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# DETERMINATION OF AMYGDALIN CONTENT IN PEACH OIL OBTAINED BY PRESSING METHOD

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**Abstract:** The aim of this study is to determine the amygdalin content in peach oil obtained using the pressing method. This information is crucial for evaluating the quality of peach oil and expanding its potential applications in pharmacological and food industries. Additionally, the study examines the effect of the pressing process on the amygdalin content, providing a significant scientific basis for optimizing peach oil production processes in the future.

**Keywords:** Peach oil, pressing, amygdalin, chromatography, water-soluble vitamins, acetonitrile, concentration, phosphorus, acetate buffer, acetonitrile.

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**Introduction.** In recent years, there has been a growing interest in natural plant-based oils. Particularly, the production of ecologically safe and biologically active products has gained significant importance in the food, cosmetics, and pharmaceutical industries. Peach oil is one such product, and a thorough investigation of its composition holds substantial scientific and practical value. One of the biologically active compounds in peach oil is amygdalin, a glycoside compound that, while offering certain health benefits, can have harmful effects if misused. To date, several scientific studies have explored the role of amygdalin in food safety and pharmaceutical applications. However, the determination of amygdalin content in peach oil obtained through the pressing method and the study of its compositional characteristics remain insufficiently addressed.

**Peach Oil.** The peach fruit is a valuable source of nutrition and is widely utilized not only in dietary consumption but also in the cosmetics and pharmaceutical sectors. The production of oil from peach kernels dates back approximately two thousand years. Over this long history, humanity has utilized this oil across various medical fields, both in conventional and alternative practices. Below, the mechanical properties of peach oil are presented (Table 1). The mechanical properties of a product refer to its response to external forces, such as its compressibility, stretchability, or susceptibility to deformation.

**Table 1. Physical and Mechanical Properties of Peach Kernel Oil**

Indicator	Peach kernel oil
Density at 15 °C, kg/m <sup>3</sup>	918–925 °C
Refractive Index at 20 °C	1,471–1,473 °C
Solidification Temperature, °C	-20–23 °C
Color	Light yellow
Smell	Mild
Boiling Point °C	232 - 235 °C

The physical and mechanical properties of peach kernel oil are presented in the table above. Density: At 15°C, the density is 918 kg/m<sup>3</sup>. This density indicator shows that the oil is lighter compared to water. Refractive Index: At 20°C, the refractive index ranges from 1.471 to 1.473. This characteristic defines the oil's ability to refract light and is used for identifying and assessing its purity. Solidification Temperature: The solidification temperature ranges from -20°C to 23°C. A low solidification temperature indicates that the oil has good flow characteristics even at low temperatures. Color: Light yellow. The color of the oil may vary depending on the peach variety and production conditions. Odor: Mild or none, characteristic of peach kernel oil. The odor is either absent or very mild, with a distinct characteristic scent related to the oil. Boiling Point: The boiling point ranges from 232°C to 235°C. A high boiling point demonstrates the oil's stability to heat and its resistance to thermal degradation.

**Beneficial Properties.** Peach kernel oil is one of the most commonly used base oils for aromatherapy purposes. This oil has almost no bitterness, making it an ideal choice for enriching cosmetic creams, ointments, shampoos, massage and cosmetic oils, balms, lotions, and masks. Peach kernel oil is particularly suitable for regular care of brittle and dry hair, as it helps to restore hair structure and ensures a healthy shine. Additionally, this oil is used as a restorative and softening component in the care of eyebrows and eyelashes. The oil obtained from peach kernels has a strengthening effect on the nail plate and helps prevent brittleness and delamination.

Peach kernel oil demonstrates beneficial effects against atherosclerosis and shows potential in reducing the harm of cardiovascular diseases. In a study conducted with rats, despite being fed a high-fat diet, improvements in blood lipid levels and a reduction in blood lipid content were observed. The study indicates that peach kernel oil has a beneficial effect on reducing the development of atherosclerosis in rats. In this experiment, researchers applied peach kernel oil to ApoE knockout rats (a model of rats predisposed to atherosclerosis) and studied its effects. The findings showed that the treatment led to a decrease in blood lipid levels, an increase in high-density lipoproteins (HDL), and a reduction in the volume of atherosclerotic plaques. These results suggest that peach kernel oil could be beneficial in preventing cardiovascular diseases.

Peach and apricot kernel oils have been explored as raw materials for biodiesel production. The oil extraction process, chemical processing (transesterification), and the

physical-chemical properties of the obtained biodiesel were studied. These properties were compared to European biodiesel standards (ELOT EN 14214). The oil content in peach kernels was found to be high (44.04% by weight), while in apricot kernels, it was relatively lower (23.30% by weight). The quality indicators of biodiesel derived from peach oil were shown to be superior to those obtained from apricot oil.

#### Sample Preparation for Experiment:

For the experiment, peach kernel oil obtained from the fuzzless peach fruits grown in the Pop and Kosonsoy districts of the Namangan region was used. The oil was extracted using the scientific laboratory facilities of the Namangan Engineering and Technology Institute. The seeds were divided into four fractions. The seeds were crushed using our grinding apparatus and sorted into fractions of whole, 6 mm, 4 mm, and 3 mm sieve sizes. Before placing them into the water bath, the moisture content was measured using a moisture analyzer. The samples were then soaked in the water bath for 5-10 minutes. Afterward, the moisture content was measured again, and the oil extraction process continued by pressing the samples in the pressing apparatus. The extracted oil was weighed, and the results were recorded. The oil was then analyzed to determine its amygdalin content.

**Amygdalin Detection Method:** The goal is to determine the purity and quantity of amygdalin in the oil extracted from the fruit kernels.

**The importance of High-Performance Liquid Chromatography (HPLC) and the structure of the equipment is as follows:**

The sample mixture, which is to be separated in very small amounts, is passed through a column and directed into a mobile phase flow. Various types of columns are available, each with different particle sizes and surface adsorbents. The mixture moves through the column at various speeds and interacts with the stationary phase, known as the adsorbent. The speed of each component in the mixture depends on its chemical properties, the nature of the column, and the composition of the mobile phase. At a specific time interval, different substances are separated from the column. The retention time is measured under defined conditions and is considered as a characteristic of the particular apparatus.

**Table 2.** Description of High-Performance Liquid Chromatography (HPLC) Equipment

Instrument	Description
Shimadzu Nexera XR	SPD – M20A
Detector	Ultraviolet (UV)
Flow Rate	1.00 mL/min
Separation Column Type	Shim-Pack GIST, 4.6 x 250mm, 5µm C18
Wavelength	254 nm
Sample Volume	10 µL
Mobile Phase	pH 2.5 buffer solution 50% : 50% acetonitrile
Solvent	Distilled water



### Sample Preparation for Analysis №1 (Oil from Fruit Kernels):

Take 1000 mg of oil and place it in a 50 mL volumetric flask. Add 50 mL of distilled water and leave the mixture in an ultrasonic water bath for 15 minutes. Afterward, filter the solution through a paper filter.

### Preparation of Amygdalin Standard Solution:

Take 100 mg of amygdalin standard and place it in a 100 mL volumetric flask. Add 50 mL of distilled water and dissolve it. Once fully dissolved, dilute with solvent to the mark.

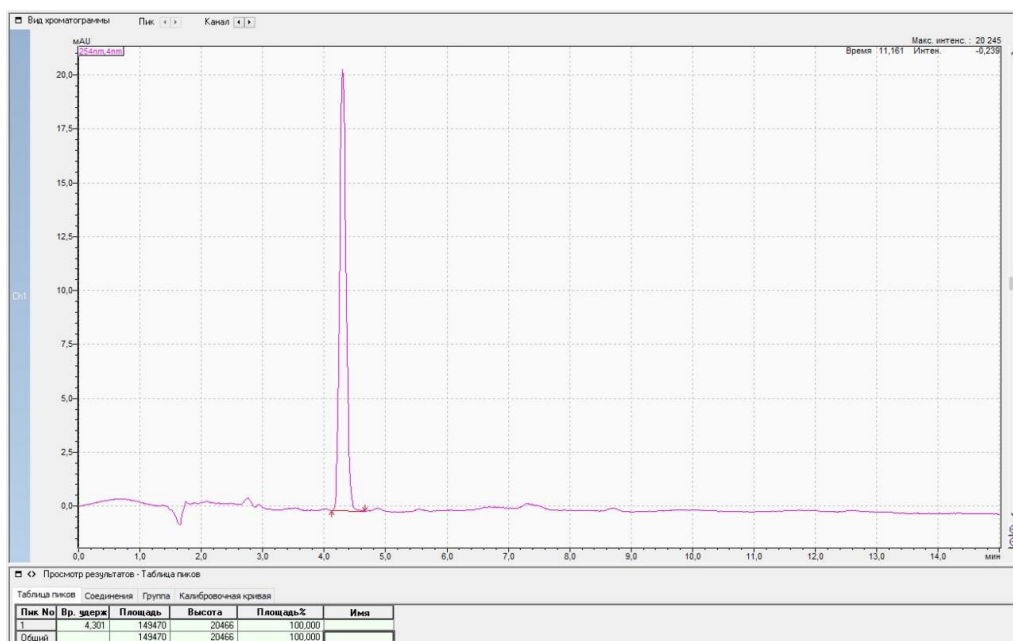


Figure 1. Chromatogram: Peach oil chromatogram

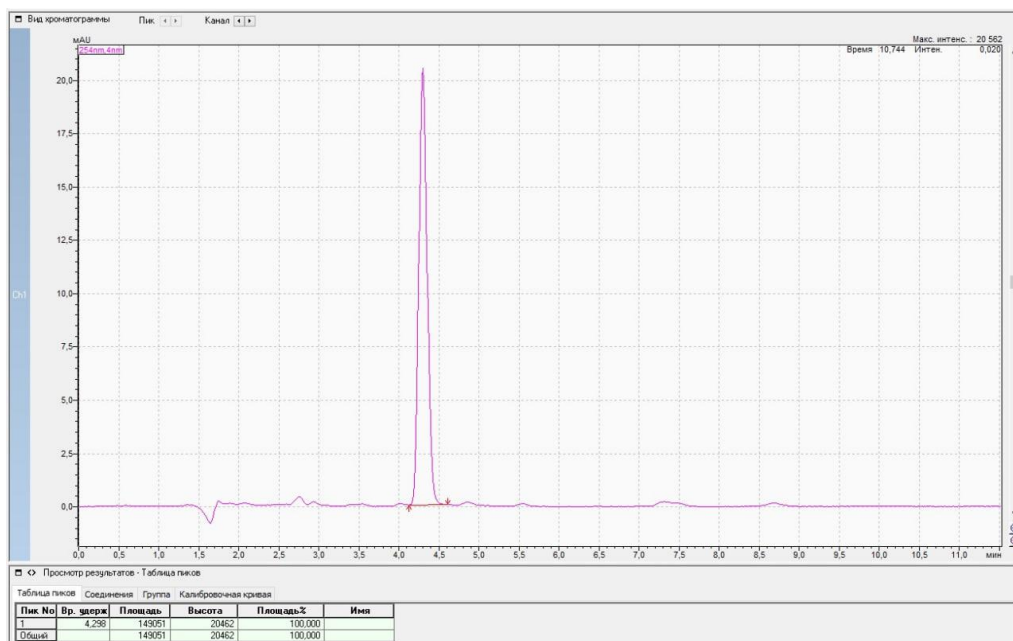


Figure 2. Chromatogram: Amygdalin standard sample

**Table 3.** Analysis of the amygdalin content of the test sample

No	Amygdalin standard sample.	Preparation of the Sample for Analysis
Time of Ingestion	4,298min	4,301min
	4,297min	4,300min
	4,299min	4,299min

### Determination of the Amigdaline Content in Oil

- Standard Amigdaline Sample – (ABS) - 149051
- Sample to be Tested (Oil) – (ABS) – 149470

Then, the following formula was used to determine the amount of amigdaline in the oil:

$$x = \frac{S_1 * m_0 * P}{S_0 * m_1}$$

$S_1$  – 149051 **Amigdaline Standard Sample**

$S_0$  – 149470 Test Sample (Oil) ABS Value

$m_0$  – 100mg Amount of Standard Sample

$m_1$  – 1014mg Amount of Test Sample

$P$  – 99,84% Purity of Amigdaline

$$x = \frac{149051 * 50 * 100 * 99.84}{149470 * 1000 * 100} = 4.91\text{mg/gr}$$

As a result, the amount of amigdaline in the oil was determined to be 4.91 mg/gr. Through this process, the amount of amigdaline in the tested sample was determined, and its quantity was calculated using the formula above.

**Amigdaline:** The seed of the peach contains plant oil, protein, and biologically active compounds, which, through processing, yield economically and industrially significant products. In particular, peach oil obtained through pressing stands out due to its natural composition and high-quality properties. One of the components of peach oil is amigdaline, which belongs to the group of glycosides. Amigdaline is a natural compound primarily found in the seeds of peaches, almonds, and other stone fruits. This compound attracts interest as a biologically active substance since it has been used in certain traditional medicinal practices. However, the hydrolysis of amigdaline results in the formation of toxic cyanide, which necessitates studying its safety.

**Conclusion.** The analysis of the amigdaline compound and the determination of its quantity require highly efficient methods. In this study, high-performance liquid chromatography (HPLC) was used to identify the compound using a standard amigdaline sample and a test sample (oil). The amount of amigdaline in the tested sample was calculated based on the time of ingestion and ABS (absorbance) measurements. This method can be widely used in molecular analysis due to its high accuracy. The results provide reliable and precise data for the detection of significant amounts of amigdaline.

Furthermore, this analytical method is also effective in assessing the quality of active compounds in oil and controlling production processes. According to the results, the amount of amigdaline in the test sample was found to be 4.91 mg/gr. This indicates the high purity and accurate quantity of the amigdaline compound in the oil. Additionally, the process of calculating the amigdaline content using the formula was confirmed to be effective and reliable.

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# CONTENTS

## TECHNICAL SCIENCES: COTTON, TEXTILE AND LIGHT INDUSTRY

<b>Rakhimov R., Sultonov M.</b>	<b>3</b>
Inspection of the strength of the column lattice of the improved fiber cleaner	
<b>Turdiyev B., Rosulov R.</b>	<b>10</b>
The influence of technological parameters of the elevator on cotton seed damage	
<b>Khuramova Kh.</b>	<b>15</b>
Graphic analysis of the obtained results on cotton regeneration	
<b>Sharifbayev R.</b>	<b>20</b>
Optimizing feature extraction in Ai-based cocoon classification: a hybrid approach for enhanced silk quality	
<b>Akramov A., Khodzhiev M.</b>	<b>24</b>
The current state and challenges of the global textile industry: key directions for the development of Uzbekistan's textile sector	

## TECHNICAL SCIENCES: AGRICULTURE AND FOOD TECHNOLOGIES

<b>Sattarov K., Jankurazov A., Tukhtamyshova G.</b>	<b>30</b>
Study of food additives on bread quality	
<b>Madaminova Z., Khamdamov A., Xudayberdiyev A.</b>	<b>37</b>
Determination of amygdalin content in peach oil obtained by pressing method	
<b>Kobilov N., Dodayev K.</b>	<b>43</b>
Food safety and industrial importance of corn starch. the impact of the hydration process on the starch content in the grain	
<b>Mustafaev O., Ravshanov S., Dzhakhangirova G., Kanoatov X.</b>	<b>50</b>
The effect of storing wheat grain in open warehouses on the "aging" process of bread products	
<b>Erkayeva N., Ahmedov A.</b>	<b>58</b>
Industrial trials of the refining technology for long-term stored sunflower oil	
<b>Boynazarova Y., Farmonov J.</b>	<b>64</b>
Microscopic investigations on the effect of temperature on onion seed cell degradation	
<b>Rasulova M., Xamdamov A.</b>	<b>79</b>
Theoretical analysis of distillators used in the distillation of vegetable oil miscella	



## CHEMICAL SCIENCES

<b>Ergashev O., Bazarbaev M., Juraeva Z., Bakhronov H., Kokharov M., Mamadaliyev U.</b>	<b>84</b>
Isotherm of ammonia adsorption on zeolite CaA (MSS-622)	
<b>Ergashev O., Bakhronov H., Sobirjonova S., Kokharov M., Mamadaliyev U.</b>	<b>93</b>
Differential heat of ammonia adsorption and adsorption mechanism in Ca <sub>4</sub> Na <sub>4</sub> A zeolite	
<b>Boymirzaev A., Erniyazova I.</b>	<b>101</b>
Recent advances in the synthesis and characterisation of methylated chitosan derivatives	
<b>Kalbaev A., Mamataliyev N., Abdikamalova A., Ochilov A., Masharipova M.</b>	<b>106</b>
Adsorption and kinetics of methylene blue on modified laponite	
<b>Ibragimov T., Tolipov F., Talipova X.</b>	<b>114</b>
Studies of adsorption, kinetics and thermodynamics of heavy metall ions on clay adsorbents	
<b>Muratova M.</b>	<b>123</b>
Method for producing a fire retardant agent with nitric acid solutions of various concentrations	
<b>Shavkatova D.</b>	<b>132</b>
Preparation of sulphur concrete using modified sulphur and melamine	
<b>Umarov Sh., Ismailov R.</b>	<b>139</b>
Analysis of hydroxybenzene-methanal oligomers using <sup>1</sup> H nmr spectroscopy methods	
<b>Vokkosov Z.</b>	<b>148</b>
Studying the role and mechanism of microorganisms in the production of microbiological fertilizers	
<b>Mukhammadjonov M., Rakhmatkarieva F., Oydinov M.</b>	<b>153</b>
The physical-chemical analysis of KA zeolite obtained from local kaolin	
<b>Shermatov A., Sherkuziev D.</b>	<b>160</b>
Study of the decomposition process of local phosphorites using industrial waste sulfuric acid	
<b>Khudayberdiev N., Ergashev O.</b>	<b>168</b>
Study of the main characteristics of polystyrene and phenol-formaldehyde resin waste	

## TECHNICAL SCIENCES: MECHANICS AND MECHANICAL ENGINEERING

<b>Kudratov Sh.</b>	
UZTE16M locomotive oil system and requirements for diesel locomotive reliability and operating conditions	<b>174</b>
<b>Dadakhanov N.</b>	
Device studying the wear process of different materials	<b>181</b>
<b>Dadakhanov N., Karimov R.</b>	
Investigation of irregularity of yarn produced in an improved drawn tool	<b>189</b>
<b>Mirzaumidov A., Azizov J., Siddiqov A.</b>	
Static analysis of the spindle shaft with a split cylinder	<b>196</b>
<b>Mirjalolzoda B., Umarov A., Akbaraliyev A., Abduvakhidov M.</b>	
Static calculation of the saw blade of the saw gin	<b>203</b>
<b>Obidov A., Mirzaumidov A., Abdurasulov A.</b>	
A study of critical speed of linter shaft rotation and resonance phenomenon	<b>208</b>
<b>Khakimov B., Abdurakhmanov O.</b>	
Monitoring the effectiveness of the quality management system in manufacturing enterprises	<b>217</b>
<b>Bayboboev N., Muminov A.</b>	
Analysis of the indicators of the average speed of units for the process of loading into a potato harvesting machine	<b>232</b>
<b>Kayumov U., Kakhkharov O., Pardaeva Sh.</b>	
Analysis of factors influencing the increased consumption of diesel fuel by belaz dump trucks in a quarry	<b>237</b>
<b>Abdurahmonov J.</b>	
Theoretical study of the effect of a brushed drum shaft on the efficiency of flush separation	<b>244</b>
<b>Ishnazarov O., Otabayev B., Kurvonboyev B.</b>	
Modern methods of smooth starting of asynchronous motors: their technologies and industrial applications	<b>250</b>
<b>Kadirov K., Toxtashev A.</b>	
The influence of the cost of electricity production on the formation of tariffs	<b>263</b>
<b>Azambayev M.</b>	
An innovative approach to cleaning cotton linters	<b>271</b>
<b>Abdullayev R.</b>	
Theoretical substantiation of the pneumomechanics of the Czech gin for the separation of fiber from seeds	<b>277</b>
<b>Siddikov I., A'zamov S.</b>	
Study of power balance of small power asynchronous motor	<b>282</b>

<b>Obidov A., Mirzaakhmedova D., Ibrohimov I.</b>	<b>288</b>
Theoretical research of a heavy pollutant cleaning device	
<b>Xudayberdiyeva D., Obidov A.</b>	<b>294</b>
Reactive power compensation and energy waste reduction during start-up of the electric motor of uxk cotton cleaning device	
<b>Jumaniyazov K., Sarbarov X.</b>	<b>302</b>
Analysis of the movement of cotton seeds under the influence of a screw conveyor	
<b>Abdusalomova N., Muradov R.</b>	<b>310</b>
Analysis of the device design for discharging heavy mixtures from the sedimentation chamber	
<b>Ikromov M., Shomurodov S., Boborajabov B., Mamayev Sh., Nigmatova D.</b>	<b>318</b>
Study of obtaining an organomineral modifier from local raw materials to improve the operational properties of bitumen	
<b>Ikromov M., Shomurodov S., Boborajabov B., Mamayev Sh., Nigmatova D.</b>	<b>324</b>
Development of composition and production technology for polymer-bitumen mixtures for automobile roads	
<b>Muradov R., Mirzaakbarov A.</b>	<b>332</b>
Effective ways to separate fibers suitable for spinning from waste material	

## ADVANCED PEDAGOGICAL TECHNOLOGIES IN EDUCATION

<b>Xoliddinov I., Begmatova M.</b>	<b>336</b>
A method of load balancing based on fuzzy logic in low-voltage networks with solar panel integration	
<b>Murodov R., Kuchqarov A., Boynazarov B., Uzbekov M.</b>	<b>345</b>
Research on the efficiency of using hydro turbines in pumping mode and for electricity generation	
<b>Abdurakhimova M., Romanov J., Masharipov Sh.</b>	<b>353</b>
A literature review of settlement land trends (past, present, and future) based on english-language articles indexed in the web of science database from 2014 to 2023	
<b>Muhammedova M.</b>	<b>360</b>
Development and scientific justification of the design of orthopedical footwear for patients with injuries to the soul-foot joint	
<b>Akbaraliyev M., Egamberdiyev A.</b>	<b>367</b>
Methods of effective organization of fire and rescue operations	

---

**A'zamxonov O., Egamberdiyev A.**

Principles of organizing material and technical support in emergency situations 373

---

**Tuychibayeva G., Kukibayeva M.**

The module of developing communicative competence of seventh and eighth-grade students in uzbekistan secondary schools 379

---

**Ismoilova Z.**

Methods for enhancing the competence of future english teachers 383

---

**ECONOMICAL SCIENCES**

---

---

**Yuldashev K., Makhamadaliev B.**

The role of small business entities in the program "From poverty to well-being" 389

---

**Mirzakhlikov B.**

Organizational mechanism for the development of state programs for poverty reduction 397

---

**Rustamova S.**

Specific characteristics of administration in developed countries 402

---