her rights. There were several lobbying and advocacy campaigns by the civil society to improve child protection content in the Code. However the Family Code has included some new concepts, which are worth taking into analysis

and see how can be applied to protect the children from abuse and neglect [5].

5. Conclusion

Violence and abuse against children is generated by the patriarchal mentality of the Albanian family that sees the violence against the child as a mean of discipline. It does not have any limits in the level of age, education, social or economical status of the family. Children that come from marginalised groups of society are more exposed to all forms of abuse in the family and community. Although there is a strong legal framework to protect children, stricter enforcement is needed of the ban on corporal punishment. They acknowledged the need for better governance frameworks and capacity building of frontline workers in the health, social, justice and education sectors to strengthen mandatory reporting, information sharing and a multisectoral response in Albania. The children are our future, they should not be violated or abused, please Stop Violence!

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PREVENTION OF THE FINANCING OF TERRORISM: CURRENT ISSUES IN THEORY AND PRACTICE OF APPLICATION IN THE RUSSIAN FEDERATION

Abstract. Urgency of the terrorism financing research is caused by the fact that terroristic activities currently is one of the most severe threats for national security of Russian Federation. As of today, within the Russia territory, in the на post-Soviet area including CIS, and in the near abroad countries terroristic organizations and groups, along with individual criminals are still active. Danger to the public raised by terrorist acts is caused by their by their large scales, cruel results, large numbers of victims, destabilizing effect for all spheres of public interest. When analyzing the problems of terrorism financing, the authors considered judicial practice using specific criminal cases, genesis dynamics of norms providing for criminal liability for this group of crimes, and discovered a number of imperfections, errors, and gaps in the current legislation.

Keywords: Russian Federation, Criminal Code, terrorist act, terrorist financing, criminal liability.

In compliance with Item 1 of the Concept of Terrorism Suppressing in RF approved by the RF President on 10/05/2009, one of the main tendencies of the present-day terrorism is raising the level of terroristic activity financing along with maintenance supply of terroristic organizations. Besides, one of the main external factors facilitating formation and spread of terrorism in our country is financial support of Russian terroristic formations by international terroristic organizations. Thereupon, the main measures against terrorism (for its prevention), along with political, social, and economic efforts, include also legal ones (legislation improvement and practical implementation of the punishment unavoidable principle including for terrorism financing).

However, the number of detected terrorism financing facts in Russia, as compared with the overall growth of terroristic crime organization, still remains extremely low. For example, according to judicial statistic data of the Justice Department at the RF Supreme Court, in the period since 2007 till 2011, only 18 crimes were disclosed, while since 2012 till the first half of 2019 148 crimes were investigated successfully. According to statistics, 49 persons were sentenced for crimes (the main accusation) under Art. 205.1 of the RF Criminal Code, while 24 ones received accumulative sentences. Besides, nobody was convicted, in these periods, under Part 2 of this Article, while 3 persons were sentenced under the Part 3 of the

main Article, and other 4 persons received accumulative sentences.

The legal base of the terrorism financing suppression includes, apart from RF international treaties, RF Constitution, RF Criminal Code, Federal Laws dd. 08/07/2001, N115-FZ, “On Measures Against Illegal Profit Legalization (Laundering) and Terrorism Financing”, and dd. 03/06/2006, N35-FZ, “On Measures Against Terrorism”, RF Government orders and instructions, and also regulatory acts of RF Central Bank and Rosfinmonitoring (FSFM).

Persons abusing their official positions shall include both officials and government and municipal employees that are not officials, along with those who, permanently, temporary, or under a special authority, are performing organizational/management or administrative duties in a business organization of any pattern of ownership or a non-profit entity that is not a state or municipal institution [3]. Abuse of any official position when committing crimes under Art. 205.1 of the RF Criminal Code shall be considered not only as intentional abusing one’s official position but also as exerting an impact, depending on importance and prestige of the occupied position, on other persons for motivation them to perform actions encouraging terroristic activities.

It should be noted that, in compliance with the note to Art. 205.1 of the RF Criminal Code, a criminal may be release from criminal liability if he/she prevented the crime commitment by informing in due time the official authorities or assisting in another way in prevention or suppression of the crime that he/she had financed and/or assisted to commit provided his/her activities include no other components of the crime[1].

In the next Revision No. 46 dd. 07/06/2016, the legislator made an amendment associated with identification of legal entity beneficiary owners. For example, Art. 6.1 “Legal Entity Duties Regarding Disclosure of its Beneficiary Owners” was added to Art. 6. Under this amendment, legal entities are obliged to: keep information about their beneficiary

owners, identify them, regularly, at least once (a year, a month, a week – a gap in the text – translator’s comment) amend the information about their beneficiary owners and fix acquired information in documents. Besides, the information about beneficiary owners and measures for their identification and collection of respective information shall be kept. The legal entity shall provide the acquired and confirmed by documents information about its beneficiary owners to an authorized body, tax agency, or other federal body of executive authorities authorized by the Russian Federation Government under their requests.

In conclusion, the legislator shall explain the concept of beneficiary owner, that is a natural person that is, eventually, a direct or indirect (via third parties) owner (having a dominant participation of over 25% in the capital) of a legal entity or may control its activities.

Having acquired such information, we may suppose the legislator thus is performing regular activities for identification of shadow financial flows that may also be used for terrorism financing [4].

The analysis carried out makes it possible to highlight a number of problems complicating identification and suppression of terrorism financing cases:

1. High latency of crimes caused by local population being afraid of cooperation with the law-enforcement authorities, especially in highly criminogenic areas, such as, for example, North Caucasian Federal District.

2. Insufficient level of employee competence in law enforcement authorities, especially in the mentioned areas.

3. Problems in performing operational search actions among local inhabitants because of their ethnic and confessional solidarity.

4. Problems of evidence collection.

5. High level of criminal organization and maintenance supplies of terroristic groups.

6. Secret preparation of terrorist acts and limited number of informed persons.

7. Shortcomings of active money laundering legislation.

8. Inefficient control of financial flows between doubtful contracting parties all listed above impedes efficient suppression of terrorist acts.

Identifying and blocking efficiently channels of terroristic organization financial support is one of the most important and, at the same time, complex prob-

lems to be resolved by world society within the scope of joint efforts for suppression of this global threat. Thus, it seems important to continue taking respective measures aimed to enhance coordination of special services in their struggle against terrorism financing and development of Russian legislation in this area.

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