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COMPOSITION, PROPERTIES AND IMPORTANCE OF OILS. DETERMINATION OF QUALITY INDICATORS OF OILS

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ANNOTATION
The article describes the process of "The composition, properties and importance of fats, determining the quality of oils " in the educational process of the younger generation.
KEYWORDS: *composition, properties, importance of oils, quality indicators of oils.*

DISCUSSION

Substances that are soluble in water and well soluble in organic solvents are calledoils. Oils contain hydrocarbons, waxes, alcohols, carbonyl compounds, fatty acids, pigments, steroids, vitamins, and other water-insoluble organic substances, in addition to triglycerides, which are esters of glycerin and fatty acids.

Oils, such as proteins, carbohydrates, and nucleic acids, are important biologically important for living organisms. First of all, the available oils serve as a source of energy for the living organism.

Of the high molecular weight unsaturated fatty acids in fats, oleinate, linolate, linolenic, and arachidonic acids are called essential acids, and fats made from these acids are liquid and are called fats. Deficiency of these acids in the body leads to various diseases. For example, diseases such as atherosclerosis, eczema in young children, and the body's inability to tolerate various infections are caused by a lack of unsaturated fatty acids.

Vitamins and steroids, which are components of vegetable and animal fats, are also of great physiological importance and play an important biological function in the body.

The quality of vegetable oils is different from that of animal fats. Vegetable oils are high in unsaturated acids. Therefore, vegetable oils are of great physiological importance.

The diversity of the daily diet and the importance of the content of fats are very important for the normal functioning of the human body. Vegetable oils are widely used in the pharmaceutical industry to make medicines. Vegetable oils are also used as a raw material in many other industries, in perfumery, paints and soaps.

One of the main tasks of our graduate work is to study the methods of determining the suitability or unsuitability of oils for consumption by determining the quality indicators of the above-mentioned oils.

The solvents and reagents required for the experiment were purified and prepared using organic matter purification methods. The extraction method with hexane or gasoline was used to separate the oils. Driving and drying methods were used to remove oil from the solvents. The physical properties of the oils were determined by a pycnometer, and the refractive index was determined by a refractometer.

The number of saponification from the chemical properties of oils was achieved by heating the oil with an alkaline solution and titrating the separated fatty acids with a solution of potassium hydroxide. The Ganus method was used to determine the iodine number of the oil. The acidic number of the oil was calculated by titration with a solution of potassium hydroxide.

Thus, in our experiment, methods of analysis of organic and analytical chemistry were used. The experimental data were compared with the values in the literature and appropriate conclusions were drawn.

Along with cotton and sunflower oils, soybean oil is also produced in large quantities on an industrial scale. Soybean oil is mainly obtained from

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soybean processing. Soybean oil is high in unsaturated fatty acids. Soybean oil is rich in phosphatides. Soy is not only a source of fat, but also a plant rich in protein and various nutrients. Therefore, the study of soybean oil is of great practical importance.

Of the high molecular weight unsaturated fatty acids in fats, oleic, linoleic, linolenic, and arachidonic acids are called essential acids. Deficiency of these acids in the body leads to various diseases. For example, diseases such as atherosclerosis, eczema in young children, and the body's inability to tolerate various infections are caused by a lack of unsaturated fatty acids.

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A mixture of mono-, di- and triglycerides is found in natural fats and oils. Such compounds are especially abundant in emulsifiers formed during oil refining. A quick and easy way to separate these compounds is by chromatography in a column and in a thin layer.

Therefore, it is of great practical importance to study the methods of separation and separation of glycerides in fats.

Fatty acids in fats

While glycerin is a constant component of fats, the acids that make up fats are very diverse. To date, about 300 different acids have been isolated from fats. Among them, there are those who are saturated and those who are not. It is characteristic that almost all acids in fats have an even number of carbon atoms (from 4 to 28) and the chain of carbon atoms has an unbranched structure. Fats often contain 12 to 18 carbon atoms (SA) and saturated and unsaturated fatty acids.

Saturated fatty acids are as follows.

1.CH3 - (CH2) 2 - COOH may acid
2. (CH3) 2 - CH2 - CH2 - COOH isovaleric acid
3. CH3 - (CH2) 4 - COOH kapronic acid
4. CH3 - (CH2) 6 - COOH caprylic acid
5. CH3 - (CH2) 8 - COOH capric acid
6. CH3 - (CH2) 10 - COOH lauric acid
7. CH3 - (CH2) 12 - COOH myristic acid
8. CH3 - (CH2) 14 - COOH palmitic acid
9. CH3 - (CH2) 16 - COOH steric acid
10. CH3 - (CH2) 18 - COOH arachinic acid

Fatty acids that have a high melting point are usually solid. For example, palm oil is one of them. The fatty acids in plants that grow at moderate temperatures are unsaturated fatty acids. That is why vegetable oils are liquid and they are called fats. Examples of unsaturated fatty acids are:

1. CH3 - (CH2) 5 - CH = CH (CH2) 7 - COOH palmitoolinate
2. CH3 - (CH2) 7 - CH = CH (CH2) 7 - COOH oleinate
3. CH3 - (CH2 - CH = CH) 3 - (CH2) 7 - COOH linolenate
4. CH3 - (CH2) 3 - (CH2 - CH = CH) 2 - (CH2) 7 - COOH linolate
5. CH3 - (CH2) 4 - (CH2 - CH = CH) 4 - (CH2) 3 - COOH arachidonate
6. CH3 - (CH2) 7 - CH = CH (CH2) 13 - COOH norvanate
7. CH2 - CH2 - CH - (CH2) 4 - COOH lipoat
ï ï

Linolaic, linolenic, arachidonic and lipoic acids are the most important unsaturated acids in fats. These acids are not synthesized in animals or humans.

Palmitinate C15H31COOH, stearinate C17H35COOH; oleinanic C17H33COOH, linolate C17N31COOH, linolenate C17N29COOH acids are among them.

In some cases, fats contain 14 or less, as well as saturated and unsaturated acids, which contain 20 or more carbon atoms.

Physicochemical properties of oils

Fats are insoluble in water and are soluble in organic solvents such as diethyl ether and petroleum ethers. Some oils are solids at normal temperatures (e.g., lard and beef fat) while others are soft (butter) or even liquid (e.g., vegetable oil, fish oil). Liquid oils are commonly referred to as fats.

The consistency of fats depends on what fatty acids they contain. Fats that have saturated fatty acid residues in their molecules are solid unsaturated acids, and fats that have high residual fatty acids are liquid. In addition, as the number of carbon atoms in a fat molecule increases, so does the liquefaction temperature, which means that the consistency of the fats changes with increasing molecular weight. In addition to the liquidus temperature, different oils are also characterized by constants called iodine content.

The amount of iodine is an indicator of fat saturation, expressed in grams of iodine per 100 g of fat. This method determines the number of double bonds in a fat molecule.

Hydration or saponification is the most important property of oils and is done in the following ways. Hydrolysis with caustic alkalis: Fats

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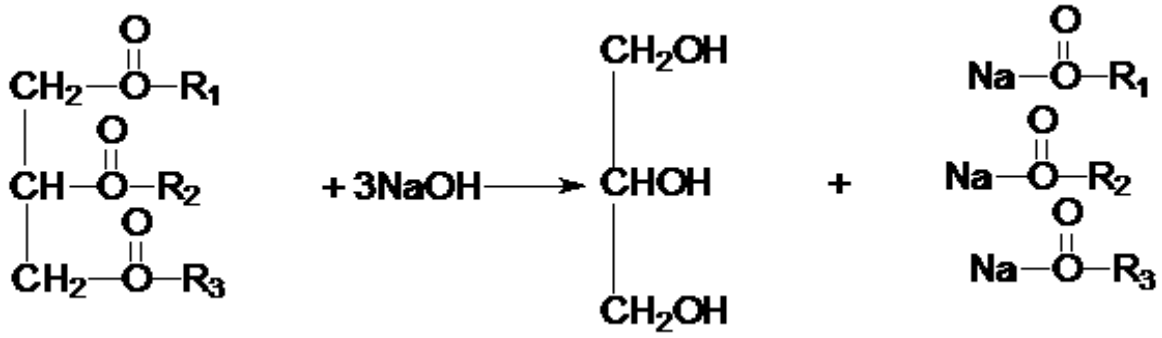
are easily hydrolyzed by caustic alkalis to glycerin and soap.



Importance and use of fats

Fats act as a reserve substance in the body of animals and plants. Fats are widely used in technology. Drying oils (oils that contain a lot of double bonding), for example, when flaxseed oil is applied in a thin layer, they harden into a thin hard film. Aliya and oil paints are made using this property.

To accelerate the solidification of oils, catalysts called desiccants are added to them. Lead compounds and some manganese salts are used as desiccants. The mechanism by which oils are formed is not well understood.

In medicine, some oils are used in the preparation of ointments (for example, lard Axungia porcina, as well as liniments, sunflower oil). Many oils (olive oil - Olium oli varum, peach oil - Olium persicorum) are used to dissolve subcutaneous drugs, such as camphor, myarsenol and a number of other drugs. Fish oil is used for both drinking and rubbing on the skin.

In recent years, polyunsaturated fatty acids have been found to have a positive effect on lipid and protein metabolism, the course of hypertension and atherosclerosis. Fats are a source of energy for plants and animals. The heat energy released from the oxidation of fats is much higher than the energy released from the oxidation of carbohydrates and proteins. For example, 17.5 kJ (4.2 kcal) is lost when 1 g of carbohydrate is completely oxidized, 18 kj (4.3 kcal) is released when 1 g of protein is oxidized, and 39 kj (9, 3 kcal) of energy is produced.

Fats are stored in special fat depots (subcutaneous fat, carcass, kidneys, heart, liver, etc.) as a backup in the animal body, while the seeds of plants (seeds, sunflower, hemp, flax, sesame) collected in The fat content in the seeds can be 30-40% or more. In addition to being important nutrients in the body, fats also participate in the formation of the structure of the protoplasm in combination with proteins, carbohydrates and many other substances.

Quality indicators of oils

One of the most common organic substances in living nature is a mixture of substances composed of various organic compounds called lipids. The main part of lipids consists of glycerins, which are complex esters of glycerin and fatty acids. When we say fats, we mainly mean triglycerides with a liquid consistency. In this dissertation, we will focus on the methods of determining the number of saponification, iodine and acidity, which play an important role in determining the quality of oils.

Free fatty acids in fats are formed by hydrolysis under the influence of water vapor in light. As a result, the oil has a peculiar odor and becomes bitter.

Fats hydrolyze under the influence of water vapor, as well as when heated with acid and alkaline solutions, and break down into glycerin and fatty acids. When hydrolysis is carried out under the influence of alkali, salts of fatty acids or soaps are formed. That is why the alkaline hydrolysis of fats is called the saponification of fats.

As a result of alkaline hydrolysis of oils, the saponification process takes place. In this case, salts of high fatty acids with glycerol are formed. This process is of great importance in the production of soap. Therefore, it is necessary to determine the number of saponification of oils in order to know how much soap can be obtained as a result of alkaline hydrolysis of oil and how much alkali is required.

Fats may contain free fatty acids, indicating the acidic number of the fat. The amount of free acids can increase when oils are exposed to light, temperature and humidity.

So it is necessary to know in advance the oils and their properties in order to recommend their use in this or that area of production. It plays a major role in expanding the field of application of oils and creating new technologies.

The amount of milligram of potassium alkali used to neutralize the free and bound fatty acids in 1 g of fat is called the saponification number of the fat.

Oils are somewhat chemically stable compounds, but when hydrolyzed by alkali, the ether

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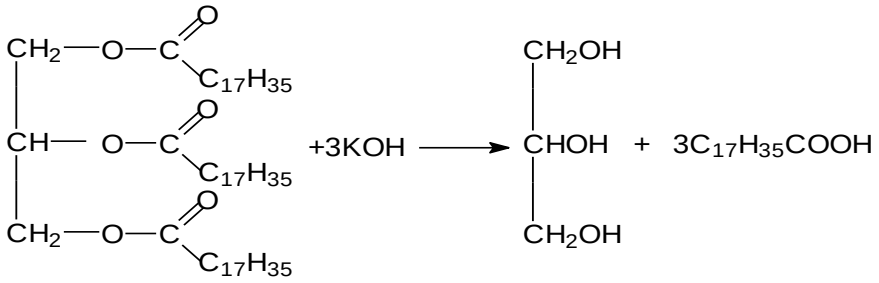
bonds are easily broken, resulting in the formation of fatty acids and glycerin.



The amount of potassium hydroxide used to neutralize the free and bound fatty acids in one gram of fat is called the saponification number of the fat. The value of the saponification number is used to calculate the amount of alkali used to hydrolyze the oil, the amount of glycerin and soap that can be obtained by hydrolysis.

The number expressed in milligrams of 0.1 N potassium hydroxide used to neutralize free fatty acids in one gram of fat is called the acid number of fats. The higher the acidity of the fat, the lower the quality of the fat. This is because the acid number depends on the presence of free fatty acids, which are formed as a result of the hydrolysis of fat and lead to fat degradation. Therefore, this number is one of the most important indicators of oil quality.

The number of iodine per hundred grams of fat is called the iodine number of fats. The higher the iodine content, the more liquid the fat. That is, the iodine number of a fat indicates the amount of unsaturated fatty acids in that fat. As mentioned above, fat with a high iodine content is a biologically important quality fat.

An easy way to determine if a fat is unsaturated is to use an iodine number. The higher the iodine number, the more unsaturated the fat. This means that when the oil is high in unsaturated acids, it is high in oleic, linolate, linolenic and arachidonic acids. The higher the content of unsaturated acids in vegetable oils, the higher the physiological value of the oil.

In addition to the above parameters, there are liquefaction and boiling points, peroxide number, number of genes, density, refractive index and other constants of oils. Determining these parameters also indicates whether the oil is fit for consumption or not.

In summary, constants such as saponification number, acidity number, iodine number, oil solubility, density, and refractive index were determined from the important physicochemical parameters that characterize the quality of glycerides that form the basis of oils. The values of these indicators are shown in the table.

Various additives found in oils have a significant effect on their physicochemical properties. Therefore, the determination of the physical and chemical constants of edible oils is of great practical importance in the analysis of their quality, in the knowledge of the nature of their additives, and in the determination of food quality.

From the point of view of water, we determined the physicochemical properties of the sparrow oil in Satio. The density of sunflower oil is determined on a pycnometer, the refractive index is measured on a refractometer. The number of acids, the number of saponification, the number of ethers are determined by the above methods.

To determine the acid number, 3 g of oil is titrated with an 0.1 N alcoholic solution of potassium hydroxide. The acid number is calculated according to the following formula.

$$Kc = \frac{a \cdot K \cdot 5{,}61}{C}$$

Here: a is the amount of KOH solution used for titration of the obtained oil, ml,

K - coefficient of ‘duzetio’ of 0.1 N KOH solution (0.095)

S - amount of fat, 3 gr

To determine the amount of saponification, boil 3 g of a 0.5 N alcoholic solution of potassium hydroxide in a flask for 3 minutes. The mixture is then titrated with 0.5 N HCl solution. The number of saponification is calculated by the following formula:

$$Cc = \frac{(a - в)K \cdot 28{,}05}{C}$$

a - v - volume of HCl used for titration of control and experimental samples, ml

K is the ‘ducetio’ coefficient of hydrochloric acid

28.05 - 0.5 n 1ml HCl solution to KOH equivalent

S - amount of fat, 3 gr.

The number of ethers is calculated by the difference between the number of saponification and the number of acids:

$$Эc = Cc - Kc$$

We determined the molecular weight of the oil according to the following formula:

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$$M = \frac{3 \cdot 56110}{Kc}$$

Table 1.
Determination of acid number

Amount of oil (sample), grams	Volume of KOH (0.1 n) used for titration,	ml Acid number, mg KOH / g	
			average
2,8	8,7	1,65	
3,0	8,5	1,51	1,52
3,1	8,2	1,41	

Table 2.
Find the number of soaps

Oil content, grams	Titration volume 0.1 n NSl volume, ml	Number of saponification, mg KOH / g	
			average
2,9	20	193,4	
3,0	20,5	191,7	191,7
3,1	21	190,0	

Table 3.
Physicochemical properties of oils

Indicators	Meaning
Density, d_4^{20}	0,915
Refractive index, n_D^{20}	1,470
Acid number, mg KON / g	1,52
Number of saponification, mg KOH / g	191,7
Ether number	190,18
Molecular number	878,1

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