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CLASSIFICATION, STANDARDIZATION AND CERTIFICATION OF PAINT MATERIALS

ON THE BASIS OF THE HARMONIZED SYSTEM

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In monography discusses the modern problems of classification and certification of paints and varnishes, the results of which are aimed at solving an urgent problem - the development of new product codes based on the results of a study of the chemical composition of coatings for use in foreign economic relations; inclusion in the national commodity nomenclature of the republic of newly developed codes of goods according to the HS. As well as the problems of coding of paints and varnishes based on their physicochemical and physic-mechanical indicators for the application of the commodity nomenclature of foreign economic activity.

The monograph contains the characteristics of notes based on the chemical composition of paints and varnishes for additionally entered product codes for existing product codes based on their chemical structure and composition. Judging by the monograph, the scientific provisions and conclusions have practical value, which lies in the fact that they contribute to increasing effective expertise in the customs sphere.

The book consists of 80 pages and consists of an introduction, a review of the literature, chapters, research methods used, own research results, their discussion, conclusions, practical recommendations.

The book is illustrated with 15 tables and 17 figures.

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LIST OF CONVENTIONS, UNITS, SYMBOLS AND TERMS

BCN	-	Brussels Commodity Nomenclature
WCO	-	World Customs Organization
FEA	-	Foreign economic activity
HS	-	Harmonized System
SCC	-	State Customs Committee
CCD	-	Cargo customs declaration
OSCC	-	Office of the State Customs Committee
CIS	-	Commonwealth of Independent States
GOST	-	Interstate standard in the CIS
ISO	-	International Organization for Standardization
Uz DSt	-	National standards of the Republic of Uzbekistan
EU	-	European Union
PV	-	Paints and varnishes
C	-	Coatings
VCR	-	Violations of the customs rule
CNFEA	-	Commodity nomenclature of foreign economic activity
CN	-	Commodity nomenclature
CTL	-	Central Customs Laboratory
CE	-	Customs examination
CCD	-	Cargo customs declaration
S	-	Specifications
CS	-	Customs Service
UC	-	Unified customs tariff
BRI	-	Basic Rules of Interpretation
GS	-	General specifications
OS	-	Organization Standard
GDP	-	Gross Domestic Product
MIP	-	Enterprise Test Methods
JV	-	Joint venture
RD	-	Regulatory documents
IR	-	infrared spectroscopy
Ch/MS	-	chromatography with a mass selective detector
DTA	-	differential thermal analysis

INTRODUCTION

Today, on a global scale, in the production of "paint and varnish products, the first places are occupied by such countries as the Netherlands, the USA, Germany, Japan, Switzerland, Norway, South Korea, India, Mexico and the Russian Federation. The demand for these products per year is 44 million (tons)."[1] It is important to conduct scientific research on the correct classification of identification in determining the quality, grades and prices of paint and varnish materials, and the creation of methods for export-import operations.

In order to ensure full compliance of the developed international nomenclatures with all the requirements of organizations, today research work is being carried out aimed at the correct classification of goods in accordance with the commodity nomenclature of foreign economic activity, at the fulfillment of international obligations in terms of a uniform classification established by the International Convention on Harmonized the system of description and coding of goods and the objectivity of customs statistics.

Since gaining independence in the republic, certain work has been done on the classification of goods in the application of the commodity nomenclature of foreign economic activity of the Republic of Uzbekistan. Relevant is the coding of paints and varnishes based on their physical, chemical and physical and mechanical indicators for the use of the commodity nomenclature of foreign economic activity. The action strategy for the further development of the Republic of Uzbekistan defines the tasks of "liberalization and simplification of expert activities, diversification of the structure and geography of exports, expansion of the export potential of economic sectors and territories"[2]. In this regard, scientific research aimed at classifying paint and varnish products on the basis of the commodity nomenclature of foreign economic activity is of particular importance.

Scientists have developed principles for the identification, classification and certification of goods based on their chemical composition. In particular, recommendations are given on the introduction into practice of identifying some expert-imported goods with the help of customs expertise based on the commodity nomenclature of foreign economic activity.

Currently, scientific work is underway to solve a number of methodological problems related to improving the efficiency of expertise on the quality of paint and varnish products, increasing the competitiveness of newly created paint and varnish products, as well as issues related to their physical and chemical properties. The creation of theoretical foundations and the practical need to solve the above problems make such studies relevant.

CHAPTER I.
GENERAL CHARACTERISTICS OF PAINT AND VARNISH MATERIALS. (LITERATURE REVIEW)

Current state of the chemistry of paint and varnish materials prospects of its development

Paints materials (PM) are one of the most popular types of chemical products used in various industries and in everyday life for corrosion protection and decorative finishing of surfaces made of concrete, brick, metal, plastics, wood, etc. [1, p. 619].

In the modern economy, paints and varnishes are widely used to give products decorative properties and protect the painted surface [2, p. 320].

The created coating on the surface of products must satisfy various requirements both in terms of decorativeness (color, gloss, roughness, etc.) and protection from external influences of the material (steel, concrete, wood, etc.). [3, c. 124].

Paintwork materials (PM) have two main functions: decorative and protective. They protect wood from decay, metal from corrosion, form hard protective films that protect products from the damaging effects of the atmosphere and other influences and extend their service life, and also give them a beautiful appearance. Lacquers are durable. They do not require additional, sophisticated equipment to apply and are easier to renew. Therefore, such coatings are widely used both in everyday life and in all industries, transport and construction [4, c. 416].

The properties of paint and varnish coatings depend not only on the quality of the applied paintwork materials, but also on such factors as the method of preparing the surface for painting, the correct choice and adherence to the technological regime of painting and drying [5, c. 64].

Every year, more and more stringent requirements are imposed on coatings and coatings based on them due to the emergence of new technologies in industry, construction and the formation of modern aesthetic tastes among the consumer [6, p. 104].

The protective and decorative functions of paints materials (PM) have been known for a very long time. Since the appearance of coatings, both they and the methods of their application have been constantly improved. Recently, the range of coatings has changed dramatically: from natural paints, they gradually switched to synthetic-based materials, solvent-based, with a high dry residue, powder, etc. [7, c. 106].

In paint and varnish technology, polymer dispersions are used, which differ not only in the nature of the film former, but also in stabilization

systems, lyophilicity, and film-forming ability. To select a film-forming substance, it is necessary to take into account the main technical characteristics of polymer dispersions and their properties. [4, p. 416].

1.2. Classification of coatings

Paint materials (PM) - a multi-component system that is applied in a liquid or powder state on an initially organized surface and after drying (hardening) creates a stable film tightly adhered to the base. The created film is called a paint coating. Paint and varnish materials are used to preserve metal products from the influence of exogenous destructive factors (humidity, gases, air, etc.), to impart decorative properties to the surface. [8, c. 2].

Paints and varnishes include: varnishes, enamels, paints, primers, putties, as well as drying oils, desiccants, solvents and thinners. In addition, various materials are produced that are auxiliary and auxiliary in nature: pastes, washes, adhesives, fasteners, compounds, mastics, compositions, hardeners and accelerators. The range of paint and varnish products includes many hundreds of brands that differ in composition, properties, purpose, methods of application and drying [9, c. 130].

The basis for the classification and designation of paints and varnishes according to the current standard / GOST 9825-73. Paintwork materials. Terms, definitions and designations / there are three features: type (lacquer, enamel, etc.), chemical composition (according to the type of resin or other film-forming agent) and purpose (according to the operating conditions of coatings) [10, c. 114].

Depending on the chemical composition, paints and varnishes are divided into groups: glyphthalic - GF, pentaphthalic - PF, melamine - ML, urea - MCH, phenolic - FL, phenol-alkyd - FA, epoxy - EP, unsaturated polyester - PE, polyurethane - UR, nitrocellulose - NC, ethyl cellulose - EC, polyacrylic - AK, alkyd and oil-styrene - MS, perchlorovinyl - HV, organosilicon - KO, rubber - KCh, bitumen - BT, oil - MA, rosin - KF [11, c. 55]. All paints and varnishes are divided into groups depending on the main film formers included in their composition (Table 1) [12, p. 45].

Table 1

Symbols of groups of paints and varnishes

Group	Conditional	Group	conditional
glyptal	designation	Alkndno- and oil-styrene	designation
Pentaphthalic	GF	Polyester unsaturated	MS
Melamine	PF	Polyurethane	Pe

Urea	ml	Polyacrylic	UR
Phenolic	martyr	Composite-acrylic	AK
Phenolic Alkyd	FL	Nitrocellulose	AC
Epoxy	F	Ethylcellulose	Nts
Copolymer-vinyl chloride	ep	Fluoroplastic	Oetz
Silicon organic	XC	polyvinyl acetal	FP
Divinyl acetylene	to	bituminous	Vl
Rubber	ext	Rosin	BT
Polyamide	CZK	Oily	KF

Within the groups, paints and varnishes are arranged according to the primary purpose of the material in accordance with GOST 9825-73 (Table 2).

Table 2

Symbols of groups of paints and varnishes by purpose [12, p. 50].

Group	Conditional designation
weather resistant	1
Limited weather resistance (under a canopy and indoors)	2
Waterproof	4
Special (having specific properties)	5
Oil and petrol resistant	6
Chemical resistant	7
heat resistant	8
Electrical insulating	9
Primers	0
Putties	00

The brand of paint and varnish material is composed of the letter designations of the group (Table 1) and several numbers, of which the first indicates the purpose of the material (Table 2), and the rest make up the serial number of registration of the material [13, c. 45].

According to the operating conditions, paints and varnishes are divided into weather-resistant (symbol - 1), limited weather-resistant (2), conservation, water-resistant (4), special (5), oil and petrol resistant (6), chemically resistant (7), heat-resistant (8) and electrically insulating (nine). Primers have the symbol 0, fillers - 00.

Thus, the brand of paint and varnish material consists of the letter designations of the group and several numbers, of which the first indicates

the purpose of the material, and the rest make up the serial number of registration of the material. For example: enamel XB-16 perchlorvinyl enamel, weatherproof, registration number 6; primer GF-031 - glyptal primer, registration number 31.

The basis for the classification and designation of paint coatings according to the current standard GOST 9.032-74. Paint coatings. Classification and designation / two signs are put: the appearance of the surface of the coating and the operating conditions.

In appearance, characterized by color, texture, gloss and workmanship, paint coatings are divided into seven classes: from the highest class I to the lowest class VII.

According to the operating conditions, they are divided into two main groups: resistant to climatic factors and resistant to special environments. Both groups are divided into subgroups similarly to those adopted for paints and varnishes, but with a more detailed breakdown (for example, chemical-resistant ones are divided into those resistant to aggressive gases, vapors and liquids, acids, alkalis, etc.).

In practice, it is also customary to subdivide paint and varnish coatings into groups and according to additional features:

According to the transparency of the films formed - transparent (varnishes, drying oils) and opaque, or pigmented (paints, enamels, primers, putties).

According to the degree of gloss - glossy (G), semi-gloss (IG), semi-matte (PM), matte (M) and deep matte (GM).

According to the drying conditions - cold drying (XD) and hot drying (HS).

According to the method of application - brush, pulverization.

According to the sequence of applying layers and the type of coating - impregnating, priming, intermediate and top coats.

According to the intended purpose (consumer attribute) - automotive, furniture, for agricultural machines, instruments, machine tools, etc. This feature loses its significance, since most paints and varnishes, in addition to the narrow purpose due to them, can find a wider scope.

In terms of environmental properties, water-based paints, powder paints, water-borne enamels and primers that do not contain toxic organic solvents are superior to the vast majority of paints and varnishes containing toxic solvents and some other toxic components [14, c. 176].

To date, there is a huge selection of paints and varnishes of various kinds, types and purposes. Now you can not only buy paint of the right color, but also the right shade with the help of automatic tinting machines or ready-

made tinting pastes. Depending on the purpose and composition, paints and varnishes (LKM) are usually divided into: varnishes, paints, enamels, primers, putties [15, c. 38].

1.3. The study of the physico-chemical properties of paint materials

To guarantee the necessary durability of the painted surface, protective and decorative coatings must comply with the necessary requirements:

- have a smooth surface that does not allow dust and dirt to stick so much;
- the coating film should be moderately flexible, not interfere with the linear expansion of the metal during sharp temperature fluctuations;
- possess the property of counteracting shocks, friction, distortion, damage, scratching;
- do not allow moisture and gases to seep through;
- have reduced aging processes, do not crack;
- do not change and lose color and maintain gloss [3, p. 125].

All of the above requirements largely depend on a number of physical and chemical properties of paints and varnishes.

Properties of liquid coatings.

The role of rheology is very important: when dispersing (wetting) pigments, transporting paints through pipelines and mixing operations.

The main indicator reflecting the properties of paints and varnishes is viscosity.

Depending on the method of application and the conditions for the formation of coatings, paints and varnishes with different viscosities are used.

The viscosity of varnishes and paints, like the viscosity of any liquids, is determined by the internal friction that occurs between their layers when moving under the action of external forces. Nonstructuring (Newtonian) fluids are characterized by the constancy of viscosity in a wide range of stresses and shear rates (Fig. 1, curve 1) [16, p. 212].

For unstructured liquids, e.g. water, organic solvents, the viscosity can be calculated using Newton's equation:

$$o_x = F/S$$

The rheological behavior of paint materials differs significantly from Newtonian fluids. Depending on the physical nature (solution, weakly or strongly filled dispersion) and the degree of manifestation of interacting forces, they are characterized by different types of flow (Fig. 1, curves 2-4, a and b). The most typical for them are plastic and pseudoplastic flows

associated with varying degrees of structure formation in the mass of the material.

Plastic flow is found in many types of paints, which are highly filled systems (oil, printing, offset, artistic, water-dispersion, etc.). It is associated with the phenomenon of thixotropy.

When the structure is established, thixotropic paints are not flowable, but are easily applied to the surface if this structure is destroyed. Such materials are typical Bingham solids. Their flow can be approximately described by the Shvedov-Bingham viscoplastic flow equation [17, p. 103]:

The opposite case of rheological behavior is less typical for paint and varnish compositions - an increase in viscosity with an increase in shear rate, which is characteristic of dilatant systems (Fig. 1, curve 2). It is noted, in particular, in highly filled compositions (thickly ground oil paints and fillers).

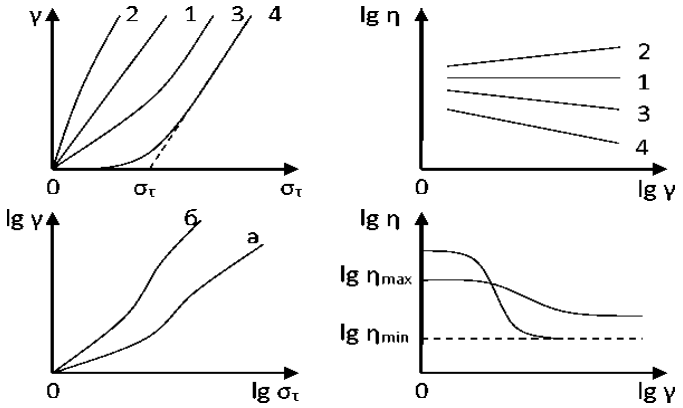
In practical conditions, when obtaining coatings, there is often an interest in regulating the viscosity of paints and varnishes.

This is achieved by using appropriate solvents, thinners, plasticizers or by heating.

Figure 1.

Fluid flow curves

A - limiting cases of flow; B - flow of real liquid paints and polymer melts;
1 - Newtonian flow; 2 - dilatant flow; 3 - pseudoplastic flow; 4 - plastic flow;
a - highly structured system; b - semi-structured system



Varnishes and paints with poorly selected viscosity are difficult to apply, and surface defects often occur. It is necessary in one way or another to strictly control the viscosity of paints and varnishes before application.

The most convenient devices for determining the rheological properties of liquid paints are rotational viscometers, which can work according to the CR principle (ControlledRate) - the shear rate is set and the shear stress is measured - or according to the CS principle (ControlledStress) - the shear stress is set and the shear rate is measured.

To assess the viscosity of non-structuring materials with a known assumption, viscometers based on the principles of flow and a falling ball, for example, a Geppler viscometer, etc., can be used. Express methods for determining the so-called conditional viscosity using viscometers (funnel VZ- 246 etc.). Definitions are carried out according to GOST 8420-74 or ISO 2431 [18, c. 189].

The viscosity of melts of powder paints is determined by capillary viscometers AKV-2, KVPD and rotational RV-7 or conditionally by the length of the trace formed when a drop of melt flows from the surface of a glass plate set at an angle of 60 ° to the horizon. For comparative characteristics of the same type of polymer paints, such as polyethylene, use a device for determining the melt flow rate (DMF).

Surface tension largely determines such important technological properties of liquid varnishes, paints and film-forming melts as the ability to spray and wet the substrate, the rate of coalescence of applied liquid drops, and their spreading on the surface. The work expended on creating a new surface during the dispersion (spraying) of paints and varnishes and released during the fusion of dispersed particles (film formation) is proportional to their surface tension.

The surface tension of paints and varnishes as multicomponent systems is determined by the surface activity of their constituent liquid components. The surface tension of varnishes and paints, which are solutions of polymers, is largely determined by the nature of the solvents.

To reduce surface tension, alcohols are introduced into the composition of water-borne paints, and surfactants are added to water-dispersion paints. The surface tension of melts is determined solely by the chemical nature of the film former.

The surface tension of paints is determined by methods generally accepted for flowing liquids, for example, by tearing off a drop, raising a liquid in a capillary, and squeezing an air bubble. In the case of melts, indirect methods are more often used: by wetting the film with liquids, swelling in solvents, cohesive energy density, zero creep, etc. [19, c. 67]

CONCLUSIONS ON THE FIRST CHAPTER

Paint materials (PM) - a multicomponent system that is applied in a liquid or powder state on a previously prepared surface and after drying (hardening) forms a strong, well-adhered film to the base.

The resulting film is called a paint coating. Coating materials are used to protect metal, as well as other types of products from the influence of external harmful factors (moisture, gases, air, etc.), to give the surface decorative properties.

Paints and varnishes include: varnishes, enamels, paints, primers, putties, as well as drying oils, desiccants, solvents and thinners. In addition, various materials are produced that are auxiliary and auxiliary in nature: pastes, washes, adhesives, fasteners, compounds, mastics, compositions, hardeners and accelerators. The range of paint and varnish products includes many hundreds of brands that differ in composition, properties, purpose, methods of application and drying.

The properties of paint and varnish coatings depend not only on the quality of the applied coatings, but also on such factors as the method of preparing the surface for painting, the correct choice and adherence to the technological regime of painting and drying.

The properties of paints and varnishes (PV) can be divided into physical-chemical, chemical and painting-technical. Physico-chemical properties of coatings imply viscosity, hiding power, density, hardening (drying) rate of the film.

The chemical properties of coatings include the percentage of constituent substances, the amount of fillers, film-forming, water-soluble salts, solvents, etc.

CHAPTER II.
STUDY OF THE PROBLEM IN DETERMINATION OF CODES OF GOODS BY TN VED IN THE CUSTOMS EXPERTISE.

Expertise (from Latin espertus - experienced) is the solution of issues, the study of which requires special knowledge with the provision of a reasoned opinion. Goods can be subjected to various types of examination: commodity, technological, economic, patent-licensing, judicial and legal. The examination is entrusted to experts. An expert is a knowledgeable, neutral person who is independent of interested parties. When conducting an examination, experts must comply with the principles of objectivity, competence, independence, a systematic approach, efficiency, safety for consumers and the environment [20, c. 471].

Expertise, as a special type of activity, consists of the following components:

1) The first component is the object of examination. The object of the examination is the consumer properties of the goods, which are manifested during their interaction with the subject, i.e. human consumer in the process of consuming goods.

2) The second component is criteria. The criteria used in the analysis and evaluation of consumer properties of goods are divided into general and specific[20, p. 478].

General criteria are value norms and ideas that have developed in society, guided by which experts judge the consumer properties of a product. Specific criteria are real requirements for the quality of goods, which are fixed in the regulatory and technical documentation, as well as a set of basic values of indicators characterizing the quality of goods.

Identification is important in commercial activities. According to a number of authors [21, p. 286; 22, p. 240], such an examination is often carried out before concluding contracts for the supply of goods. In this case, the results of the examination have a decisive influence on the decision to conclude a contract. The correctness of the assortment policy depends on the correct identification of market requirements and the choice of goods that meet these requirements.

The authors [23, p. 20] show that in expert activity identification is the first and one of the most important stages in quality control and quality assessment of new products. The absence of this stage in the quality assessment can also lead to incorrect results of the assessment itself. Identification is subjected to prototypes of goods, individual units of goods in packaging, sometimes used and commercial lots. In the event that a used

product is presented for ex-za, the expert may request from the store an additional copy of the new product in packaging from the same batch for its identification, if possible, a third sample from the manufacturer.

Identification of goods differs not only by scope, but also by type. Depending on the objectives of the examination, the following types of identification are distinguished: assortment, quality, batch and quantitative [24, c. 43].

Goods crossing the customs border are subject to customs clearance and customs control. In the course of customs control, a customs examination may be appointed in order to establish the country of origin, raw material composition, manufacturing method, cost, etc. A specialist with commodity knowledge can largely contribute to ensuring effective counteraction to violations of customs rules and crimes in the customs sphere. Customs expertise, in addition, is one of the barriers to protect the country's consumer market from the import of substandard, harmful, dangerous, counterfeit and counterfeit goods.

Only a highly qualified specialist in the field of commodity science can carry out expert activities. It is also important for a practically working customs officer to be able to distinguish goods by completeness, degree of readiness for use, highlight their estimated indicators, know the mandatory requirements for them and the criteria for customs assessment.

The customs inspector controls the security of imported goods. In addition, the inspector must know the requirements for the goods under the contract of sale, transportation, insurance. At these stages of circulation, materials and products manifest themselves in different ways, and these properties are just as important for participants in foreign economic activity as those that will appear in the final consumer.

2.1. The role and place of customs examination in determining the codes of goods according to the CN FEA.

Depending on the objectives of the examination, examiners may consider one or more different criteria. The formation of market relations and the creation of a competitive environment in the market caused the need for a deeper study of goods as an object of commercial activity. Therefore, at present, commodity expertise is becoming important [20, p. 17].

In trade practice, quite often there is a situation when the available information is insufficient or partially unreliable to make any decisions regarding specific goods. Organoleptic, measurement and other methods (for example, organoleptic evaluation of goods included in the sample) may

provide incomplete and sometimes random information (due to the randomness of sampling in the sample). It is impossible to postpone the decision until the appearance of accurate calculation methods. Then there is no other alternative than the use of expert methods.

Expert methods are based on the adoption of heuristic decisions, which are based on the knowledge and experience accumulated by experts in a particular field in the past. In this heuristic methods differ from computational methods based on solving formalized problems.

Like other methods used in commodity examination, expert methods have certain advantages and disadvantages.

The advantage of these methods is that they allow decisions to be made when more objective methods are unacceptable. Other advantages include their reproducibility. The scope of these methods is not only the assessment of the quality of goods (consumer and industrial purposes), but also the study of technological cycle operations, management decision-making, and forecasting.

These areas of application of the methods are directly related to commodity expertise. So, in order to make a decision about the quality of a product or its quantitative and qualitative characteristics, an expert needs to investigate individual operations or a set of operations of production technology, packaging, storage, preparation for sale and sale. When drawing up a conclusion with recommendations regarding the examined goods, the expert necessarily makes certain managerial decisions (recommendations on the release from production and / or for sale or on sending for industrial processing or destruction, etc.). [20, c. 471].

A feature of the modern paint and varnish market is a wide variety of assortment, the emergence of many new types of goods with different properties. This trend in the field of coatings production is explained by the creation of modern technologies and new raw materials, which allow the production of coatings with improved properties. [25, c. 49]. Since the coatings market is currently quite saturated, it is characterized by competition. However, regional markets have their own characteristics. Formation processes take place in different ways, their assortment differs, which is predetermined by the territorial location of national enterprises, channels for the supply of imported products, economic, climatic and other features of consumption.

Therefore, at present, research on the paintwork materials market and the development of new paintwork code numbers are relevant, since they give the most significant practical results.

The need for theoretical research and practical application of the above questions explains the choice of the topic of this research. This was the reason for conducting research in the field of theoretical and practical substantiation of methods for assessing the quality of a number of paintwork materials, determining their competitiveness, conducting research and developing new codes for paintwork materials, as well as examination issues in order to identify falsification of the main types of paintwork materials.

Each product has a certain set of characteristics and properties that distinguish it from many others, often very similar.

It is possible to establish identity (identity) or vice versa - the difference between a particular product and others, by carrying out identification or "establishing a match". This is how the explanatory dictionary of the Russian language interprets the term “identify - establish matches”, and “identical-identical, completely matching” [26, p. 38].

The author [27, p. 27] shows that identification as an identification procedure is widely used in various sciences and fields of activity. In commodity science, the need to identify goods arose in connection with the transition of the economy of our country to market relations. Negative processes, such as deceit, falsification, etc., which always accompany the process of forming new relationships, have determined the demand for identification in commodity science is a product, as well as raw materials, services, consumer requirements, information about the product.

In this case, the description means information about the product, which may be contained in the labeling, brochures, shipping documents, etc. Identification of falsification and confirmation of the authenticity of a specific name (type) of goods.

The main tasks aimed at achieving these goals at the present stage are the following:

- definition of basic concepts, terms, procedure for identification;
- determination of criteria and indicators suitable for the purposes of identifying homogeneous groups of goods, their introduction into standards and rules for certification.

Development of new methods for identifying goods, including express methods that allow you to quickly and with a sufficiently high degree of reliability of identification of goods.

Identification as an initial stage is necessary for certification, examination, evaluation activities, quality control and supervision.

However, at present, in the standards of general technical requirements, identification indicators are not singled out, and many of the

indicators provided for in them do not meet the requirements that identification indicators must meet.

Nikolaeva M.A. for the purposes of identification it is supposed to apply two groups of methods: organoleptic and measuring [28, p. 72-74]. In GOST R 51293-99 [29, p. 2], for the purposes of identification, it is recommended to use such methods as analytical (according to documentation), organoleptic (visual and sampling), and measuring. practical experience in carrying out work on identification made it possible to identify a number of methods that can be used depending on the purposes of identification and the specifics of products, for example, express methods.

Thus, all of these methods can be used for identification, however, the practice of their application is not systematized and is currently under search. It should be pointed out that the processing and attraction of new methods, in turn, expands the range of identification indicators. this will allow the development of new standards for the identification of goods [24, c. 62].

Identification is an obligatory stage of work during certification, and its characteristics and features are described in certification systems for homogeneous product groups.

A feature of the identification for the purposes of certification is the control of the sale of products that are dangerous to life, human health, property of legal entities and individuals, the environment; ensuring the competitiveness of products in the world market; creating conditions for the participation of domestic and joint ventures, entrepreneurs in international economic, scientific and technical cooperation and international trade; reduction of costs for its implementation, and consequently, for certification. therefore, the number of identification indicators is reduced and, if possible, can be limited to organoleptic indicators only. [30, c. 3].

Customs expertise is the organization and conduct of research carried out by customs experts and (or) other experts using special and (or) scientific knowledge in order to solve problems in the field of customs regulation [31, c. 56].

Customs examination is regulated by the legislation of the member states of the customs union.

A customs examination is carried out by an appointed expert, according to certain rules, and ends with the execution of a written opinion of the expert in the established form.

The examination performed in the forensic divisions of the customs service (TS) at the direction of the customs authorities solves the following tasks [32, c. 74]:

- obtain information about the true structure of commodity flows in international trade;

- to discover hidden patterns of distortion of information about goods (in the volume of commodity flows);

- identify criminally dangerous, counterfeit goods, as well as the properties of goods that are most susceptible to false declaration, non-declaration and other types of falsification.

In publications on customs law, little attention is paid to the issues of customs classification, although they are the key ones in the field of customs. This is due to the fact that the legal properties of the classification of goods for customs purposes are closely intertwined with the commodity properties of property moved across the customs border, and the technological properties of object classification operations [33, c. 15].

Several customs classifiers are currently operating on the territory of the CIS, in particular the CIS, EurAsEC, CU and Russia. However, in the Unified Customs Tariff (UCT) of the Customs Union, the unified Customs Code of the Customs Union is used as a customs classifier. Thus, a legally significant customs classification of goods is carried out on the basis of a regulatory legal act – the FEA CN [33, p. 16].

In scientific publications, it is sometimes considered that the classification of goods ends with the coding of the goods (the definition of the commodity code according to the HS code), and therefore it is the commodity code according to the HS code that is a legally significant result. This statement can be considered incorrect, since in addition to customs tariff and non-tariff purposes, statistical purposes are pursued in the HS, and the HS codes of goods are used for these purposes [34, p. 164].

The classification code of goods in accordance with the HS is one of the most common tools used by participants in foreign economic activity to minimize costs and expenses. This code, which refers to the information to be indicated in column 33 of the goods declaration, is of great importance, since it determines the amount of import (export) customs duty. In addition, in the lists of goods approved at the legislative level, in respect of which prohibitions and restrictions are established or tax benefits and exemptions are determined, the goods are determined exclusively by the HS code, and the name of the goods is given only for ease of use. The use of some lists involves the use of both the product code and its name. HS codes are also used in the management of customs statistics [35, p. 271].

Modern classifications used in the world State regulation of hundreds of thousands of items that turn around on the international market of goods requires their systematization. The most effective way to solve this

problem is the distribution (classification) of the commodity mass into groups of homogeneous goods using the "coding" technique, which results in classification systems and commodity nomenclatures [36, p. 154].

Coding of goods is a technical technique that allows you to express the classified object (product) in the form of a group of signs according to the rules established by the classification system. This makes it possible to present information in a form convenient for collection and transmission, to adapt it to computer processing, as well as to provide search, sorting and aggregation of specific data.

The middle of the XIX century was characterized by a significant development of industry, which led to the intensification of international trade, there was a need to systematize statistical information about the goods being moved and the development of the economies of the countries participating in foreign economic activity.

At the same time, at that time, each state independently carried out accounting of commodity flows, and national classifiers differed significantly among themselves. This was the reason for the lack of a uniform understanding of published statistics from different countries. Some national tariffs were developed only in the most general form; others were originally drawn up on some methodological basis, which was subsequently repeatedly modified due to national protectionist measures, international commercial or multilateral tariff agreements.

In the future, as the number of different duty rates or exemptions from its payment increased, it became necessary to create a classification of goods that would be based on the criteria of the substance or nature of the goods, and not on its duty status. At the same time, a certain product was identified for payment of the duty within the framework of the corresponding classification system. Thus, the very natural development of trade and economic ties has put forward the need to develop and apply a standardized customs nomenclature of goods.

2.2. Statistical analysis of paintwork materials according to the Commodity Nomenclature of Foreign Economic Activity of the Republic of Uzbekistan.

International statistics received intensive development in the middle of the XIX century, when international economic relations reached a high level of development. The main objectives of international statistics at this stage were to achieve comparability of national data and the development of international statistical standards (classifications, indicator systems,

methodological provisions, etc.), as well as the collection, development and publication of comprehensive statistical data on countries and world totals based on international recommendations.

Only 60 years after the 1st International Congress, the first uniform statistical nomenclature of goods was adopted, established by the Second International Conference on Commercial Statistics.

Under the state regulation of foreign economic activity:

– HS is the basis for the systematization of customs duty rates applied to goods transported across the customs border in the system of measures of tariff regulation of foreign trade in goods;

– codes of goods in accordance with the HS are used in the preparation of documents establishing the procedure for determining certain concepts for the application of customs tariffs;

– classification codes of goods in accordance with the HS are used in the development, introduction and implementation of quantitative and other prohibitions and restrictions of an economic nature in the system of measures of non-tariff regulation of foreign trade in goods;

– in customs, the HS is a tool for implementing control functions and ensuring proper classification of goods;

– HS is used in conducting international trade negotiations, thereby ensuring the accuracy and comparability of data on goods;

– HS makes it possible to simplify the collection, comparison and analysis of statistical data, especially related to international trade in the conduct of customs statistics of foreign trade.

Group 32 "Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other coloring substances; paints and varnishes; putties and other mastics; printing ink, ink, ink" includes an extensive range of products used for tanning, surface leveling and coloring. However, some goods similar in name to the goods of the group 32 of the Nomenclature are not classified in it. For example: asphalt mastics or other bitumen mastics (heading 2715).

The commodity items of group 32 are formed taking into account the type (name) of the product, its origin, composition, in some cases – the form, scope of use, method of receipt [36, p. 320]. Example 3207 "Ready-made pigments, ready-made glass silencers and ready-made paints, vitreous enamels and glazes, angobs (slips), liquid glosses and similar preparations used in the production of ceramics, enamel or glass; vitreous frit and other glass in powder, granules or flakes."

In addition, trade names of paint and varnish products also contain information useful for classification according to HS, since they designate

groups of homogeneous goods distinguished by the type of film-forming substance and the type of medium in which this film-forming substance is dispersed or dissolved [37, p. 35]. For example, paint and varnish products of heading 3208 have trade names such as "alkyd enamel", "alkyd-urethane enamel", "epoxy paint", "alkyd gloss enamel", "lacquer enamel", etc. Paint and varnish products of heading 3209 have trade names such as "latex paint", "acrylic paint", "water-emulsion paint", "water-dispersion paint", "textured paint", etc.

Paint and varnish products of heading 3210 have such trade names as "oil paint", "oil enamel paint", "oil varnish", "black varnish", "glue paint", etc. [38, p. 135].

In scientific publications, it is sometimes considered that the classification of goods ends with the coding of the goods (the definition of the commodity code according to the HS code), and therefore it is the commodity code according to the HS code that is a legally significant result. This statement can be considered incorrect, since in addition to customs tariff and non-tariff purposes, statistical purposes are pursued in the HS, and the HS codes of goods are used for these purposes [39, p. 512].

In many cases, an organoleptic and mental analysis of either the product itself (sample) or its documentary display is sufficient to make a decision on the goods for customs purposes. However, since these analyses have legal significance, they must be carried out in accordance with the procedures (rules, regulations) and methods.

The lack of national detail in the Commodity Nomenclature of Foreign Economic Activity (HS) makes it difficult to work on the classification and coding of goods.

Relations between customs authorities representing the State at the border with entities engaged in foreign trade operations related to the collection of customs duties and other taxes for the movement of goods and vehicles across the customs border are economic relations of a special kind.

They are formed in violation of the market principle of equivalent exchange: part of the income of economic entities is withdrawn in the form of customs payments and is converted into state revenues. The basis of such an act is the power of the customs authorities and their desire to have a regulatory impact on the processes associated with the export and import of goods [40, c. 5].

Import quotas have a twofold effect on the regional market situation: on the one hand, the establishment of import quotas for certain goods guarantees against a further increase in the cost of importing goods and an increase in prices for them, and it can cause a monopolization of the domestic

market, on the other. Non-measurable quoting of imports of goods will cost the country more than the establishment of an equivalent customs tariff [40, c. 6].

The largest segment of the coatings market is architectural paints. The volume of this segment is directly related to the volume of the construction and finishing works market. Today, the main goal of architectural paint manufacturers is to reduce the amount of harmful fumes by using fewer solvents.

The second largest segment is industrial paints, which are used primarily as protective coatings: anti-corrosion, frost-resistant, special coatings for woodworking and others; this also includes road marking paints. This segment has been growing most steadily in recent years.

The third large segment is powder paints used for painting surfaces in industrial conditions. Mostly used for painting household appliances, metal pipes.

In the context of declining revenue and profitability of paint and varnish manufacturers, it seems a logical step to reduce the cost of production, including through the use of cheaper additives. For this reason, many manufacturers have been switching to Chinese-made additives in the last two or three years. Additives from Korea and India are also used to a lesser extent [41, p. 3].

Despite the difficult economic conditions, market players note only a slight decrease in the market growth rate, not even its stagnation. However, different segments have different development trends. For example, the road marking paint segment directly depends on the budget for road construction. In 2015, the budget for road construction was cut by 20%, which led to a decrease in sales in the segment by the same amount [42, p. 10].

The volumes of construction and mechanical engineering are also decreasing, which affects the segment of industrial coatings used for painting metal structures and various devices, machine tools, and so on. Investment activity in these areas is declining. It is also possible to reduce volumes in the segment of powder paints, since in order to save money, many manufacturers switch to liquid coatings [41, p. 6].

The segment of household paints shows a shift in demand from the average towards the budget price segment while maintaining stable sales volumes in real terms; high price segments are more stable. The segment of automotive coatings also demonstrates stability. Cars continue to be repaired, therefore, demand remains.

Over the past few years, the global chemical market, including paint and varnish, continues to consolidate. Moreover, the value of transactions is

growing much faster than their number. Thus, from 2016 to 2020, the number of mergers and acquisitions increased by 36% (from 450 transactions to 612), and their total value increased by almost 10 times (from $15.6 billion to $145.8 billion) [43, p. 10].

The coatings industry is one of the most heavily regulated industries in the world, so manufacturers over the past 40 years have been forced to use technologies with low levels of solvents and solvents and will continue to do so [112, p. 9]. The number of coating manufacturers is large, but most of them are regional manufacturers, with only 10 or more large multinational companies. Most large transnational corporations have expanded their activities in fast-growing regions such as China [43, p. 12].

The most notable trend has been consolidation, especially among the largest manufacturers. After a decade of steady growth, production in Asia is 50-55% of the total. Production and consumption are almost the same in every country, as trade is limited to a relatively small amount of a high-value product. Generally, coverages grow in tandem with the economy, so growth will continue to focus on the developing world. The following pie chart (figure 2) shows the world production of paints and coatings:

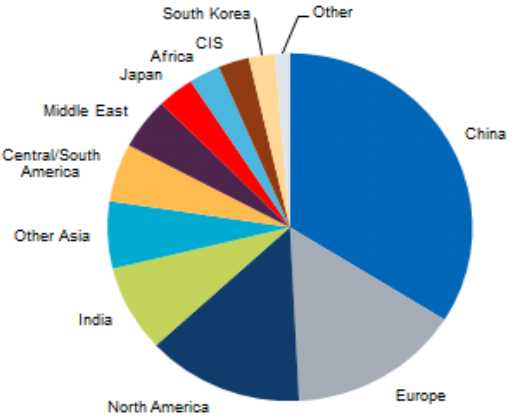


Figure 2. Worldwide paint and varnish production for 2020.

A major change that has taken place in the coatings industry over the past 40 years has been the adoption of new coating technologies. These new coating technologies include waterborne (thermoset emulsions, colloidal dispersions, waterborne) coatings, high solids coatings, two component systems, powder coatings and radiation cured coatings. Coatings provide two

main functions - decoration and protection - that are of significant economic importance.

Approximately 45% of coatings produced worldwide are used to decorate and protect new construction and to maintain existing structures, including homes and apartments, public buildings, factories and factories (called "architectural" or "decorative" coatings) An additional 40% of coatings are used to decorate and/or protect industrial products (referred to as "product finishing").

Without coatings, the life of products can be greatly reduced and many products will not even sell. Most of the remaining coatings, referred to as "special purpose", are used for a variety of applications such as road paints, vehicle refinishing, high performance industrial plant and equipment coatings, and marine and ship protection. They are usually applied outdoors in ambient conditions.

Coverages in the United States, Western Europe, and Japan are mature and generally correlate with the health of the economy, especially housing, construction, and transportation. Overall demand from 2017 to 2021 increased at an annual average rate of 3% in the United States and 2% in Western Europe. However, in Japan, coatings consumption experienced relatively slow growth during this period as a result of lack of growth in major markets such as automotive OEMs, machinery and appliances.

In emerging markets, coverages are growing much faster. The best growth prospects are in China (6-7% CAGR in the near future), India (6.6%), Iran (4-5%), Poland (4%) and Saudi Arabia (3-4%). Overall global growth should be around 4% per year. Based on value, growth is likely to be even higher as a result of increased production of relatively high value coatings.

Most major multilayer coating manufacturers, including PPG, Akzo Nobel, Kansai Paint, Nippon Paint, BASF, Axalta (formerly DuPont Automotive Coatings), Chugoku Marine Paint, Valspar, Sherwin-Williams and Hempel, have production facilities in China. Multinational manufacturers should gain an even greater presence in the developing world as living standards rise and per capita consumption of coatings rises.

Demand in Asia continues to grow faster than in other regions of the world, and the region currently accounts for 50-55% of global consumption on a volume basis. Over the next five years, air pollution regulations will continue to be the driving force behind the introduction of new coating technologies.

Despite the relatively slow demand growth expected for coatings, waterborne and high grade coatings, powders, UV curing agents and two component systems appear to have good growth prospects. In general,

environmental regulations are becoming more stringent in all regions to limit emissions of volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) not only in industrialized countries but also in developing countries such as China.

Accounting for almost 50% of consumption, this sector is of great importance for the coatings industry. Especially the demand for paint for the house and walls has a positive effect on the construction of residential buildings. Large-scale projects in the field of industrial construction and infrastructure will further contribute to the positive development of paints and varnishes in many countries. In addition to traditional interior and exterior paints, the construction sector is increasingly crafting innovative products that have a variety of uses.

Due to the multitude of requirements in many applications, sales of paints and varnishes used for industrial products are highly dependent on macroeconomic developments. In the coming years, we expect that global demand for paints and varnishes in this segment will increase by an average of 2.1% per year. Ceresana market researchers expect the Asia Pacific region to continue to expand its leading position in the global market over the next eight years due to global developments. Already, about 40% of global income is generated in this region.

Another important area of application is transport, i.e. the painting of cars, trucks, buses, aircraft, railway vehicles and ships. Ceresana analysts expect this segment to show the highest growth and explain the need for paints and varnishes over 5 million tons until 2022. Thus, the serial coverage of road vehicles will increase significantly by 3.2% p.a. and varnishing for repair, as well as a protective coating for ships, will develop less dynamically.

2.3. Export-import of coatings for - 2012-2017

To date, it is impossible to imagine a single large, developed state that would not participate in foreign trade. Properly built foreign trade provides the state with a dominant position in the world market

Differentiation of import customs duty rates implies a deeper specification of the Commodity Nomenclature for Foreign Economic Activity (CN FEA), which takes into account the entire modern existing range of the market. [45, c. 172].

In world practice, when forming national customs nomenclatures and tariffs, the assortment of goods produced in these countries (national assortment) is taken into account. At the same time, any customs

nomenclature reflects the structure of world trade, and not just the national structure [45, p. 172].

Foreign trade activity is an entrepreneurial activity in the field of international exchange of goods, works, services, information, results of intellectual activity, including exclusive rights to them (intellectual property). Foreign trade activities are mainly used to meet material needs.

World export

Foreign trade is carried out on the basis of export and import of goods. Export of goods is the export of goods from the customs territory without the obligation to re-import. Re-export goods include goods that were previously imported into the customs territory of the Customs Union and then exported from this territory without payment of customs duties, taxes and without the use of economic and political measures [46, p. 25].

If we consider the foreign trade activities of individual states, the priority is the export of goods and services, since it is one of the sources of replenishment of the state budget, which also affects the development of the state economy. In turn, imports create competition for domestic producers, and the purchase of imports is carried out in the presence of foreign currency, however, almost no country in the world can do without imports.

Imports are calculated on the basis of CIF prices, i.e. includes cost, insurance, freight (fee for the carriage of goods by sea), and therefore the value of world exports will always be less than the value of imports by the amount of the insurance premium, the ship's freight for transportation, and other port charges.

World exporters of paint and varnish products in 2012-2017 were 134 countries. Of these, the top ten countries together export almost 75% of world exports, the remaining 124 countries account for only 25%. The undisputed leader in the export of paints and varnishes is Germany, occupying more than a quarter of the world market, US exports are half as much (13.2%).

In 2016, global demand for coatings amounted to 43 billion (l) worth 144 billion US dollars. Of these, Germany exported 255.4 thousand tons, followed by other exporters, the first of which is the United States with an export volume of 98 thousand tons.

Figure 3. The structure of world exports of products according to the code 320910 "Paints and varnishes (including enamels and varnishes) made on the basis of acrylic and vinyl polymers"
Source: COMTRADE World Trade Statistics [42].

World import

Import is the import of goods, works, services, results of intellectual activity into the customs territory of the country from abroad without obligations for re-export [46, p. 21]. Re-imported goods include goods that were previously exported from the customs territory and then imported into its territory without payment of customs duties, taxes and without application of prohibitions and restrictions of an economic nature to the goods.

It is important to note that import is an important object of regulation by the state, since it is he who affects the development of the national economy of the country. Import regulation can be carried out with the help of trade policy: specific and ad valorem duties, quotas, export restrictions, establishment of minimum import prices, technical barriers.

Import restrictions are usually introduced for protectionist purposes (to protect national producers from competition). Import taxes can also be set for fiscal purposes (replenishment of the state budget).

In 2017, world imports of paints and varnishes under code 320910 amounted to 2244.3 million US dollars. The products were imported by 210 countries of the world. Canada is the largest importer of paint products under code 320910. Its share in the world market is 10%, France occupies 7% of world imports. 3-5% of world imports are occupied by Belgium, Great

Britain, Germany, Poland, Russia, Austria, Italy, Denmark. The share of other countries in world imports is less than 3 %

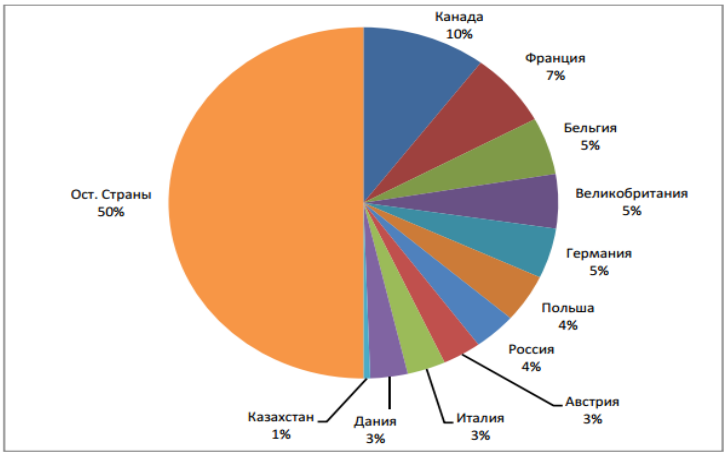


Figure 4. The structure of world imports of products according to the code 320910 "Paints and varnishes (including enamels and varnishes) made on the basis of acrylic and vinyl polymers" [42].

The top ten countries import half of the world's imports.

The remaining 200 countries import the other half. Russian import is 77.8 million US dollars, or 4% share of world imports. Kyrgyzstan and Uzbekistan import, respectively, 2.3 and 2.2 million US dollars, or 0.1% share of world imports.

2.3.1. Trends in the world market of paints and varnishes

The production of paint and varnish products is one of the significant segments of the chemical industry. The world produces approximately 25 million tons of paints and varnishes (PM) per year. In the early 2000s, before the onset of the global economic crisis, the global paint and varnish market expanded in physical volume by an average of 3.5% per year, at present, the corresponding average indicator has decreased to 3% per year.

Such low growth rates are mainly due to the high degree of saturation of the markets of developed countries. According to the British company IRL, the largest paint and varnish manufacturers in the world are BASF Group, Du Pont, Akzo Nobel, ICI Group, PPG Industries, etc.

Demand for coatings is growing most rapidly in Asian countries (China, Thailand, Indonesia, India and Taiwan); Eastern European countries, especially in Russia, Hungary and the Baltic countries. The increase in demand in these countries is mainly due to the expansion of the construction, automotive and electronics industries. There has been a long-term trend in industrialized countries to replace chemical solvent-based paints with water-based ones.

Thus, the development of the paint and varnish market at present and in the future is due to the growth in demand for traditional products in developing countries and the development of new forms of special quality products in industrialized countries.

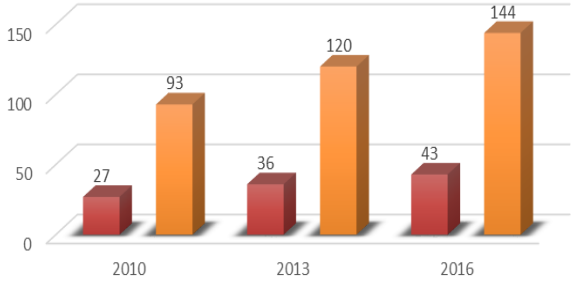
The largest consumers of construction paints are the rapidly developing countries of the Asia-Pacific region and China, while the countries of Europe, the USA and Japan consume industrial coatings more. The annual consumption of building paints in the world in the total volume of consumed paint and varnish products is 46%. The rest is paintwork materials for mechanical engineering, household purposes, protective, furniture, automotive, repair, for canning containers and others.

In recent years, the development of paint and varnish production was influenced by various factors, among which the following can be distinguished:

- Rise in the cost of raw materials and materials for production, like all manufacturers of chemical products;
- Increase in prices for plastic containers and packaging, which is also a consequence of the rise in the cost of raw materials for the chemical industry;
- Prolonged tense situation with the supply of titanium dioxide, which also entails a price increase policy;

At the same time, the manufacturers of paints and varnishes themselves were limited in their ability to raise prices for their products due to a decrease in consumer demand. Thus, in the United States, according to the statistical office of the Ministry of Labor of the country, over the past two years, the producer price index of finished paints has increased by 7.3%, and in the same period, the producer price index of paint components (raw materials) has increased by 13.6%.

In 2010, global demand for coatings amounted to 27 billion (liters) per year, worth $93 billion. In 2013, global demand for coatings amounted to 36 billion (l.) per year, worth 120 billion US dollars. And in 2016, the global demand for coatings amounted to 43 billion (l.) in the amount of 144 billion US dollars.



Red-volume billion (l) Orange -price billion dollars

Figure 5. Global demand for coatings for 2010-2016

Currently, in the product segment of the paint and varnish industry, a significant share falls on imports, in particular, these are paints and enamels produced in Russia, Germany, Turkey, and the United Arab Emirates. The capacity of the Uzbek market is quite large. The construction industry is one of the most promising and dynamically developing areas of the Uzbek economy.

In turn, the paint and varnish industry, which is part of the chemical complex, has a significant production, raw material and scientific and technical potential and is part of one of the basic sectors of the economy of the Republic of Uzbekistan.

The share of chemical products in the gross domestic product (GDP) of the country is 5%, in industrial products -12%. The number of people employed in the industry is about 45 thousand people. Enterprises producing paint and varnish products are equipped with high-tech equipment and produce products of quality that meets international standards.

Trade in paint and varnish products of Uzbekistan with the rest of the world has a pronounced negative balance, i.e. Uzbekistan is a net importer of these products. The import of Uzbekistan occupies a 0.1% share in the world volume; in the rank of world importers, Uzbekistan ranks 88th.

Table 3

The volume of imported coatings by Uzbekistan for 2012-2017

PM	2012	2013	2014	2015	2016	2017
Unit: thousand dollars USA	93,471	119,719	120,179	86,601	88,136	61,796

When analyzing imports of paint and varnish materials in Uzbekistan, it is necessary to consider the dynamics of imports in value terms (million US dollars) using statistical data. For clarity, we will present the data in graphical form, namely, we will display Figure 5 on the histogram, since it is this type of diagram that is most appropriate for the indicators of the same name.

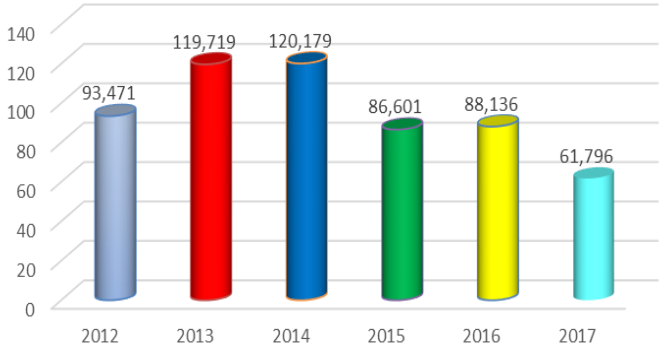


Figure 5. The volume of imported coatings by Uzbekistan for 2012-2017

After analyzing the diagram, it can be seen that the import of coatings in 2013 compared to 2012 increased by 26.248 million US dollars. And in 2015, compared to 2014, it decreased by 33.578 million US dollars. The main supplier of paint and varnish products to the Uzbek market is Turkey, its share in Uzbekistan's imports is 53.6%, or 1.4 thousand tons in the amount of 1.2 million US dollars.

Approximately equal shares, 15.1 and 13.6, respectively, in the volume of Uzbekistan's imports are occupied by Germany and Russia. The remaining share is distributed among suppliers from Azerbaijan, Kyrgyzstan, Italy, the Netherlands, Finland and Switzerland. Kazakhstan does not supply paint and varnish products to Uzbekistan.

Table 4

The volume of exported coatings by Uzbekistan for 2012-2017

PM	2012	2013	2014	2015	2016	2017
Unit: thousand dollars USA	1,079	1,093	1,119	695	892	794,5

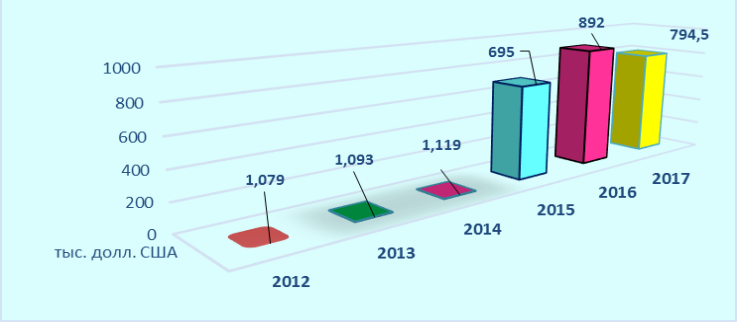


Figure 6. Diagram of paint and varnish exports for 2012-2016

Turkey, Germany, the Netherlands have good competitive opportunities. Their export to the world is growing faster than export to Uzbekistan. Consequently, in the presence of the necessary demand, they have the potential to increase their exports to Uzbekistan.

Exports to the world of other exporters - Russia, Finland, Kyrgyzstan, Italy - are growing more slowly than their exports to Uzbekistan, which indicates a gradual decrease in their share in the Uzbek market.

Thus, the main competitors of Kazakh exporters of paint and varnish products in the Uzbek market can be Turkey, Germany and the Netherlands [41].

Conditional cost of a unit of production in the market of Uzbekistan

The average market value of one ton of imported paints and varnishes in Uzbekistan is 1,591 US dollars.

The closest to the average level is the conditional cost of a unit of Turkish products. This is primarily due to the fact that Turkey is the largest supplier of paint and varnish products to Uzbekistan, its market share in Uzbekistan is 53.4%.

Imports from Russia have the highest notional value ($9,677 per ton). First, it should be noted that the COMTRADE database for Uzbekistan contains “mirror” statistics, i.e. imports of Uzbekistan from partner countries data on exports of partner countries to Uzbekistan.

Russia's export to Uzbekistan was carried out at a notional cost of $9,766 per ton. In Russian exports, this notional value is also the highest. There is no apparent reason for this level of notional value other than the possible presence of a data entry error.

Export paint products from the Netherlands have a high notional unit value. The conditional value presented on the market of Uzbekistan is also typical for other countries of the Central Asian region, on the basis of which

it can be assumed that the conditional value of the Dutch product depends on certain quality characteristics.

The Uzbek-Korean joint venture "Uz-DongJu Paint Co" was established in accordance with an agreement signed on March 25, 1995 between "Dong Ju Industrial Co., Ltd." from the Korean side and JSC "UzAvtoSanoat" from the Uzbek side and in accordance with the decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 191 dated May 30, 1995. On April 3, 1999, the official opening of the company took place.

The purpose of creating a joint venture "Uz-DongZhu Paint Co": - to provide paint and varnish materials and surface preparation means for the automotive industry of Uzbekistan. -provide the paint and varnish market of Uzbekistan with construction and industrial paints.

The mission of the company is to give inspiration and quality solutions to transform the world around us for the better [47, p. 3].

Pink - car paint blue - industrial paint

Figure 7. The volume of exports produced by JV LLC "Uz-Dongzhu Paint Co" for 2012-2017

Compared to 2015, the volume of exports of paint and varnish materials produced by JV Uz Dong Zhu LLC increased by 27% for car paint, and 5% for building paint. From Figure 7, it can be seen that the volume of car paint production is growing at a high rate, as the demand for car paint produced by Uz Dong Zhu is increasing year by year.

The study of the problems of the safety of imported goods contributes to the understanding of the system of state control and regulation as a single, inseparable, integral mechanism. It is this circumstance that

explains the enormous complexity of ensuring the safety of imported goods and the poor development of many of its theoretical and practical aspects.

The high importance of such a function of state bodies as ensuring the safety of imported goods is explained by the fact that it actively influences the development of one or another sphere of the life of an individual, society, and the state as a whole.

In addition, the level of security of imported goods is determined by the level of development of the market and the system of regulatory authorities (the more developed a country is in various areas, the more it has the ability to ensure its security in all areas of life).

However, a high level of development does not guarantee an equally high level of security, including in the field of imports [48, p. 171].

CONCLUSIONS ON THE SECOND CHAPTER

The commodity nomenclature of foreign economic activity of any state in modern international trade is a universal tool for managing export-import commodity flows. A large number of various commodity nomenclatures used for this purpose, at the beginning of the last century, gave rise to numerous problems, which necessitated their international unification by the middle of the 20th century. At present, the universal system for classifying goods for customs purposes, which is used by the vast majority of countries of the world and customs unions, is the Harmonized System for the Description and Coding of Goods, with the introduction of which the procedure for classifying goods in all countries of the world was streamlined and is now based on uniform rules.

Thus, in order to classify goods for customs purposes (determine the customs name), it is necessary to have a commercial and / or product name of the goods, its description, including in the form of values of the actual properties of the goods that affect its classification according to the CN FEA.

The names of positions act as classes in the CN FEA. Also in the TN VED as a classifier there are classification rules in the form of the General Rules of Interpretation (GRI) and special criteria in the form of Notes.

CN FEA as an official customs classifier, contains a classification procedure (GRI), but does not have classification methods. In addition to the mandatory part, the CN FEA includes a recommendatory part in the form of Explanations of the CN FEA.

The range of goods produced by industry and entering the trade includes tens of thousands of the most diverse types and varieties. Every year their number increases: the assortment of goods is updated; with the development of science and technology, new, more advanced complex technical goods appear; new types of raw materials and materials are created by the chemical industry.

The classification coding system is applied taking into account the peculiarities of object classification. According to this coding system, each character of the code denotes a classification grouping. In this case, sequential and parallel coding methods are used in accordance with the methods of object classification. The sequential coding method is used for objects separated by a hierarchical method. At the same time, the signs of classification are sequentially indicated in the code designation.

The development of the paint and varnish market at present and in the future is due to the growth in demand for products in developing countries

and the development of new forms of special quality products in industrialized countries.

And also the problems of numerical analysis of the world and Uzbekistan exports and imports of paintwork materials at the present time are considered. The features of the application of such statistical methods as - statistical observation, summary and grouping of observation data, absolute, relative and average values, distribution and dynamics series, as well as the index method of research are analyzed. Identified and numerically confirmed such regularities of the effectiveness of foreign trade relations as: the need for the development of foreign trade, the growth of welfare as a result of the growth of aggregate supply in the domestic market of paint and varnish materials, as well as the need to use statistical methods to study any problem of foreign trade analysis.

An important point is a comparative analysis of the statistical indicators of the import of paint and varnish materials at the present time with respect to the countries that supply paint and varnish materials to the national market. The main suppliers of paint and varnish products to the world market are industrialized countries and developing countries included in the group of "newly industrialized countries". The undisputed leader in the production of paints is Germany, which accounts for more than a quarter of all world exports of the analyzed products.

The consumption of architectural and decorative paints in China and India is growing, the demand in Asian markets is encouraging the entry of large industrialists in Europe and the United States into Asian paint companies. and the US to Asian paint companies.

In turn, all countries exporting their paint and varnish products to the markets of Russia, Uzbekistan and Kyrgyzstan also have good competitive opportunities. Suppliers from Croatia, Turkey, Finland and the Netherlands have the highest competitive positions. The shares of Germany and China in the world market tend to decrease, however, despite this, they remain highly competitive.

In the markets of Uzbekistan and Kyrgyzstan, the main competition for Kazakh, Turkish and Russian products will be paint and varnish products from JV LLC Uz Dong Zhu.

Uz Dong Zhu has a special place among automobile paint manufacturers, which provides automobile plants not only in Uzbekistan, but also abroad.

Based on the foregoing, we can conclude that not a single developed country in the world can do without imports, although sometimes imports cause serious damage to domestic production. The thing is that imported

goods, due to their low price and higher quality, seriously compete with domestic products, which in turn threatens the ruin of domestic companies and loss of jobs, and as a result, a decrease in demand for all types of goods and services.

However, as mentioned above, each country in the world has its own geographical, industrial conditions, therefore, with the help of export and import of goods between individual countries or groups of countries, not only the exchange of goods, but also global integration is carried out. Sometimes, even if a country has the ability to grow or produce any product or product, this does not happen, since the costs of producing this product or product will not be paid off in the future.

CHAPTER III.
METHODOLOGICAL PART.

Materials and equipment

- 1. Hardness tester J - 022. Germany. BYK. 1998.
- 2. Pycnometer No. 19784, 674, 25442, 25440. Germany. BYK. (100± 2) ml. 1997.
- 3. Scales OHAUS No. 40930015. China. (0-3000±0.01)g. 2015.
- 4. Stopwatches "mechanical" 1 pc. No. 5424. Russia - AGAT, (0 ~ 60 min ± 0.2) s.1997.
- 5. Hardness tester GS-70SN No. 3635. Japan. (0-100±0.1)μm. 1997.
- 6. Thickness gauge 256 FN PS4348-17 No. J-039. England-Elcometr (0-1250±1)μm. 1998.
- 7. Viscometers “Ford Cup#4” No. 56788 Germany BYK. Ø (4 mm), (2.0 ~200±1) s. 1998.
- 8. Grindometer “Gagdneg. No. 59481. Germany BYK. (0-50) μm. 1998.
- 9. Density hydrometers AOH Inv. No. J-042 Russia (700-1840 kg/m³±0.5kg/m³). 1998.Вискозометр Stomer № 971010. США. (0-100)сР KU (сПз) ±1%. 1998 1. Gloss meter micro-tri gloss No. 739382 Germany (20°,60°,85°±2)%. 1998.
- 10. Drying cabinet D 06062, J-017Owen. Germany. 1997.
- 11. Black and white paper (a. chess, b. contour.).
- 12. Press form Grase by specac GS01150. USA. 2003.
- 13. IR spectrometer Perkin Elmer Spectrum Version 10.4.3. USA. 2003.
- 14. Derivatograph Paulik-Paulik-Erdey Q-1500D. Hungary.1980.
- 15. Chromato-mass spectrometer "Agilent Technology" 5975 C. USA. GC MC (YR-Puro PROB. E-5000) (England) 2009.

3.1. The study of the physical indicators of paintwork materials and the issues of their classification during the customs examination.

3.1.1. Coating Methods for Testing and Determination of Dry Film Thickness

Methods for obtaining a paint coating on a metal, glass, wood or other surface - a substrate. This test procedure complies with the

recommendations of the CMEA RS 2095 regarding the application of paints and varnishes with an applicator and the international standard ISO 1514 regarding the preparation of the surface of the substrates and the determination of the dry film thickness.

Depending on the test method and the paint material being tested, glass and steel substrates are used.

The substrate is made in the form of a panel (plate), rod or other form.

Application of paint and varnish material by pneumatic spraying.

The application of the test material by pneumatic spraying is carried out in the spray booth with a paint sprayer at a distance of at least 20 cm from the surface to be painted and an air pressure for spraying 196-440 kPa (2.0-4.5 kgf/cm^2).

The jet of the test material is directed perpendicular to the surface of the substrate, making a cross application of the material by moving the paint sprayer at a uniform speed up to 1 m / s along and across this surface and parallel to it. The test material is applied in a uniform layer of the required thickness without gaps and streaks. Determination of dry film thickness (coating). After coating the panel, the sample is dried in the mode specified in the regulatory and technical documentation for the product. Before use, the dry film thickness measuring device should be calibrated using a calibration plate [49, c. 39]. Before testing, make sure that the paint is completely dry and check for the presence of magnetic and other contaminants, as these can affect the test results on the surface. Then measure less than 7mm from the edge or corner of the painted panel at 3 points, if it is necessary to make the measurement closer than 2.5 mm, in special areas, the calibration of the instrument should be rechecked to expand the effect of the edge on the measurement.

3.1.2. Methods for determining the mass fraction of volatile, non-volatile and solid substances

The methods consist in heating a sample of a paintwork material at a certain temperature for a specified period of time or until a constant mass is reached and the mass fraction of volatile and non-volatile substances is determined by the difference in the results of weighing before and after heating [50, p. 2].

The mass of the sample, the temperature and the exposure time during heating of the sample taken for testing must be indicated in the regulatory and technical documentation (NTD) for the paintwork material. If

there are no such instructions, samples weighing (1.5 ±.2) g are taken into cups and the test is carried out for 3 hours at a temperature of (105±2) 0C. It is allowed to carry out heating to constant mass at the following recommended temperatures:

for oil, oil-resin, bituminous, melamine-formaldehyde, urea-formaldehyde, alkyd-acrylic and polyester products – (140±2) ^{0}C;

for epoxy products – (120±2) ^{0}C.

Set the desired temperature in the oven. Before weighing, the cups are kept in an oven at the test temperature for at least 10 minutes. After that, the cups are placed in a desiccator, cooled to room temperature and weighed. A portion of the test material, thoroughly mixed to a homogeneous consistency, is placed and weighed.

The mass fraction of volatile (X) and non-volatile (X1) substances in percent is calculated by the formulas

$$X = \frac{m_1 - m_2}{m_1} \cdot 100; \quad (1)$$

$$X = \frac{m_2}{m_1} \cdot 100; \quad (2)$$

where m_1 is the mass of the test material before heating, g;

m_2 is the mass of the test material after heating, g;

The test result is taken as the arithmetic mean of the results of parallel determinations, the discrepancy between which should not exceed 1%.

3.1.2.1. Method for determining the mass fraction of solids

The method consists in extracting the film-forming substance with a solvent from a sample of the tested paint and varnish material, separating the solid substance by centrifugation, drying the precipitate and determining the mass fraction of solids in relation to the mass of the sample taken.

A test tube with a capacity of 25 cm^3 is preliminarily weighed. A weighed portion of the test material weighing from 2 to 3 g is thoroughly stirred until a homogeneous mass is obtained, placed in a test tube and weighed. Approximately 10 cm^3 of the solvent is added to the sample in small portions, after which the contents of the test tube are thoroughly mixed with a glass rod. After mixing, the residue on the stick is washed off into the same test tube in such an amount of solvent that the test tube is filled to ¾ of its capacity.

A test tube with a precipitate is dried in an oven at a temperature of (105±2)^{0}C until a constant weight is reached, unless otherwise indicated in

the regulatory and technical documentation for the paintwork material. Before each weighing, the tube is cooled to room temperature in a desiccator.

The mass fraction of solids (X2) as a percentage is calculated by the formula

$$X = m_4 / m_3 * 100,$$

where m_3 is the mass of the test material before heating, g;

m_4 is the mass of the dried precipitate (solid matter), g.

The test result is taken as the arithmetic mean of the results of parallel determinations, the discrepancy between which should not exceed 1%.

3.1.3. Methods for determining conditional, dynamic and fluid viscosities

The methods consist in determining the conditional viscosity of the free flow of paints and varnishes, take the time of continuous flow in seconds of a certain volume of the test material and dynamic viscosity i.e. dynamic viscosity (internal friction coefficient) of a medium in which, in laminar flow, a friction force of 1 N acts on each square meter of the moving layer, provided that the difference in the velocities of the layers located at a distance from each other is normal to the direction of velocity.

3.1.3.1. Determination of relative viscosity using a VZ-246 viscometer (and Ford cup).

The viscometer is placed in a tripod and with the help of a level set in a horizontal position. A vessel is placed under the nozzle of the viscometer. The nozzle opening is covered with a finger, and the material to be tested is poured into the viscometer in excess to form a convex meniscus above the top edge of the viscometer. Fills the viscometer slowly to prevent the formation of air bubbles. Excess material and formed air bubbles are removed with a glass rod, shifted along the upper edge of the funnel in a horizontal direction so that no air gap is formed [51, c. 3]. Open the nozzle opening and, simultaneously with the appearance of the test material from the nozzle, start the stopwatch. At the moment of the first interruption of the jet of the test material, the stopwatch is stopped and the elapsed time is counted.

3.1.3.2 Determination of rotational viscosity with a Thomas stormer viscometer

An undiluted sample in 3-4 parts is placed in a metal beaker and brought to a temperature of (20±0.5) ^{0}C. Then, without forming bubbles, the sample is thoroughly mixed. Place the viscometer spindle into the sample, then set the viscometer rotation counter to the reading "0" and start the viscometer by measuring the time with a stopwatch until the viscometer needle reaches the "0" mark back. Calculate the result of the test according to the indication of the time of the stopwatch by comparing the indications of the Krebs value [52, c. 4].

3.1.4. Method for determining particle size or degree of grinding

The method for determining the particle size or the degree of grinding by the depth of the groove of the Klin device in micrometers and the Higman value corresponding to the boundary of a significant amount of individual particles and aggregates of pigments and fillers visible on the surface of the layer of the material being tested, or the boundary of the beginning of strokes from them.

The method consists in filling the wedge-shaped groove of the grindometer with a sample in determining the depth of the groove in micrometers and the Higman value corresponding to the boundary of a significant amount of individual particles and aggregates of pigments and fillers visible on the surface of the test material layer or the boundary of the beginning of strokes from them [53, c. 3].

The degree of grinding of primers, enamels and ready-to-use paints is determined by the boundary of visible particles and agglomerates on the surface of the test material layer. The degree of grinding of thick and water-based paints, as well as fillers, is determined by the border of the beginning of strokes, unless otherwise indicated in the standard or normative and technical documentation for the material being tested.

The measuring plate of the grindometer is placed on a horizontal surface. The test material is thoroughly mixed and placed over the upper limit of the scale of the instrument in an amount sufficient to fill the upper groove, while avoiding the entry of air bubbles. The scraper is installed perpendicular to the measuring surface and to the length of the groove behind the test material placed in the groove.

With a slight pressure, the scraper is moved at an angle of 900 along the measuring surface at a uniform speed for 3 s from the maximum value of

the scale beyond zero, while the groove must be completely filled with a layer of the material under test, and the measuring surface must remain clean.

The surface of the test material layer is immediately examined in the light with the direction of sight perpendicular to the length of the groove, at an angle of view of 20-300, and in no more than 6 s the position of the boundary of visible particles and agglomerates or the beginning of the strokes is determined. Determine the indication of the scale of the grindometer corresponding to this boundary.

The time spent on one determination (from the moment the test material is placed beyond the upper limit of the grindometer scale until the end of the examination) should not exceed 10 s. The boundary of visible particles and agglomerates is determined by the position of the upper edge of the strip 2-3 mm wide, on which from 5 to 10 particles and agglomerates are visible. Separate particles and agglomerates located outside the boundary of the main amount of these particles are not taken into account (method A).

The boundary of the beginning of the strokes located in the direction from the largest division of the scale to 0 is determined by the place where the third continuous stroke appears, reaching the metal in depth, unless otherwise indicated in the regulatory and technical documentation for the material under test (method B). A single continuous stroke starting at a distance of more than 15 mm from other strokes is ignored in figure 8.

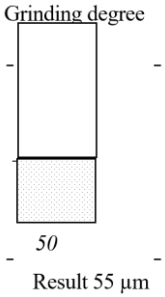


Figure 8. Determining the degree of grinding.

3.1.5. Methods for determining hiding power

To determine the hiding power, the paintwork material is diluted to the working viscosity. In a solvent-free metal panel, use adhesive tape to attach checkered paper Figure 9. [54, c. 3].

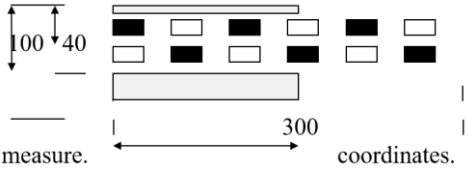


Figure 9. Determination of hiding power using checkered paper

Close the lower part of the panel with 250 mm cardboard and paint with 1 layer of paint, then cover part of the surface for 200 mm, after which the open surface should be painted. By repeating these operations, 5 variants of thickness are obtained, after which the samples are left to dry at the temperature specified in the normative and technical documentation for the material being tested.

After this operation, the samples are checked visually in a well-lit place in a horizontal position at an angle of 45^0. The thickness of the applied paint is checked by a device for determining the thickness of the paint film (Figure 10).

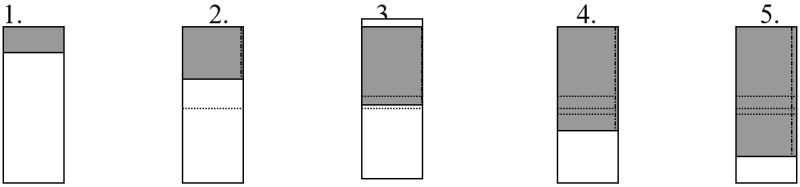


Figure 10. Determining the thickness of the applied paint.

The type of product for diluting the paintwork material to the working viscosity, the value of the working viscosity, the method of applying the paintwork material to the paper surface, the drying mode or the absence of drying should be indicated in the regulatory and technical documentation for the paintwork material.

The hiding power of the dried film of the paintwork material is calculated:

to determine the hiding power of the film using black and white chess paper, it is calculated from the thickness of the dry film of paint specified in the regulatory and technical documentation for the material being tested;

to determine the hiding power of the film using black and white contour paper according to the formula:

HP % = B / C;
where, B is the black part of the paper
C - white part of paper

3.1.6. Photoelectric method for determining gloss

The method consists in measuring the magnitude of the photocurrent excited in the photodetector under the action of a beam of light reflected from the surface of the coating under test. The essence of the method for determining the gloss of paint coatings is to measure the magnitude of the photocurrent excited in the photodetector under the action of a beam of light reflected from the surface of the test coating [55, c. 3].

To measure the gloss of paint and varnish coatings by the photoelectric method, panels made of cold-rolled sheet steel grade 08 kp 08 ps and / or glass panels are used as a substrate.

Samples for testing (application method, number of layers, drying, coating thickness) are prepared in accordance with MIP 15769172-001-2002 and standards or specifications for the tested paints and varnishes [56, p. 4.; 57, p. 5].

The minimum surface dimensions of coatings for gloss measurement are 40 x 60 mm. Samples of paint and varnish coatings prepared for gloss measurement should have a flat, smooth and uniform surface, without gaps, smudges, wrinkles, foreign inclusions and mechanical damage. Before measurement, the sample is wiped with a dry soft flannel.

Measurements are made on a horizontal surface. Before testing, the gloss meter is adjusted according to the calibration plate made of uviol glass attached to the device. The correctness of the readings of the device is checked periodically on a calibration plate.

The magnitude of the gloss of the sample is determined in different parts of its surface. The test result is taken as the arithmetic mean of three determinations, the discrepancies between which should not exceed 2%.

3.1.7. Density determination with a pycnometer

Before filling the pycnometer with the sample, weigh and record the weight of the clean pycnometer with the lid. After filling the pycnometer with a sample, remove the formed air bubbles and close the lid of the pycnometer [58, c. 4]. While pressing the lid, remove the excess sample and wipe the lid with a soft flannel, then weigh the pycnometer with the sample and determine the weight (P2).

Density results are processed according to the formula:

$$S.G.\ g/sm^3 = \frac{P_2 - P_1}{V_c};$$

where: P1 - weight of a clean pycnometer with a lid
P2 - weight of the pycnometer with the test sample
Vc - specific volume of the pycnometer

From the three experimental data, obtain the arithmetic mean sum S.G.

3.1.8. Method for determining the hardness of coatings

The essence of the method is to determine the hardness of the paint coating applied to a massive metal or glass substrate, deformed by pressing the indenter under a load of 25 g for 30 s. After removing the load, the long diagonal of the imprint, resulting from the indentation, is measured [59, p. 4].

The method of applying the paintwork material, the number of layers, drying conditions, the thickness of the coatings are indicated in the regulatory and technical documentation for the paintwork material.

In a pre-prepared sample according to Sec. 2. Install the device so that the tooth of the device is inserted evenly without tilt and must be above the sample for 30 seconds, after which it is removed from the surface of the sample, then using a special microscope, measurements are made of the length of the imprint resulting from indentation.

Measurements should be taken at 5 different points on the painted surface. The average number is estimated from 5 measurements and taken as the length of the prints.

The value of hardness (H %) in arbitrary units is calculated by the formula

$$H\ \% = \frac{100}{t},$$

where t is the length of the imprint resulting from the indentation.

The arithmetic mean of five determinations is taken as the test result, the discrepancies between which should not exceed 3%.

3.2. Application of IR spectroscopy methods in coatings research

IR spectroscopic methods for the analysis of automotive and industrial paints

IR spectra were obtained on IR spectrometers in the range of wave numbers 400-4000 cm-1. To do this, a portion of 1 - 2 mg of each sample is

thoroughly mixed with 200 mg of finely dispersed dried KBr and a tablet is pressed [60, c. 69].

IR absorption spectra were recorded on a Perkin Elmer Spectrum Version 10.4.3 spectophotometer (400–4000 cm–1) using the technique of pressing samples with KBr [61, p. 121].

3.3. Identification of coating materials based on the method of chromatography with a mass selective detector

Chromatomasspectrometric analysis of automotive and industrial paints

The method is based on recording (fixing) the spectra of substances eluting from a chromatographic column by chromatography (GC/MC).

Agilent chromato-mass spectrometer, based on a 5975 C GC MS chromatograph (YR-Puro PROB. E-5000) [62, p. 10]. The sample is thoroughly mixed. Sample weight is 1-3 μg.

Samples can be injected into the inlets with an autosampler (such as an autosampler for liquid materials or an Agilent headspace sampler) or manually with a syringe. The sample is introduced onto a quartz tube, after which it is placed on a pyrolytic attachment.

The sample is held in a pyrolytic attachment at a temperature of 7500C so that all the organic components of the paint go into gas mode. And then the sample is sent to the chromatograph. Analyzes are carried out in a gas chromatograph.

The parameters are set according to the first data. Analyzes for the sample are carried out in accordance with this parameter [63, c. 129]. The results of the analysis are sent to the computer within 27-35 minutes. The received data will be analyzed. After that, the results of the analysis will be printed on paper in the form of a chromatogram.

3.4. Research of coatings by thermal analysis

Differential - thermal analysis of automotive and industrial paints

The samples were preliminarily ground in an agate mortar to a powder state in order to uniformly fill the crucible of the derivatograph and uniformity of the temperature gradient during the heating of the sample in the derivatograph. The sample was then dried in an oven to remove residual moisture and solvent.

Thermal analysis was carried out on a derivatograph of the Paulik-Paulik-Erdey system, which makes it possible to record the change in mass and temperature difference during continuous heating at a given heating rate

of 100C/min and a sample of 0.1 g at a sensitivity of the galvanometer T-900, TG-200, DTA- 1/10, DTG-1/10 in air atmosphere.

The weight of the samples was in the range of 10-40 mg. The sample was heated in air in ceramic crucibles in the temperature range from 250C to 7000C. Recording was carried out under atmospheric conditions with constant removal of the gaseous medium using a water jet pump. The holder was a platinum crucible 7 mm in diameter without a lid. Al2O3 was used as an inert support.

The analysis was carried out according to DTG, DTA and TG curves, which were obtained by registration on a personal computer with an analog-to-digital converter. The obtained thermograms were used to determine the thermal-oxidative stability and kinetic characteristics of the thermal-oxidative degradation of the samples: the degradation rate, the degradation rate constant, and the activation energy [64, p. 85].

Thermal methods of analysis - methods for studying physical, chemical and chemical processes based on the registration of thermal effects / accompanied by temperature programming. The setup for thermal analysis methods usually includes an oven, sample holders, thermocouples that measure the temperature in the oven and samples.

When the sample is heated or cooled, changes in the temperature of the object over time are recorded. In cases of phase transformations, a platform or a break appears on the heating (cooling) curve [65, p. 5]. Thermogravimetric analysis (TGA) is based on recording the change in the mass of a sample depending on temperature under conditions of a programmed change in the temperature of the medium.

In differential thermal analysis (DTA), the temperature difference between the test sample and the reference sample, which does not undergo any transformations in a given temperature range, is recorded in time. The effects recorded by DTA can be caused by melting, sublimation, evaporation, boiling, changes in the crystal lattice, and chemical transformations [66, p. 6].

CONCLUSIONS ON THE THIRD CHAPTER

Methods for applying a paint coating on a metal, glass, wood or other surface - a substrate are given.

Methods for determining the mass fraction of volatile, non-volatile and solid substances have been studied, which consist in heating a sample of paintwork material at a certain temperature for a specified period of time or until a constant mass is reached and determining the mass fraction of volatile and non-volatile substances by the difference in the results of weighing before and after heating.

Methods for determining the relative viscosity using a VZ-246 (and Ford cup) viscometer and determining rotational viscosity using a Thomas stormer viscometer were used. The particle size and the degree of grinding of the coatings were determined using the wedge device in micrometers and the Higman value corresponding to the boundary of a significant amount of individual particles and aggregates of pigments and fillers visible on the surface of the test material layer or the boundary of the beginning of strokes from them.

The covering power of the film was determined on black and white checkered paper with uniform application of coatings. The photoelectric method for determining gloss consists in measuring the magnitude of the photocurrent excited in the photodetector under the action of a beam of light reflected from the surface of the coating under test.

IR spectroscopic methods for the analysis of automotive and industrial paints were carried out in a Perkin Elmer Spectrum 10.4.3 IR spectrometer. with an absorption band of 400-4000 cm-1).

Chromatomasspectrometric analysis of automotive and industrial paints was carried out on an Agilent chromato-mass spectrometer based on a 7890 B chromatograph with a 5975C GCMS (YR-Puro Probe-5000) mass selective detector.

Thermal analysis was carried out on a derivatograph of the Paulik-Paulik-Erdey system with a heating rate of 100C/min and a sample of 0.1 g at a sensitivity of the T-900, TG-200, DTA-1/10, and DTG-1/10 galvanometers in air.

CHAPTER IV.
EXPERIMENTAL AND DISCUSSION OF THE RESULTS.

4.1. Research of physical indicators of paintwork materials.

Identification of a particular product can be carried out by one or several types, which is determined by the purpose of its implementation. An important role in identification is given to the choice of criteria.

Certain requirements are imposed on the identification criteria, such as typicality, objectivity, comparability (verifiability) [67, c. 223].

Comparability or verifiability means that during repeated checks, regardless of the subjects, means and conditions for carrying out identification, the same or similar results (within the experimental error) will be obtained with respect to the indicators of the identified object.

Carrying out identification involves the use of means of identification, with which you can prove identity. When identifying goods, as a rule, the following shipping documents are used: a contract (agreement) for the supply of goods, an invoice, a waybill, a quality certificate, a certificate of conformity, a certificate of origin, etc. [68, c. 160].

The means of identifying goods also includes regulatory documents (standards, specifications, rules) and other technical documents regulating quality indicators that can be used for identification purposes.

It should be noted that until recently the identification of goods was difficult due to the lack of regulatory documents and standards for a number of goods. At present, for a number of goods, GOSTs of the

General Specifications (GTU) type have been developed, which specifically define the general requirements not only for quality indicators, but also additional requirements for labeling. They provide only information for consumers, but also criteria for identification [69, c. 400].

These standards introduced a restriction on the raw materials used, thereby in the production of paint and varnish products.

Primary are the criteria, the choice of which is determined by the purpose and type of identification, and the list of identification indicators is determined by the established criteria, that is, the indicators are secondary. Therefore, the criteria determine the choice of identification indicators.

Secondly, these categories are distinguished by means of identification. Thus, the requirements for the criteria are not defined in any regulatory documents, and the requirements for indicators and methods for their determination are established by standards, specifications and other RD for products.

At the same time, some criteria, such as the name, purpose of the goods, can be thought of by using several identification indicators. Thus, indicators are an additional tool for confirming or not confirming identity according to a number of identification criteria [70, p. 271].

The third difference between criteria and indicators lies in the methods of their determination. To determine a number of identification criteria, an analytical method is used (document analysis), an expert method (visual inspection of packaging and labeling, testing), and sometimes express methods can be used. To determine the indicators of identification, only organoleptic and measuring methods are used, the characteristics and methods of which are clearly defined in the RD for products or for methods of determination. [71, c. 143].

Of great importance for identification is the choice of methods for determining indicators. When choosing identification indicators and methods for their determination, the principle of sufficiency and optimality is followed. To do this, from the complex of properties inherent in the product, only those indicators (properties) are selected that are necessary and at the same time sufficient to confirm the identity. At the same time, simpler and cheaper methods are initially used for identification: organoleptic, express methods, etc. [73, 73].

The procedure for identifying chemical products, set out in the Rules for Certification of Chemical Products, has its own peculiarity. The rules state that the identification of chemical products (household chemicals, polymer products, etc.) is carried out in order to confirm: 1) compliance of a specific product with a sample or description provided by the applicant; 2) product belonging to the classification group (batch, brand, type, etc.); 3) compliance with the purpose and main characteristics that determine belonging to a group of homogeneous products.

The Certification Rules recommend that the products to be certified be identified in two stages: during sampling and during testing.

The content of the identification stages testifies to the commonality, primarily in the first stage, and the differences in the identification works carried out for different product groups, in the second stage [67, p. 52].

It should be noted that the certification rules for types of products provide for the indication of identification characteristics in the certificate of conformity, such as volume, type, brand, etc., which is necessary for the identification of this product by the certificate.

Identification of coatings was carried out for the following goods produced by JV Uz Dong Zhu.

Product: AT-540 TRAFFIC PAINT (industrial-top coat). This road paint is based on a fast drying acrylic copolymer resin. It has excellent moisture resistance, weather resistance and excellent adhesion with materials such as cement, asphalt, bitumen-cement concrete, etc. It can also be used as a road reflector [68, c. 40]. Designed for marking road signs, cement, asphalt, bitumen-cement surfaces.

Composition: Acrylic copolymer resin, organic solvents, pigments, flooring agents and special additives.

Table 6

Results Determination of the physical properties of AT-540 TRAFFIC PAINT

Checkpoints	Specifications	Results	Note
Viscosity, KU	75 – 80	80	25°C
Grinding degree	4	4	Hegman scale
Minimum	1.38 – 1.44	1.42	25°C
Density, kg/l	63-67	65.71	120°C x 2 h
Content of non-volatile particles,%	10	10	20°C
Drying time	2	2	20°C
Maximum	20-30	25	60°C
curing time,	0.90	0.96	

Product: NT-661U ROYALMEL UDJ–9794 - (Architectural and construction). Alkyd enamel is used for finishing work on metal, wood and other surfaces, both indoor and outdoor [69, c.40].

Composition: Alkyd enamel, pigments, filler, solvent and special additives.

Table 7

The results of the determination of the physical properties of paint NT-661U ROYALMEL

Checkpoints	Specifications	Results	Note
Viscosity, KU	80 – 85	84	25°C
The degree of grinding,	6	6	Hegman scale
Minimum	1.03-1.09	1.07	25°C
Density, kg/l	50–55	53.04	120°C x 2 h
Content of non-volatile particles,%	2	2	20°C
drying time,	8	8	20°C
maximum h	0.88	0.96	
curing time,	85	89	60°

Product: FAT-000 BPR BASE COAT SOLID - Paint for painting plastic products. This base coat is based on a polyester-melamine resin with a pigment mixture, has good adhesion, is UV-resistant and weather-resistant. Pre-primed plastic coating [70, c. 157].

Composition: Polyester-melamine resin, titanium dioxide, fillers, organic solvents, pigments.

Table 8

Results Determination of the physical properties of BPR BASE COAT SOLID

Checkpoints	Specifications	Results	Note
Viscosity, KU	32-36	33.51	25°C
The degree of grinding,	max10	10	Hegman scale
Minimum	1.21-1.25	1.24	25°C
Density, kg/l	50-54	52.64	120°C x 2 h
Content of non-volatile particles,%	Max 50	24	
Coverage, minimum	80	92	60°

PRODUCT NEOLITE - Based on thermoplastic acrylic resin with moisture resistant pigments. Resistant to environmental influences. It has excellent resistance to air, alkalis, has such properties as fast drying. The products are used as a top coating in high humidity environments for tiles, concrete floors, as well as slate and plaster surfaces.

Composition: Acrylic resin, organic solvents, pigments, fillers and special additives.

Table 9

Results of the determination of the physical properties of neolite paint

Checkpoints	Specifications	Results	Note
Viscosity, F/C#4, sec	80 – 90	88	25°C
Grinding degree minimum	7	7	N.S.
Density, kg/l	1.18 - 1.24	1.21	25°C
Gloss % minimum	80	90	60°
Content of non-volatile particles, %	59 – 63	61.41	120°C x 2 h
Drying time, min	10	10	20°C

The main operating criteria are the degree of grinding, specific gravity, N V %, which does not particularly affect the viscosity parameter. In

case the viscosity level is low, in order to reduce the viscosity level, a small amount of solution is applied when spraying (table 10).

Table 10

Results of the determination of the physical and mechanical properties of automotive paints

№	PM	Viscosity, F#cup		Degree of grinding, microns		density, kg/l		Mass of non-volatile substances, %	
		norm	result	norm	result	norm	result	norm	result
1	BPR Gaz	32-36	34.12	max 10	10	1.21-1.25	1.24	51-55	52.84
2	Solid 12U	45-55	51.65	max 10	10	1.19-1.24	1.23	58-62	59.12
3	Qthate UT-720 White	60-64	64	min 7	7	1.15-1.19	1.17	52-56	53.17
4	YS-360 Surfaser grey	60-65	64	min 6.5	6.5	1.32-1.39	1.38	66-69	69.77
5	BPR Gan	22-27	25.59	max 25	25	0.97-1.01	0.97	30-34	30.17
6	Top solid gaz	45-55	47.91	max 10	10	1.19-1.24	1.22	58-62	60.02
7	Solid 77 K	45-55	48.76	max 10	10	0.99-1.03	1.01	45-48	45.64
8	GNL Met	29-33	32.65	max 25	25	0.95-0.98	0.97	28-32	29.94
9	BPR GCW	22-27	24.69	max 25	25	0.96-0.99	0.97	28-32	31.71
10	Gaz acril	29-33	31.64	max 10	10	1.16-1.19	1.18	54-56	54.88
11	GNG Met	29-33	31.88	max 25	25	0.96-0.99	0.96	30-33	30.01
12	Solid 38 L	45-55	49.12	max 10	10	1.05-1.08	1.07	48-53	49.01
13	Primer gaz	34-40	38.66	max 10	10	1.19-1.23	1.20	57-61	58.01
14	QT-Sea wave	57-61	61	min 7	7	1.05-1.09	1.09	46-49	48.47

If the viscosity level is higher, then more solution is added. Relative viscosity is the main parameter. Metal paints are expensive because they contain polyurethane resin. Alkyd resin enamels are 50% cheaper. Paints with red and green pigments are expensive.

Different levels of ink viscosity depend on the amount of resin in the ink composition, the type of ink, and are determined by the number of parameters in the form. For example: in 10 sample in Gaz acril synthetic enamel the viscosity is up to 29-34, this is measured in F# 4 in liquid paint.

Or in 4 sample YS-360 Surfacer gray made of epoxy resin viscosity 60-65 Ku, this paint is measured in Ku thick paints. In urethane paints, i.e. in 3-sample QThane UT 720 White and in 14-sample in Sea Wave paints QU 720 top viscosity up to 57-66.

Metallic and bumper paints are the same as acrylic paints. The degree of grinding of metal paints in the 5th sample of BPR Gan, in the 8th sample of GVL Met, in the 9th sample of BPR GCW, in the 11th sample of GNG Met max from 25 to 40 microns is allowed, since they contain aluminum paste.

It depends on the size of the aluminum paste because it plays a big role in determining the color. If the specific gravity is below the norm, then the paint will not cover the black and white color.

The higher the Nv% parameter in paints within its type, the less it pollutes the environment. The main reason for measuring performance is hiding power, viscosity and specific gravity, which affects them. The electric current resistance parameter is measured for the use of robotic spraying.

If the electric current resistance parameter does not correspond to the norm, then the robot-machine immediately stops working. The dry film thickness parameter is measured for the quality test. This parameter particularly affects the following criteria: gloss, adhesion, impact, bending, crack. If the parameter dry film thickness corresponds to the norm, then the paint meets all the criteria of the test.

Before saying that the adhesion parameter is not normal, it is necessary to measure the dry film thickness parameter. If the hiding power does not meet the requirements, this means that the aluminum paste and pigments are not added correctly.

If the amount of pigments is not correct, the black-and-white coverage will be less. If the degree of grinding, NV%, dry film thickness is normal, then the gloss will be normal. The hardness parameter in metallic and solid paints depends on the technology of drying and spraying the varnish. The hardness parameter in urethane paints depends on the added hardeners.

Table 11

Results of determination of physical and mechanical properties of industrial paints

PM	Viscosity, Ku		Degree of grinding, microns		Specific gravity, kg/l		Mass of non-volatile substances, %		Shine, 20°C	
	norm	result	norm	result	norm	result	norm	result	norm	result
Traffic	75-80	80	min 4	4	1.38-1.44	1.42	63-67	65.14	20-30	27
Neolite	80-90	88	min 7	7	1.18-1.24	1.20	59-63	61.44	-	90
Royal mel	80-85	83	6	6	1.03-1.09	1.08	50-55	53.41	85-60	89
Royal tex	85-90	90	min 3	3	1.28-1.33	1.39	52-56	54	-	-
Qd top 9050	80-120	107	max 20	20	1.23-1.29	1.27	41-49	46.86	Min 60	93
QD primer	80-85	103	max 15	30	1.23-1.29	1.28	58-63	65.79	-	82
Royal pox	68-72	70	max 20	20	1.28-1.34	1.34	59-63	61.14	70	80

In the fifth sample, the viscosity is 107, the NV% is 46.86, and the gloss is 93. If we compare the degree of grinding, where it is 30, then the gloss in the sixth sample is 82. In the first and fourth samples, where the degree of grinding is the lowest, the gloss index also the lowest and equal to 27.

From the above, it can be seen that in terms of the degree of grinding, changes in the gloss index can be observed. This means that the higher the degree of grinding, the higher the NV%. In addition, the higher the specific gravity, the lower the gloss index.

Table 12

Comparative physical and mechanical properties of paints Uz Dong Zhu with other industrial paints

№	Options	Royalmel extra	Royalmel ekonom	Hayat emal eco universal	Mehrjon emal PF-115	Mehrjon emal PF-121 MM	Mehrjon emal PF-121	Hayat emal pf-115
1	viscosity, ku	83	83	80	72	75	70	74
2	grinding degree minimum	6	6	6	8	7.5	6	7
3	ρ,kg/л	1.08	1.07	1.07	1.08	1.07	1.06	1.14
4	N.V, %	49.61	58.71	51.39	61.94	60.72	60.00	63.03
5	hiding power, minimum	0.97	0.95	-	0.96	0.90	0.95	0.96
6	shine, %	94	88	-	93	88	94	84

A high viscosity index in industrial paints is the norm. This means that paints belonging to the royal mel family differ from other paints in high viscosity, then it is of high quality. The indexes of the degree of grinding indicate the level of grinding of pigments in the composition of the product.

This means that the table shows that the level of grinding of enamels is low - equal to (6), compared with other paints, the quality of Royal mel enamels is high. The higher the NV%, the higher the % ratio of pigments within the product.

In Royal mel 49.61 and in this paint, the amount of pigments is less. If the % ratio of pigments does not exceed 50-55%, then the shelf life is

longer. If the quality of the pigment is high, then the hiding power corresponds to the standard.

The analysis of industrial paints was carried out according to organoleptic, physicochemical parameters (viscosity, grinding degree, specific gravity, content of non-volatile substances, hiding power) in accordance with standard methods. All studies were carried out in 3-4 replicates and processed statistically.

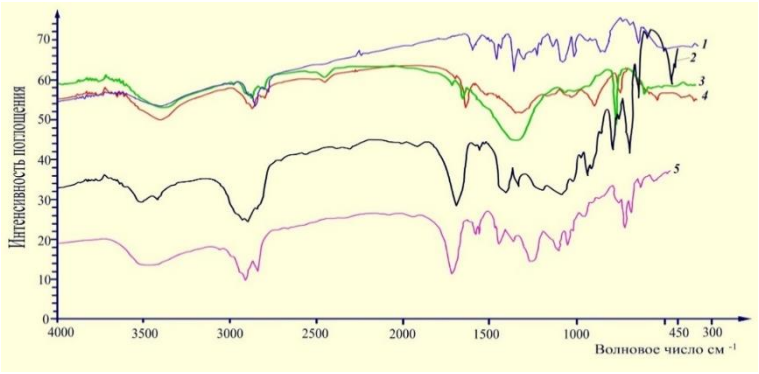
The experimental part shows the average values of the indicators and standard deviations from the average (x+m). The experimental data were processed using standard methods of correlation analysis.

4.2. Identification and quantitative determination of paint materials by IR spectroscopy.

A qualitative comparison of the IR spectra of the studied samples with the reference spectra was made by comparing them. It was found that the corresponding spectra coincide with each other in terms of the general form, number, position, and relative intensity of the absorption bands.

This allows you to make a preliminary identification of the samples under study. More than 15 paints belonging to various groups were selected as samples for the study [72, p. 120].

IR spectra were obtained on IR spectrometers in the range of wave numbers 400-4000 cm-1. To do this, a portion of 1–2 mg of each sample is thoroughly mixed with 200 mg of finely dispersed dried KBr and a tablet is pressed.



1. - Royalpox; 2. - Neolite; 3. - Royaltex; 4. - Traffic; 5. - Royal mel.

Figure 11. IR spectra of industrial paints.

Using IR - spectroscopy as an integral part of studies to elucidate the structure of paints, using the characteristic purity found in the IR spectrum, it is possible to identify with a high probability the functional groups and structural elements present in the compound. When comparing spectra, special attention should be paid to the region from 700 to 1400 cm-1, the so-called "fingerprint" region.

The IR spectra of industrial paints produced by domestic manufacturers were studied: IR spectra of Royal Roh (spectrum 1), Neolit paints (spectrum 2), Royal tech (spectrum 3), IR spectra of Traffic paint (spectrum 4) and Royal chalk (spectrum 5). All spectra are presented in Fig. 11 as a series of spectra, which, for convenience of study, are shifted relative to each other along the transmission axis.

All spectra show characteristic absorption bands of industrial paints, which, first of all, include a wide and intense band in the frequency range of 2910-2925 cm 1 corresponding to the stretching vibrations of the carbonyl ester groups C-O-COO.

The presence of these groups can be confirmed by the presence of a very intense absorption band in the region of 1250-1270 cm-1, due to the stretching vibrations of the C–O bonds for alkyd paints. The presence of intense absorption bands in the region of 1450-1600 cm-1 and 690-770 cm-1 corresponds to the spectral manifestation of aromatic hydrocarbons, which is observed in all samples.

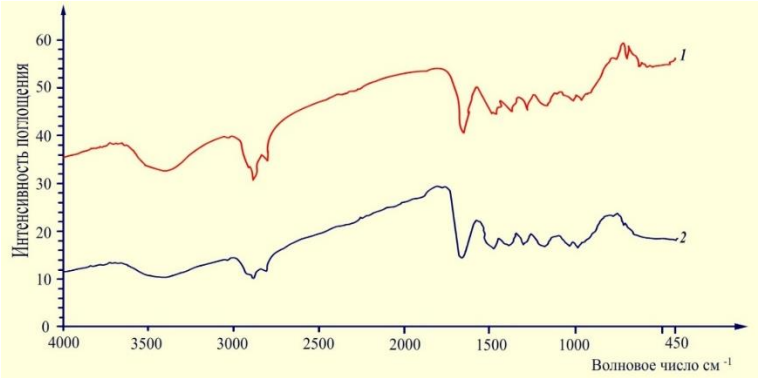
However, together with a doublet of intense bands 1120-1130 and 1060-1070 cm-1, they are easily detected both in the spectra of 5 alkyd resins and in the spectra of coatings based on them. The presence of an aromatic ring with two substituents in the ortho position is detected by a band of medium intensity at 740 cm-1 due to out-of-plane bending vibrations of four adjacent hydrogen atoms of the aromatic ring.

This band, together with weak bands in the region of 690-710 and 760-770 cm-1, forms a characteristic group typical of o-phthalic ethers.

In the IR spectrum of the amine hardener, broad absorption bands are recorded in the region of 650-900 cm and 1182 cm-1 corresponding to the amino groups in sample 1. The characteristic intensity band at 830 cm-1 is due to out-of-plane deformation vibrations of the triazine ring, which correspond to acrylic paints in samples 2, 3, 4.

Thus, characteristic absorption regions are clearly identified in samples 2,3,4 which have an intensity band at 830 cm-1 due to out-of-plane deformation vibrations of the triazine ring, broad absorption bands in the region of 650-900 cm-1 and 1182 cm corresponding to amino groups in

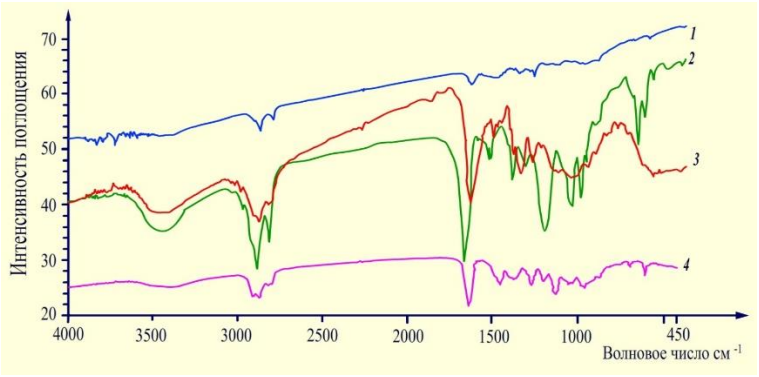
sample 1 and intense bands 1120 -1130 cm-1 and 1060-1070 cm-1 in the spectra of 5 characteristic alkyd resins.



1. - IR spectrum of paint solid 38 L. 2. - IR spectrum of paint solid 12 U.

Figure 12. IR spectra of automotive (solid) paints.

You can also observe in Figure 12 the IR spectra shown for automotive paints solid based on modified alkyd resins, which have a common characteristic absorption band for both samples.



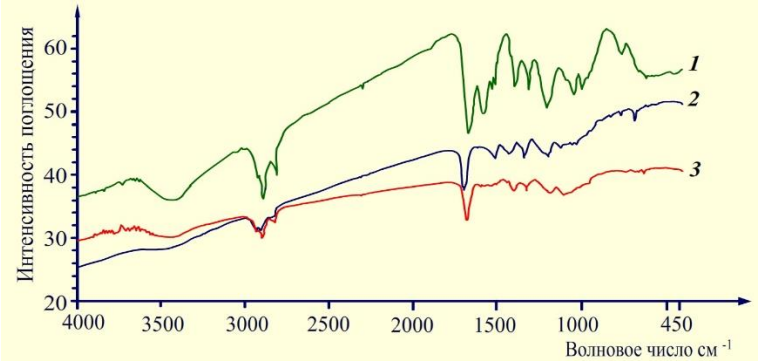
1. - GNGMET. 2. - QDPrimer; 3. - QT- Sea wave; 4. - GNLMET.

Figure 13. IR spectra of automotive (metallic) paints.

On fig. 13 shows the IR spectra of metallic automotive paints, which differ in composition. The IR spectra in samples 1 and 4 have intense absorption bands in the regions of 2925 cm -1, 1735 cm -1, 1380 cm -1, which

are clearly pronounced in both samples, which corresponds to the presence of -CH2, -CH2-CHO, -CH3, characteristic of polyester paints.

The IR spectra of samples 2 and 3 have common intense absorption bands in the regions of 3450 cm-1, 2925 cm-1, 1735 cm-1, 1600 cm-1, 1450 cm-1, 1384 cm-1, which corresponds to the stretching vibrations of the –OH, -CH2, -CH2-CHO, aromatic ring, -CH3, characteristic of alkyd and alkyd-urethane paints.



1. - IR spectrum of BPRGAZ paint. 2. - IR spectrum of BPRGAN paint. 3. - IR spectrum of BPRGCW paint.

Figure 14. IR spectra of automotive (bumper) paints.

Figure 14 shows the IR spectra of bumper paints based on polyethermelamine resins. Clear wave numbers are shown at 2925 cm-1, 1736 cm-1, 1465 cm-1, 1384 cm-1 corresponding to -CH2, -CH2-CHO, aromatic ring, -CH3.. groups in all samples.

In samples 2 and 3, the other corresponding absorption bands are less pronounced, as filler pigments overlap these areas.

4.3. Analysis of coatings using GC with a mass selective detector

A method for identifying paints and varnishes based on the joint use of gas chromatography, mass spectrometry of electron ionization and mass spectrometry of negative ions of resonant electron capture (MS REM REE) is that after chromatographic separation, the substances are ionized by the method of electron ionization with the detection of positive ions (PI) and/or are ionized by electrons with energies from 0 to 15 eV, with the registration of negative ions, and on the basis of complementary data obtained, the

composition of the test sample and the molecular structure of individual compounds are established.

The sample is thoroughly mixed. Sample weight is 1-3 μg. Samples can be injected into the inlets with an autosampler (such as an autosampler for liquid materials or an Agilent headspace sampler) or manually with a syringe.

The sample is introduced onto a quartz tube, after which it is placed on a pyrolytic attachment. The sample is held in a pyrolytic attachment at a temperature of 750^0C so that all the organic components of the paint go into gas mode. And then the sample is sent to the chromatograph. Analyzes are carried out in a gas chromatograph. The parameters are set according to the first data.

Analyzes for the sample are carried out according to this parameter. The results of the analysis are sent to the computer within 27-35 minutes. The received data will be analyzed. After that, the results of the analysis will be printed on paper in the form of a chromatogram [73, c. 129].

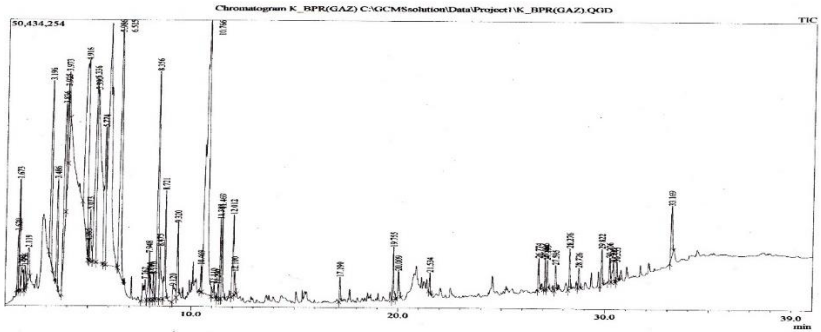


Figure 15. Chromatogram of BPR BASE COAT (GAZ).

When identifying the BPR (GAZ) sample by gas chromatography-mass spectrometric method, it was revealed that first there is decomposition in the groups of carboxylic acids, then by butene double bonds and then ketone, polystyrene, pentyl glycol, etc.

4.3. Determination of coatings by thermogravimetric method.

Thermal analysis was carried out on a derivatograph of the Paulik-Paulik-Erdey system [74, p. 54]. The results of thermogravimetric analysis of paints are shown in figures 16 and 17.

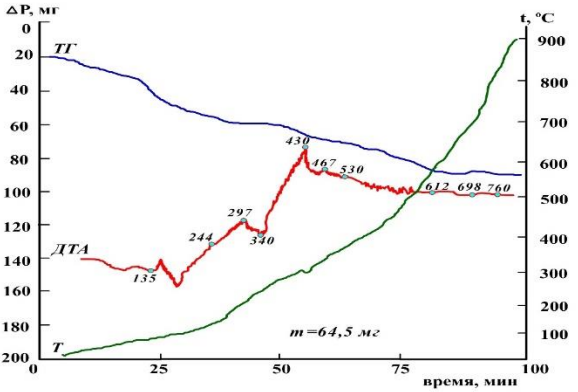


Figure 16. Result of differential thermal analysis paints BPR BASE COAT (GAZ)

Results of thermogravimetric analysis of BPR BASE COAT (GAZ) paint with four endo effects and eight exo effects. The endoeffect at 105°C corresponds to the release of bound water, the following endoeffects at 135, 165, 340°C are characteristic of carboxyl, ketone, glycol and ethyl groups.

Eight exo-effects at 244, 297, 430, 467, 530, 612, 688°C thermogravimetric analysis of the BPR BASE COAT (GAZ) sample correspond to the exo-effects during thermal analysis - polystyrene, ethyl benzene, xelen, methoxypropyl acetate, cyclopentane, benzene, methylene, cyclopropanol.

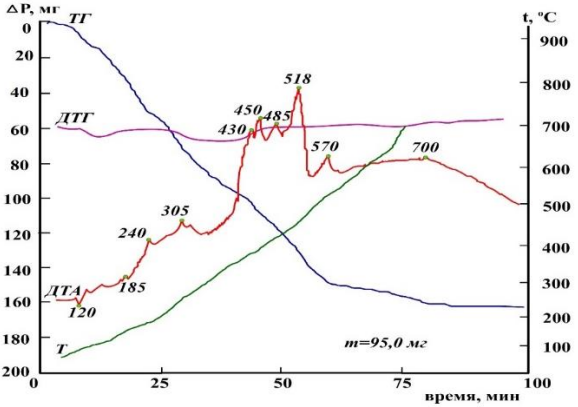


Figure 17. The result of differential thermal analysis of paint Royal mel.

On the heating curve of the Royal mel sample, two endothermic effects were found, at 120, 185°C, which corresponds to aldehydes and alcohols. Exothermic effects at 240, 303, 430,450, 485, 518, 570, and 705°C correspond to the thermal effects of polyacrylamide, oxylene, cyclopentane, octane, undecane, cyclohexane, cyclodecane, and pentadecane.

Conclusion: the thermal behavior of the samples depends on the chemical composition and the amount of added components. The sequence of reactions in parallel gas chromato-mass spectrometric method is confirmed by the results of thermogravimetric analysis.

Analyzing the organization of the process of customs control over the declaration of goods in terms of the classification of paint and varnish products, it was determined that they belong to the category of "complex" goods, because it is impossible to unambiguously determine the GN FEA code, detailed at the level of 10 characters, without applying the rules of interpretation, notes and experimental studies using modern methods of analysis.

They can be attributed to goods, the classification of which is possible with different rates in different groups and commodity items, which is one of the categories of risks in the customs area.

As is known, heading 3208 covers paints and varnishes (including enamels and lacquers) based on synthetic polymers or chemically modified natural polymers, dispersed or dissolved in a non-aqueous medium; solutions referred to in Note 4 to this Chapter.

Heading 3209 includes paints and varnishes (including enamels and varnishes) based on synthetic polymers or chemically modified natural polymers, dispersed or dissolved in an aqueous medium, 3210 00 Other paints and varnishes (including enamels, varnishes and adhesive paints); prepared aqueous pigments used for finishing leathers.

However, despite the different chemical composition, at present, paints and varnishes, when classified at the time of customs clearance, are located in the following commodity subheading:

Table 13

Classification of paint and varnish materials according to GN FEA

3208	**Paints and varnishes (including enamels and varnishes) based on synthetic polymers or chemically modified natural polymers, dispersed or dissolved in a non-aqueous medium; solutions referred to in Note 4 to this Chapter:**
3208 10	- based on polyesters:
3208 10 100 0	- - solutions mentioned in Note 4 to this Chapter

3208 10 900 0	- - other
3208 20	- based on acrylic or vinyl polymers:
3208 20 100 0	- - solutions mentioned in Note 4 to this Chapter
3208 20 900	- - other:
3208 20 900 1	- - - for the industrial assembly of motor vehicles of headings 8701 - 8705, their components and assemblies
3208 20 900 9	- - - other
3208 90	- others:
	- - solutions referred to in Note 4 to this Chapter:
3208 90 110 0	- - - polyurethane of 2,2'-(tert-butylimino)diethanol and 4,4'-methylenedicyclohexyldiisocyanate in the form of a solution in N,N-dimethylacetamide with a polymer content of 48 wt.% or more
3208 90 130 0	- - - copolymer of n-cresol and divinylbenzene in the form of a solution in N,N-dimethylacetamide with
3208 90 190	polymer content of 48 wt.% or more
3208 90 190 1	- - - other:
3208 90 190 9	- - - - other
	- - other:
3208 90 910	- - - based on synthetic polymers:
3208 90 910 1	- - - - for the industrial assembly of motor vehicles of headings 8701 - 8705, their components and assemblies
3208 90 910 9	- - - - other
3208 90 990 0	- - - based on chemically modified natural polymers
3209	**Paints and varnishes (including enamels and varnishes) based on synthetic polymers or chemically modified natural polymers, dispersed or dissolved in an aqueous medium:**
3209 10 000	- based on acrylic or vinyl polymers:
3209 10 000 1	- - for the industrial assembly of motor vehicles of headings 8701 - 8705, their components and assemblies
3209 10 000 9	- - other
3209 90 000 0	- others
3210 00	Other paints and varnishes (including enamels, varnishes and adhesive paints); prepared aqueous pigments used for finishing leathers:
3210 00 100 0	- oil paints and varnishes (including enamels and varnishes)
3210 00 900 0	- others

Such a classification principle does not allow displaying the main parameters of this group of goods, because each of them has a different chemical structure, as well as technological action.

The results of the study in the course of performing gas chromatography with mass spectrometric detection, thermogravimetric analysis and IR spectroscopy confirmed the existence of significant differences in the chemical composition of paints and varnishes included in this commodity subheading [75, c. 46-50].

In this regard, in order to prevent violations of customs rules in terms of unreliable classification of paintwork materials according to the FEA GN, associated with underestimation of customs duties, avoidance of their payment and non-tariff regulatory measures, chemical classification can be considered the most appropriate and scientifically based. It allows you to study the relationship between the chemical structure, physical and chemical properties of paintwork materials.

The given signs are recommended to be used to determine the nature, group affiliation and the corresponding name of the paintwork material when determining the 10-digit product code in accordance with the FEA GN of the Republic of Uzbekistan. We have proposed new code numbers for paints and varnishes shown in

Table 14.

Recommended new codes for paintwork according to FEA GN

№	PM	Chemical composition (resin)	Density, kg/l	Price	Recommended FEA GN code
1	Royal chalk	Alkyd	1.03-1.09	51 895	3208 10 900 0
2	UT-720 Q-Thane	Urethane	0,96-1,20	57 471	3208 10 900 1
3	Base coat solid	Polyester-melamine	1.21-1.25	86 733	3208 10 900 2
4	Top solid	Alkyd-melamine	1,19-1,25	108 627	3208 90 910 1
5	Neolithic	Acrylic-melamine	1,08-1,29	31 578	3208 90 910 2
6	Royal pox	Epoxy	1,36-1,40	47 480	3208 90 910 3
7	ST-600 Royal tem silver	Silicone	1,28-1,36	54 314	3208 90 910 4
8	Traffic	Acrylic	1.38-1.44	25 009	3209 10 000 9
9	Royal tex	Alkyd	1,34-1,40	15 650	3209 90 900 0

The obtained results of the study made it possible to develop an algorithm for assessing the authenticity of paintwork materials in order to unambiguously classify them in accordance with the TN VED of the Republic of Uzbekistan, as well as to identify facts of falsification during customs clearance of this category of goods.

4.4. Economic efficiency of research results

As a result of coding when assigning customs surcharges without relying on the real composition of goods, a number of errors are observed in the classification of paints and varnishes.

For example: in 2016, firm “A” provided imported goods to our Republic from abroad for customs examination in the amount of $1.6 billion. Examination of samples of 26 types of goods "B" was carried out.

According to the documents provided by the entrepreneur on the FEACN, the CCD (cargo customs declaration) was incorrectly classified. Their goal was to reduce customs payments for paintwork materials by assigning them code numbers based on Note 4, 32 of the TN VED group.

According to the Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 212 of June 2016, for oil-based paint and varnish products under the code number 321000100, 30% import duty, 30% excise tax, and 20% value added tax (VAT) are established.

When analyzing the chemical composition and properties of this commercial type by the customs examination, it was revealed that customs payments for this product should have been made in accordance with the code number 320810900 of alkyd-based paint.

Customs payments under the commodity code 320810900 are set as follows: import duties - 30%, excise tax - 50%, VAT - 20%. 15 table.

15 table

PM rates in 2015-2017.

321000100 - oil based paint			
Rate/year	2015	2016	2017
Duty	30%, but not less than $0.5 per kg	30%, but not less than $0.5 per kg	30%, but not less than $0.5 per kg
excise tax	30 %	30 %	30 %
VAT	20 %	20 %	20 %
321000100 - oil based paint			
Rate/year	2015	2016	2017
Duty	30%, but not less than $0.5 per kg	30%, but not less than $0.5 per kg	30%, but not less than $0.5 per kg
excise tax	50 %	50 %	50 %
VAT	20 %	20 %	20 %

To collect excise tax, the total amount of goods of $1.6 million must be multiplied by the dollar exchange rate in relation to the soum ($1 = 3204

soums, as of December 2016) and 20% of the additional excise tax is collected. 1.6 million $ × 3204 soums = 5.1 billion soums.

AN=5.1 billion soums × 20/100 = 1.007 billion soums is charged as an additional customs payment.

This means that 1 batch of goods with an incorrect name in the customs declaration, estimated at $ 1.6 million under the name of household paint based on alkyds, is classified under the code 321000100 of the TN VED as “oil-based household paint”. As a result of non-payment of 20% of the customs duty or calculation of the difference between prices, economic damage was compensated for 1.007 billion soums.

The effectiveness of the introduction into the customs expert practice of the developed methods for the identification and quantification of coatings using gas chromatography, IR spectroscopy and thermogravimetry will improve the quality of customs examinations, will contribute to a high level of validity and reliability of the results obtained, thereby ensuring the formation of a reliable system for protecting interests states in the field of customs.

The proposed approach will help improve quality control of domestic and foreign-made paintwork materials in strict accordance with the requirements of regulatory documents during their customs clearance, as well as solve classification problems in accordance with the TN VED of the Republic of Uzbekistan, which is directly related to the fiscal function of the customs authorities of the Republic of Uzbekistan.

The expected economic effect from the introduction of the developed methods for the identification and quantification of paintwork materials using chromatographic and thermogravimetry amounted to 1.007 billion soums per year.

Based on scientific research to improve the classification of paints and varnishes in accordance with the commodity nomenclature of foreign economic activity:

new code numbers for paints and varnishes introduced into the commodity nomenclature of foreign economic activity have been introduced into customs practice (Certificate of the State Customs Committee No. 05/16-05132 dated May 10, 2018). As a result, it became possible to prevent possible damage to the country's economy, due to incorrect determination of the code numbers of paints and varnishes;

introduced into customs practice an express method for conducting customs examination, developed to determine the code numbers of paints and varnishes (Certificate of the State Customs Committee No. 05/16-05132

dated May 10, 2018). As a result, it became possible to quickly and qualitatively analyze paintwork materials;

the method of chromatography with a mass-selective detector was introduced into the practice of the State Customs Committee, which determines paintwork materials by their composition (Reference of the State Customs Committee No. 05/16-05132 dated May 10, 2018). As a result, it became possible to classify paints and varnishes according to their chemical composition;

the thermogravimetric method for the quantitative and qualitative determination of paints and varnishes was introduced into the practice of the State Customs Committee (Certificate of the State Customs Committee No. 05/16-05132 dated May 10, 2018). as a result, it became possible to increase the efficiency of examination of paints and varnishes in customs activities.

CONCLUSIONS ON THE FOURTH CHAPTER

The metrological characteristics and composition of industrial, architectural and automotive paints are presented and studied.

Methods for determining the mass fraction of volatile, non-volatile and solid substances have been studied, which consist in heating a sample of paintwork material at a certain temperature for a specified period of time or until a constant mass is reached and determining the mass fraction of volatile and non-volatile substances by the difference in the results of weighing before and after heating.

Methods for determining the relative viscosity using a VZ-246 (and Ford cup) viscometer and determining rotational viscosity using a Thomas stormer viscometer were used.

The particle size and the degree of grinding of the coatings were determined using the wedge device in micrometers and the Higman value corresponding to the boundary of a significant amount of individual particles and aggregates of pigments and fillers visible on the surface of the test material layer or the boundary of the beginning of strokes from them.

The covering power of the film was determined on black and white checkered paper with uniform application of coatings. The photoelectric method for determining gloss consists in measuring the magnitude of the photocurrent excited in the photodetector under the action of a beam of light reflected from the surface of the coating under test.

IR spectroscopic methods for the analysis of automotive and industrial paints were carried out in a Perkin Elmer Spectrum 10.4.3 IR spectrometer. with an absorption band of 400-4000 cm-1).

Chromatomasspectrometric analysis of automotive and industrial paints was carried out on an Agilent chromato-mass spectrometer based on a 7890 B chromatograph with a 5975C GCMS (YR-Puro Probe-5000) mass selective detector.

Thermal analysis was carried out on a derivatograph of the Paulik-Paulik-Erdey system with a heating rate of 100C/min and a sample of 0.1 g at a sensitivity of the T-900, TG-200, DTA-1/10, and DTG-1/10 galvanometers in air.

The classification of paintwork materials according to TN VED Res.Uz. and recommended new product codes for coatings. And also clearly calculated the economic efficiency of the results of the study.

CONCLUSION

1. For the first time, the characteristics of notes are given, based on the chemical composition of paints and varnishes, for additionally introduced commodity codes to existing commodity codes based on their chemical structure and composition;

2. A physico-chemical method has been developed for determining commodity codes for types of paints and varnishes based on the amount of resin, the nature of pigments and solvents, as well as the amount of other chemicals in their composition;

3. It is recommended to determine the code numbers of paints and varnishes based on their density in accordance with their organoleptic and physico-chemical parameters that determine the condition of the goods;

4. A method has been developed that corresponds to the quality indicators of paint and varnish materials, which differs sharply from the method based on documents when determining their code numbers.

5. Based on the study of the dependence of density on the chemical composition, new product code numbers of coatings were recommended, comments were prepared for them: for alkyd varnishes - 3208109000, for urethane varnishes - 3208109001, for polyester and polyester-melamine varnishes - 3208109002, for alkyd primers and alkyd-melamine paints - 3208909101, for acrylic-melamine and acrylic-urethane paints - 3208909102, for epoxy paints - 3208909103, for silicone paints - 3208909104, for acrylic water-dispersion emulsions - 3209100009, for alkyd water-dispersion paints - 320990900 in total.

6. Effective "express" methods have been developed for conducting customs examination of paints and varnishes, which are proposed for use by declarants in the preparation of a cargo customs declaration, in international economic relations, as well as by experts, participants in foreign economic activity.

GLOSSARY

Brussels Commodity Nomenclature – The Brussels TN is the First Practical Uniform Statistical Commodity Nomenclature. It was approved by the Second International Convention, which was held in Brussels in 1913. This convention was signed by 29 states.

It consisted of 5 sections, including 186 commodity items. Sections: I - living animals (7p: 1-7). II - food products and drinks (42p: 8-49). III - Raw materials and semi-finished products (49p: 50-98). IV - Finished products (84p: 99-182). V- Gold and silver unworked, gold and silver coins (4p: 183-186).

The World Customs Organization is an intergovernmental international organization headquartered in Brussels, Belgium. Members of the WTO / STS are the customs services of almost all countries of the world. The work of the WTO/JCC is focused on the development of international instruments, conventions on such issues as classification of goods, valuation of customs value, rules of origin of goods, customs duties, security of the supply chain, facilitation of international trade procedures, combating customs offenses and counterfeit products (protection of intellectual property rights), as well as the fight against corruption.

The WCO/JTS pays particular attention to institutional development programs aimed at supporting the implementation of reforms and modernization of customs services. The WTO/JTS has developed the Harmonized Commodity Description and Codification System (HS) and administers two World Trade Organization (WTO) Agreements:

Agreement on the Application of Article VII of the General Agreement on Tariffs and Trade of 1994 (Customs Valuation) and the Agreement on the Rules for Determining the Country of Origin of Goods.

Foreign economic activity is a set of functions of enterprises focused on the world market, taking into account the chosen foreign economic strategy, forms and methods of work in foreign markets. FEA belongs to the market sphere, is based on the criteria of entrepreneurial activity, structural connection with production and is distinguished by legal autonomy and economic, as well as legal independence from industry departmental guardianship.

The initial principle of foreign economic activity of enterprises is commercial calculation on the basis of economic and financial independence and self-sufficiency, taking into account their own monetary, financial and material and technical capabilities.

Harmonized Commodity Description and Coding System (abbr. Harmonized System, HS) – a system for describing and coding goods (a standardized system for classifying goods in international trade; goods are classified as intended (clothes, weapons, etc.).d.), and by sectors of the economy (textiles, animals and livestock products, etc.) The selected categories are assigned codes of 6 digits, while individual countries detail the nomenclature to codes consisting of 8 or 10 digits. Council of Customs Cooperation in 1988. It was signed in the city of Brussels (Belgium).

The State Customs Committee is the state executive body of Uzbekistan, Russia, exercising control and supervision in the field of customs. It also has broad functions in the field of currency control, protection of intellectual property rights, international transport and sanitary supervision.

Cargo customs declaration (CCD) is the main document issued when moving goods across the customs border of the state (export, import). The customs declaration is drawn up by the cargo manager and certified by the customs inspector, which later serves as the basis for passing through the border.

The declaration contains information about the cargo and its customs value, the delivery vehicle, the sender and the recipient. Without submitting a cargo customs declaration, the state customs control bodies do not accept goods and property for customs clearance for passage through the state border.

The European Union (European Union, EU) is an economic and political association of 28 European states. The European Union was created by the Maastricht Treaty of 1992 (entered into force on November 1, 1993) on the basis of the European Economic Community and is aimed at regional integration. The EU is an international entity that combines the features of an international organization (interstate) and a state (suprastate), but legally it is neither one nor the other.

Paints and varnishes (PV) are composite compositions applied to surfaces to be finished in liquid or powder form in uniform thin layers and after drying and curing form a film that has strong adhesion to the base. The formed film is called a paint coating, the property of which is to protect the surface from external influences (water, corrosion, temperatures, harmful substances), giving it a certain look, color and texture.

A coating in materials science is a relatively thin surface layer of another material deposited on an object. The purpose of coating is to improve the surface properties of the base material, commonly referred to as the substrate material. They improve, among others, properties such as

appearance, adhesion, wettability, corrosion resistance, wear resistance, high temperature resistance, electrical conductivity. Coatings can be applied in liquid, gaseous or solid phases, but as a result they are integral with the base material. The coating, as a rule, is applied only to the working part of the part, less often - to the entire surface. Different parts of the surface of the same object can be coated with different coatings. Sometimes multi-layer coatings are used (for example, primer + paint).

Surface-active substances (surfactants) are chemical compounds that, concentrating on the interface of thermodynamic phases, cause a decrease in surface tension.

The commodity nomenclature of foreign economic activity of the Eurasian Economic Union (TN VED EAEU) is a classifier of goods used by customs authorities and participants in foreign economic activity (FEA) for the purpose of customs operations. TN VED CU was adopted by the Commission of the Customs Union.

Customs examination is a special examination or test carried out by experts to detect defective or non-conforming goods accepted in Res. Uz. product standards.

Customs examination is a study that is carried out by experts to solve the problems of customs.

Infrared spectroscopy (vibrational spectroscopy, mid-infrared spectroscopy, IR spectroscopy, IR) is a branch of spectroscopy that studies the interaction of infrared radiation with substances.

Chromatography (from other Greek χρῶμα - "color") is a method for separating and analyzing mixtures of substances, as well as studying the physicochemical properties of substances. It is based on the distribution of substances between two phases - stationary (solid phase or liquid bound on an inert carrier) and mobile (gas or liquid phase, eluent). The name of the method is associated with the first experiments on chromatography, during which the developer of the method, Mikhail Tsvet, separated brightly colored plant pigments.

Gas chromatography with mass spectrometry, or GC-MS, also known as "mass selective detector", is becoming a very popular and powerful gas chromatography technology. It has applications in many areas including environmental protection, forensics, law enforcement, food and beverage, oil and gas, and can be used to perform very low concentration determinations and provide additional molecular weight information.

Differential thermal analysis (DTA) is a research method that consists in heating or cooling a sample at a certain rate and recording the time dependence of the temperature difference between the sample under study

and the reference sample (standard), which does not undergo any changes in the considered temperature range. The method is used to register phase transformations in a sample and study their parameters.

Research work – work of a scientific nature associated with scientific research, research, experiments in order to expand existing and obtain new knowledge, test scientific hypotheses, establish patterns that manifest themselves in nature and society, scientific generalizations, scientific substantiation of projects.

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