METHODOLOGICAL BASIS OF CUSTOMS EXPERTISE OF COTTON AND POLYESTER BLENDED FABRICS

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ABSTRACT

The paper deals with the problem of classifying cotton and mixed fabrics for customs purposes and correctly determining their code according to the commodity nomenclature of foreign economic activity. The level of study of the problem and peculiarities of changes in the chemical composition of cotton and blended fabrics as a result of treatment with dyeing are investigated. As a methodological base, the method of chemical analysis of the customs examination of such fabrics is used, by obtaining infrared spectra on special attachments. Mathematical formulas are proposed for determining the percentage of a dissolved substance in the process of chemical analysis. An algorithm has been developed for determining the composition of a substance by chemical and physico-chemical analysis, the final result of which is the classification of cotton and mixed fabrics for customs purposes. Recommendations are given for the practical application of the obtained scientific results and the improvement of its methods.

KEYWORDS: *Commodity Nomenclature, Cotton Fabrics, Customs Expertise, Goods Classification Algorithm.*

INTRODUCTION

The range of textile products produced for human and technical needs in the world is growing day by day.This is due to the recent creation of new fibers and threads with different properties and characteristics.In line with the development of production, the issue of improving and controlling the quality of finished products, expanding and updating the range is constantly relevant.

One of the most pressing issues in the process of customs control is the correct definition of product codes in accordance with the commodity nomenclature for foreign tconomic activity(CN FEA). This is due to the fact that customs duties are levied in full on the basis of commodity codes under the CN FEA.Customs expertise is important in the analysis of CN FEA code numbers of goods, which can provide important information on their chemical composition, structure, organoleptic, physicochemical and other parameters, as well as production processes of goods.

Almost any object can be analyzed through chemical examination.This type of examination allows the study of the chemical composition, physicochemical and physico-mechanical

properties of fabrics.At the same time, the introduction of automated methods and techniques in product quality control and testing is a topical issue.

2. Description of the Problem and Level of Study

At the time of identification of goods, if they are marked and marked (fabric), it is not a big problem to determine their composition depending on the type.However, in the absence of any information, especially if they are physically similar goods, determining what the contents are can cause certain problems.

Certain types of fabrics are characterized by a certain color, clarity, surface character, gloss, tension, elasticity and other similar properties, the appearance of which allows to know the pattern of the material or product, as well as to have an initial idea of the nature of the fabric.

It is also an important task to determine its CN FEA code through the composition of natural and chemical fibers.These methods and techniques should make it possible to model in the laboratory the results of various external influences that occur during the production and use of textile products and materials.

Analysis of the chemical composition, structure, organoleptic, physicochemical and other parameters of goods in determining the CN FEA code numbers is the main concept of problem solving.

A number of scientists have conducted research to solve this problem.In particular, Russian scientists Shepelev A.F. [1], Zueva O.N. [2], N.A. Babkina [3] and many other scientists have conducted research on the microscopic appearance, composition, origin, characteristics of textile fabrics and their classification, characteristics and classification of nonwovens, characteristics of knitted fabrics and their classification of light industrial goods fibers and yarns.

In addition, a number of Uzbek scholars, including Karimkulov K.M., Askarov M.A. [4], Sattorov M.O., Zhuraev Z.B., Yusupov R.K., Bakirov N.[5] , Kamoliddinzoda N.J., G'afurov J.Q., Fayzullaev Sh.R., Tuychiev I.I., Mavlyanberdieva G.G., Axunbabaev U.O., Khasanova S.X. [6,7] conducted research on cotton and polyester.They studied the classification of textile materials, textile fibers and yarns, fabrics, knitted products, nonwovens and other textile products by indicators such as organoleptic characteristics, properties, structural structure.

The research conducted by these scientists is important in the classification of textile fabrics according to the CN FEA code.Therefore, additional quantitative analysis of the chemical tracking of textile products is an important task [8].

3. Introduction of the method of analysis of CN FEAcode numbers of cotton and polyester blended fabrics

One of the first tasks in determining the CN FEA code of any brand is to study its specific features.Cotton and polyester blended fabrics The initial stage of the analysis of CN FEA code numbers also begins with the study of the specific properties of these materials.

a) Cotton is a natural fiber, a villi that separates from the surface of the seed.It is used in the manufacture of warm clothing, bedding, furniture industry, medicine, artificial silk, artificial leather, photographic film, film, artificial glass, linoleum, plastic, paper, explosives and other products.

Cellulose makes up 92-96% of cotton fiber and 40-60% of trees.The purest cellulose is obtained from cotton.To do this, cotton fiber is repeatedly treated with a 1% NaOH solution, resulting in 99.85% pure cellulose.

To obtain cellulose from wood, wood chips are heated in a solution of calcium bisulfite Ca(NBO3) 2 at 160-180° C, at a pressure of 6-8 atmospheres, as a result of which all substances except cellulose are dissolved, i.e. cellulose is separated. Various papers, synthetic fibers and a number of other organic compounds are obtained from this cellulose.

It can also be treated with a chemical in the manufacture of cotton fiber fabrics.In particular, when alkaline cellulose is esterified with monochloric acetic acid, water-soluble cellulose ether-carboxymethylcellulose is formed.

The composition based on carboxymethylcellulose (along with glycerin and OP-10) is used in the textile industry in the enrichment of cotton fiber in the spinning process, ie in the treatment of damaged fibers.

In addition, azo dyes are used in dyeing yarn fabrics, wool, silk, polymers, man-made and synthetic fibers, adding pigments to other dyes.Sometimes the dye forms a chemical bond with the fiber. It is also possible to paint by immersing the material directly in the paint solution.

Natural silk and wool fibers are dyed directly with acid dyes. To dye cotton fiber directly, it is first processed with tannin, then dyed.

In some cases, the dyeing of the fabric is carried out by adding fixing substances (protrusions). In the process of coloring, fixing substances form pairs with both the material and the paint. As such substances, such as aluminum acetate, iron chloride, iron oxides, chromium and lead are used. Fabrics can be dyed in different colors with the same dye in the presence of different fixers. Cotton, wool and silk are natural polymers, and artificial polymers are obtained by chemical processing of natural polymers.

Depending on the raw materials , chemical fibers are divided into three main groups:

- Synthetic fibers are obtained by separating polymers from natural substances and their chemical treatment. For example, cellulose, casein, proteins.
- Synthetic fibers are made from synthetic organic polymers obtained by synthesis reactions (polymerization and polycondensation) from low molecular weight compounds (monomers).
- Mineral fibers - Fibers are also obtained from inorganic compounds.

b) Polyester is a chemical fiber. The macromolecules of polyester fibers (lavsan, tesil, terylene, dacron) are as follows: $HO\{CH_2\text{-}CH_2\text{-}OOC\text{-}(C_6H_4)\text{-}COO\}_n\text{-}CH_2\text{-}CH_2\text{-}OH$

Polyester fiber has a polydispersed structure, a hard chain, which has the property of crystallization. The internal structure of the fiber has a high degree of order.It is a hydrophobic fiber due to the density of the structure and the absence of hydrophilic groups.At 65% relative humidity, the fiber absorbs 0.4% moisture and at 100% humidity it absorbs 0.6-0.8% moisture.In an aqueous environment, the fiber does not swell. It has a high electrical charge accumulation property.These properties worsen fiber dyeing and mechanical working conditions.

Polyester is a thermoplastic fiber , its softening temperature is 258-260 ^{o} C, soluble in organic solvents.Under the influence of some reagents, polyester fibers (benzoic and salicylic acid)

swell, and this property is used in the dyeing process. Even in the wet state, the elongation value of the polyester at the break does not change.

In the analysis of the CN FEA code of textile fabrics consisting of cotton and polyester fibers, they are quantified by chemical dissolution in the following sequence.

- For chemical analysis, the sample is taken in the smallest unit, which reflects the entire properties of the fabric, the minimum amount is 1 gram. The sample obtained is dried to constant weight and weighed on a special analytical balance.
- The prepared sample is poured into a 300 ml Erlenmeyer flask. 70% sulfuric acid at a temperature of 23-25 ºC is added to the sample in the ratio of 100% by volume and the mixture is stirred in a water bath for 10 minutes. Cotton fibers dissolve in solution.
- Using a glass filter, the solution is subjected to vacuum filtration.The fibers remaining in the funnel are washed in the previous volume and at a temperature of 23-25 ºC in 70% sulfuric acid, then washed with water.
- The fibers are placed in a beaker and neutralized with an aqueous solution of ammonia (about 1%) in a sample volume of about 50 volumes.Once again, it is filtered through a vacuum and the remaining fibers in the funnel are washed with water.
- The remaining fibers are dried in a drying chamber at 105 ± 3ºC for 60 minutes and weighed on an analytical balance. After the weighing process, the fibers are re-examined.

To examine the fibers, the fibers of the weighed sample are separated and KBr tablets or infrared spectra are obtained in a special set-top box. Using a microscope, the presence of cotton fibers in the fiber is checked. When checking, it is necessary to make sure that the cotton fibers in the sample are dissolved.

Determination of the mass of solute is determined by the following formula:

$$M_{er.mod} = M_{nam} - M_{qol} \qquad (1)$$

The percentage of solute is determined as follows:

$$M_{re.\%} = \frac{M_{er.mod} * 100\%}{M_{nam}} \qquad (2)$$

here:

$M_{er.mod}$ – mass of solute (gr).

M_{nam} – mass of the sample (gr).

M_{qol} – residual mass (gr).

$M_{re.\%}$ – percentage of solute (%).

4. Algorithm analysis of code numbers CN FEA xlopchatobumajnyx and polyester smesovyx tkaney

The algorithm for analyzing CN FEA code numbers of cotton and polyester blended fabrics is considered to consist of the following sequence of steps.

Step 1: Inspection and examination of samples and documents.

The submitted sample will be reviewed and studied by experts. During the examination, it is possible to determine that the sample is a fabric with an image of various colors (Fig. 1.).

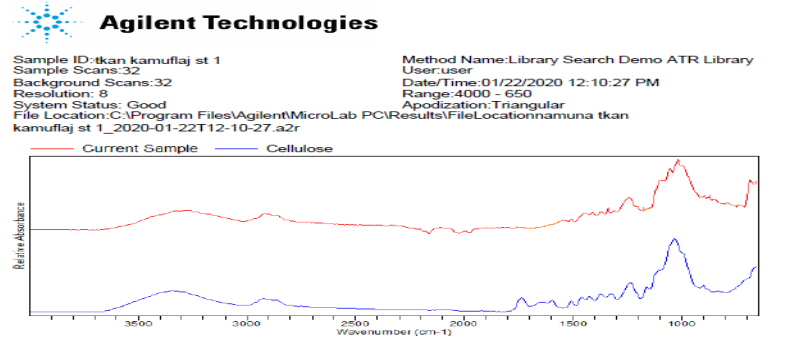
Fig. 1. Type of provided sample

Step 2: Spectral Analysis.

In order to study the composition of the sample, it is checked with an infrared spectrometer brand "Agilent Technologies Cary 630" and the spectrum is taken. According to the obtained spectrum, the yarns in the sample should correspond to the spectrum of cellulose and polyester substances (Fig. 2.).

Step 3: Microscopic Analysis.

The samples are magnified under a microscope to determine what yarn the sample is made of and the nature of some of the fibers. According to the research results, the sample threads should be made from fibrous threads and checked for the presence of cotton and polyester fibers(Fig. 3.).



Quality	Library	CAS#	Name
0.92557	ATR Demo Library (19)		Cellulose Filter Paper
0.92426	ATR Demo Library (53)		Cellulose Filter Paper
0.89035	Agilent Polymer Handheld ATR Library (12)		Cellulose Filter Paper
0.88647	Agilent Polymer Handheld ATR Library (13)		Cellulose Paper Filter W 40 Ashless

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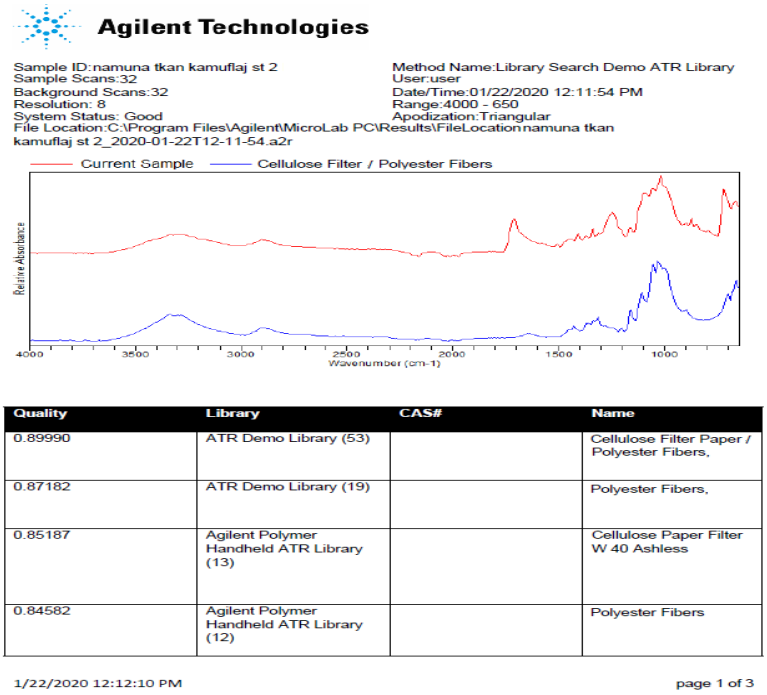

Quality	Library	CAS#	Name
0.89990	ATR Demo Library (53)		Cellulose Filter Paper / Polyester Fibers,
0.87182	ATR Demo Library (19)		Polyester Fibers,
0.85187	Agilent Polymer Handheld ATR Library (13)		Cellulose Paper Filter W 40 Ashless
0.84582	Agilent Polymer Handheld ATR Library (12)		Polyester Fibers

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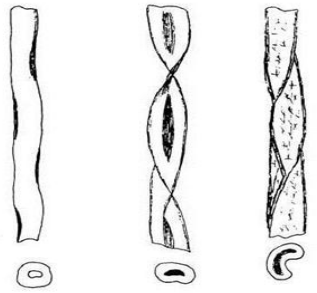
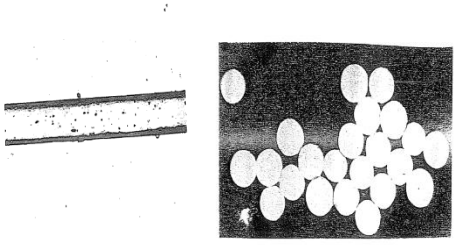
Fig.2. Infrared spectrum of a tissue sample taken with an Agilent Technologies Cary 630 spectrometer



a)



b)

a) Microscopic structure of cotton with different degrees of maturity:
1) Overripe cotton fiber;
2) Mature cotton fiber;
3) Raw fiber.

b) Microscopic structure of polyester fibers:
1) Side view;
2) Top view.

Fig.3. View of tissue samples under a microscope

Step 4: Chemical analysis.

The sample is chemically melted to determine the amount of polyester and cotton in the sample. According to the study, the amount of cotton in the sample (e.g. 48% (± 2)) and the amount of polyester fiber (e.g. 52% (± 2)) are determined as percentages.

Step 5: analysis of the surface density of the samples.

The exact dimensional shape of the sample is cut, measured on an analytical balance of the mark "*" and the surface density is determined. According to the calculation, the average surface density of the sample can be 190 (± 3) g / m2.

CONCLUSION

In conclusion, it should be noted that the goods CN FEA code number analysis algorithm gives the expected results when applied in practice.

In particular, this method is used in the activities of the State Customs Committee of the Republic of Uzbekistan to analyze their CN FEA codes through spectral analysis of the composition of a sample of cotton and polyester blended fabrics.

Quantitative parameters, in particular the percentage of cotton and polyester fibers and the density of the fabric, play a decisive role in the analysis of CN FEA codes of goods.

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