

## NEWS

OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN  
SERIES CHEMISTRY AND TECHNOLOGY

ISSN 2224-5286

<https://doi.org/10.32014/2020.2518-1491.25>

Volume 2, Number 440 (2020), 69 – 74

UDC 547.99

IRSTI 31.23.23

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## PHYTOCHEMICAL COMPOSITION OF LIPOPHILIC FRACTION OF PLANTS OF THE PLANT *ROSA CANINA L.* GENUS *ROSA*

**Abstract.** The genus of wild rose, or *Rosa L.*, belongs to the family Rosaceae. It has many cultural forms, bred under the general name *Rosa*. At the moment, more than 400 species of rose hips are known. Usually these are upright shrubs, less often creepers, sometimes low tree-like forms or almost herbaceous plants. Rosehip is common in the temperate and subtropical zones of the Northern Hemisphere, it can often be found in the mountainous regions of the tropical zone. Some species of rose hips are common from the Arctic Circle in the north to Ethiopia in the south. On the American continent - from Canada to Mexico, favorable conditions for Rosehip are in the Mediterranean region. Several species of the Rosehip genus have an extensive distribution area.

Kazakhstan has significant resources of medicinal raw materials of plant origin. Among the most priority representatives of the wild flora are species of the rosehip genus - *Rosa L.* as a most valuable medicinal plant. In total, 21 species of wild rose grow in the republic, including 5 in the central Kazakhstan: *R. glabrifolia* - sh. naked, *R. laxa* Retz. - w. loose, *R. acicularis* Lindl. - (*W. needlefish*), *R. majalis* Herrm. (*R. cinnamomea L.*) - sh. *May* (*W. cinnamon*) and *R. pimpinellifolia L.* (*R. spinosissima L.*) - *W. femoral cell*. Kazakhstan species of the genus *Rosa L.*

Rose hips are characterized by a high content of biologically active substances and are widely used both in medicine and in cooking.

In this paper, a comparative analysis of rose hips, *Rosa canina L.*, harvested in the fall of 2018 is carried out.

Plant raw materials are collected in the southern region of the Republic of Kazakhstan (Almaty region). The crushed air-dry raw materials were extracted with hexane and chloroform in the ratio of raw materials-reagent (1:10) in a Soxhlet apparatus. The resulting extract was concentrated under mild conditions to a thick concentrate, which was analyzed on a gas chromatograph with a mass selective detector.

The analyzes were carried out on a gas chromatograph with a mass spectrometric detector 6890N / 5973C (Agilent, USA). The peaks detected in the chromatograms were identified using the NIST'11 and Wiley 10 mass spectral libraries.

The article first studied and conducted a comparative analysis of lipophilic substances contained in the fruits of the plant *Rosa canina L.*, harvested in the Almaty region.

The extracts mainly include hydrocarbons, derivatives of higher carboxylic acids, higher alcohols and some other substances, in particular butyl tetradecyl ether of hydrochloric acid, [4- (2-methylpentanoylsulfamoyl) phenyl] amide of 2-methylpentanoic acid in hexane extract and, butyl undecyl ether sulfuric acid, eicosyl trifluoroacetate and ethoxycarbonyl-3-methyl-4-azafluorenone, 2-fluorenilim in the chloroform extract.

Further work will be continued in order to determine the potential biological activity of the obtained extracts.

**Keywords:** *Rosa canina L.*, СКФ-экстракция, никотин, GC-MS, химический состав.

### Introduction

The rosehip genus, *Rosa L.*, belongs to the family *Rosaceae*. It has many cultural forms, bred under the general name *Rosa*. At the moment, more than 400 species of rose hips are known. Usually these are upright shrubs, less often creepers, sometimes low tree-like forms or almost herbaceous plants. Rosehip is common in the temperate and subtropical zones of the Northern Hemisphere, it can often be found in the mountainous regions of the tropical zone. Some species of rose hips are common from the Arctic Circle in

the north to Ethiopia in the south. On the American continent - from Canada to Mexico. Favorable conditions for Rosehip are in the Mediterranean region. Several species of the Rosehip genus have an extensive distribution area [1-3].

Kazakhstan has significant resources of medicinal raw materials of plant origin. Among the most priority representatives of the wild flora are species of the rosehip genus - *Rosa L.* as a most valuable medicinal plant. In total, 21 species of wild rose grow in the republic, including 5 in the central Kazakhstan: *R. glabrifolia* - sh. naked, *R. laxa* Retz. - w. loose, *R. acicularis* Lindl. - (*W. needlefish*), *R. majalis* Herrm. (*R. cinnamomea L.*) - sh. May (*W. cinnamon*) and *R. pimpinellifolia L.* (*R. spinosissima L.*) - *W. femoral cell*. Kazakhstan species of the genus *Rosa L.* [4-5].

Rosehip (canine) (*R. canina*). Branched tall shrub with curved, sparse spikes with single flowers of pale pink or white color. Fruits are smooth, fleshy, light or bright red, spherical or oval-spherical elongated-oval; the flesh is sweet, edible, thick. Sepals fall off before ripening. The pulp content in relation to the weight of the dry fruit is 54.9-65%; seed content 35.0-45.1%. The fruits of this type of rosehip are a weak source of vitamin C. The content of ascorbic acid in the pulp of fruits is usually extremely limited - from 0 to 0.95% and carotene 3.8-12.9 mg% [6].

In this article, we consider lipophilic substances in the composition of *R. canina* fruits identified in hexane and chloroform extracts.

### Materials and Methods

Plant raw materials are collected in the southern region of the Republic of Kazakhstan (Almaty region). The crushed air-dry raw materials (500 g) were extracted with hexane in the ratio of raw materials-reagent (1:10) in a Soxhlet apparatus. The extract obtained was concentrated under mild conditions (water bath temperature 40-45 ° C) using a vacuum water-jet pump, to a thick concentrate, which was analyzed on a gas chromatograph with a mass-selective detector. The analyzes were performed on a gas chromatograph with a 6890N / 5973C mass spectrometric detector (Agilent, USA) equipped with a Combi-PAL autosampler (CTC Analytics, Switzerland). For GC-MS analysis, 1.00 µl of the sample was injected into the injector of a gas chromatograph using an autosampler at an injector temperature of 250°C. Chromatography was performed using an HP-5ms capillary column (Agilent, USA) with a length of 30 m, an inner diameter of 0.25 mm, and a film thickness of 0.25 µm at a constant carrier gas velocity (helium, > 99.995%, Orenburg-Tekhgaz, Russia) equal to 1.0 ml / min. The program for heating the chromatographic column: holding for 5 min at 40 ° C, heating at a speed of 10 ° C / min to 280 ° C, holding for 5 min. The total chromatographic time was 34 minutes. The temperatures of the quadrupole and the MSD ion source were 150 and 230 ° C, respectively [7-16].

Mass spectrometric detection was carried out in the ion scanning mode in the m / z range from 40 to 550 with a solvent delay of 5 min. The peaks detected in the chromatograms were identified using the NIST<sup>®</sup> 11 and Wiley 10 mass spectral libraries [17-25]. Data are presented in tables 1 and 2.

### Results and discussion

Table 1 - The data of chromatography-mass spectrometry of a hexane extract obtained from rose hips *Rosa canina L.*

No	Retention time	Name of compound	Gross formula	Quantity,%
1	26,89	Gentriacontan	C <sub>31</sub> H <sub>64</sub>	3,00
2	28,46	Heptocazane	C <sub>27</sub> H <sub>56</sub>	9,63
3	28,76	Bis 2 (ethyl hexyl) phthalate	C <sub>24</sub> H <sub>38</sub> O <sub>4</sub>	3,89
4	29,21	butyl tetradecyl ether hydrochloric acid	C <sub>18</sub> H <sub>38</sub> O <sub>3</sub> S	3,75
5	29,93	Pentacosin	C <sub>25</sub> H <sub>52</sub>	21,87
6	30,04	1-heptacosanol	C <sub>27</sub> H <sub>56</sub> O	14,69
7	30,63	Nonhexacontanoic acid	C <sub>38</sub> H <sub>76</sub> O <sub>2</sub>	1,99
8	31,32	Octadecan	C <sub>18</sub> H <sub>38</sub>	19,16
9	31,48	Methyl 2-oxo octadecanoate	C <sub>39</sub> H <sub>76</sub> O <sub>3</sub>	3,10
10	31,64	Methyl -5.9.21-octa-cosatrenoate	C <sub>29</sub> H <sub>52</sub> O <sub>2</sub>	3,82
11	31,82	[4- (2-Methylpentanoylsulfamoyl) phenyl] amide 2-methylpentanoic acid	C <sub>18</sub> H <sub>24</sub> O <sub>4</sub> S	3,00
12	32,97	Octadecanoic acid 2-oxo-methyl ester	C <sub>39</sub> H <sub>76</sub> O <sub>3</sub>	9,63

12 substances were identified in the hexane extract of the rosehip *Rosa canina L.*, of which Heptocazane, Pentacosin, Octadecane, belonging to the hydrocarbon class, have a high percentage, higher alcohols 1-Heptacosanol, derivatives of higher carboxylic acids (Methyl 2-oxo octadecanoate), Methyl-5,9,21-octa-cosatrienoate, 2-oxo-methyl ether of octadecanoic acid) and higher carboxylic acids Neagexacontanoic acid. In addition, Bis 2 (ethyl hexyl) phthalate (a phthalic acid derivative) and butyl tetradecyl ether of hydrochloric acid were identified in the extract.

Table 2 - Chromatography-mass spectrometry data of a chloroform extract obtained from rose hips of *Rosa canina L.*

№	Retention time	Name of compound	Gross formula	Quantity, %
1	28,47	2-methyl okatacosan	C <sub>29</sub> H <sub>60</sub>	8,14
2	29,22	Butyl undecyl sulfuric acid ester	C <sub>15</sub> H <sub>32</sub> O <sub>3</sub> S	3,23
3	29,93	Octadecan	C <sub>18</sub> H <sub>38</sub>	21,23
4	30,04	Eicosyl trifluoroacetate	C <sub>24</sub> H <sub>41</sub> F <sub>3</sub> O <sub>2</sub>	14,27
5	31,24	Naphthalene, decahydro-1,4a-dimethyl-7- (1-methylethyl) -, [1S- (1α, 4αα, 7α, 8αβ)] glucopyranosyloxy) -1-butenyl] -4	C <sub>15</sub> H <sub>28</sub>	1,36
6	31,31	Octacosan	C <sub>18</sub> H <sub>38</sub>	25,51
7	31,37	4- [3 - (β-d-hydroxy-3,5,5-trimethyl-2-cyclohexen-1-one,	C <sub>27</sub> H <sub>38</sub> O <sub>12</sub>	1,54
8	31,82	3-benzyl-2,4-pentanedione	C <sub>12</sub> H <sub>14</sub> O <sub>12</sub>	4,46
9	32,97	1 eicosen	C <sub>20</sub> H <sub>40</sub>	5,51
10	33,62	ethoxycarbonyl-3-methyl-4-azafluorenone, 2-fluorenilimim	C <sub>29</sub> H <sub>22</sub> N <sub>2</sub> O <sub>2</sub>	6,34

10 compounds were identified in the chloroform extract of rosehip *Rosa canina L.*

The dominant hydrocarbons are 2 methyl okatacosan, octadecane, octacosan and naphthalene, decahydro-1,4a-dimethyl-7- (1-methylethyl) -, [1S- (1α, 4αα, 7α, 8αβ)] glucopyranosyloxy) -1-butenyl] -4.

Separately, it should be noted that eicosyl trifluoroacetate belongs to the class of organohalogen compounds, which are relatively rare in plant objects. In addition, a homolog of butyl tetradecyl ether of hydrochloric acid was identified. Butyl undecyl ether of sulfuric acid was also detected in the hexane extract. Ethoxycarbonyl-3-methyl-4-azafluorenone, 2-fluorenylimime, which is a natural dye, was also identified in the chloroform extract.

### Conclusion

For the first time, a comparative analysis of lipophilic substances contained in the fruits of the plant *Rosa canina L.*, harvested in the Almaty region, was studied and carried out.

The extracts mainly include hydrocarbons, derivatives of higher carboxylic acids, higher alcohols and some other substances, in particular butyl tetradecyl ether of hydrochloric acid, [4- (2-methylpentanoylsulfamoyl) phenyl] amide of 2-methylpentanoic acid in hexane extract and, butyl undecyl ether sulfuric acid, eicosyl trifluoroacetate and ethoxycarbonyl-3-methyl-4-azafluorenone, 2-fluorenilim in the chloroform extract.

Further work will be continued in order to determine the potential biological activity of the obtained extracts.

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### *ROSA CANINA L.* ӨСІМДІК ЖЕМІСТЕРІНІҢ ЛИПОФИЛЬДІ ФРАКЦИЯСЫНЫҢ ФИТОХИМИЯЛЫҚ ҚҰРАМЫ

**Аннотация.** Итмұрын немесе раушан (*Rosa L.*), Қызғылт түсті (*Rosaceae*) отбасына жатады. Жалпы Роза деп аталатын көптеген мәдени нысандары бар. Қазіргі уақытта итмұрынның 400-ден астам түрі белгілі. Әдетте бұл тік бұталар, сирек Лиана, кейде биік емес ағаш тәріздес немесе шөпті өсімдіктер. Итмұрын

Солтүстік жарты шарның қалыпты және субтропикалық аймақтарында таралған, оны тропикалық белдеудің таулы аудандарында кездестіруге болады. Итмұрынның кейбір түрлері солтүстіктегі полярлық шеңберден оңтүстіктегі Эфиопияға дейін жетеді. Ал Америка құрлығында-Канададан Мексикаға дейін барады. Итмұрын үшін қолайлы жағдай Жерорта теңізі аймағы. Итмұрын түрінің бірнеше кең таралу аймағы бар.

Қазақстанда өсімдік тектес дәрілік шикізаттың елеулі ресурстары бар. Жабайы өсетін флораның ең басым өкілдерінің қатарына итмұрын – *Rosa L.* тегінің түрлері жатады. Республикада итмұрынның 21 түрі өседі, оның ішінде Орталық Қазақстанда-5: *R. glabrifolia* – бас сүйекті итмұрын, *R. laxa Retz.* – борпылдақ итмұрын, *R. acicularis Lindl.* – (ине итмұрын), *R. majalis Herrm. (R. cinnamomea L.)* – май итмұрын (сыбыр итмұрын) и *R. pimpinellifolia L. (R. spinosissima L.)* – бедренцелистік итмұрын.

Итмұрын жемістері биологиялық белсенді заттардың жоғары болуымен ерекшеленеді және медицинада да, кулинарияда да кеңінен қолданылады.

Бұл жұмыста 2018 жылдың күзінде дайындалған итмұрын, *Rosa canina L.* жемістеріне салыстырмалы талдау жүргізіледі.

Өсімдік шикізаты Қазақстан Республикасының оңтүстік өңірінде (Алматы облысында) жиналған. Ұсақталған ауа-құрғақ шикізат Сокслет аппаратындағы шикізат-реагент (1:10) қатынасында гексан және хлороформмен экстрагерленді. Алынған сығынды масс-селективті детекторы бар газды хроматографта талдаған қалың концентратқа дейін жұмсақ жағдайларда шоғырландырды.

Талдаулар 6890N/5973C (Agilent, АҚШ) масс-спектрометриялық детекторы бар газды хроматографта жүргізілді. Хроматограммаларда табылған шындалды сәйкестендіруді NIST'11 және Wiley 10 масс-спектрлері кітапханаларының көмегімен жүргізді.

Мақалада алғаш рет Алматы облысында дайындалған *Rosa canina L.* өсімдігінің жемістеріндегі липофильді заттарға салыстырмалы талдау жүргізілді және зерттелді.

Сығындылардың құрамына негізінен көмірсутектер, жоғары карбон қышқылдарының туындылары, жоғары спирттер және басқа да заттар табылды, оның ішінде тұз қышқылының тетрадецил эфирі бутилі, [4-(2-метилпентаноилсульфоамил) фенил] гексан сығындысындағы 2-метилпентан қышқылы амиді және күкірт қышқылының бутил ундецил эфирі, Эйкозил трифторацетат және этоксикарбонил-3-метил-4 – азафлуоренон.

Одан кейінгі жұмыстар алынған сығындылардың әлеуетті биологиялық белсенділігін анықтау мақсатында жалғасатын болады.

**Түйін сөздер:** *Rosa canina L.*, ЖКФ-экстракция, никотин, GC-MS, химиялық құрамы.

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#### **ФИТОХИМИЧЕСКИЙ СОСТАВ ЛИПОФИЛЬНОЙ ФРАКЦИИ ПЛОДОВ РАСТЕНИЯ *ROSA CANINA L.* РОДА ШИПОВНИК (*ROSA*)**

**Аннотация.** Род шиповник или роза (*Rosa L.*) относится к семейству розоцветных (Rosaceae). Имеет множество культурных форм, разводимых под общим названием Роза. На данный момент известны более 400 видов шиповника. Обычно это прямостоящие кустарники, реже лианы, иногда невысокие древовидной формы или почти травянистые растения. Шиповник распространён в умеренных и субтропических зонах Северного полушария, нередко его можно встретить в горных районах тропического пояса. Некоторые виды шиповника распространены от полярного круга на севере до Эфиопии на юге. На американском континенте - от Канады до Мексики. Благоприятнейшие условия для шиповника находятся в области Средиземноморья. Несколько видов рода шиповник имеют обширный ареал распространения.

Казахстан обладает значительными ресурсами лекарственного сырья растительного происхождения. К числу наиболее приоритетных представителей дикорастущей флоры относятся виды рода шиповник – *Rosa L.* как ценнейшего лекарственного растения. Всего в республике произрастает 21 вид шиповника, в том числе в Центральном Казахстане – 5: *R. glabrifolia* – ш. гололистый, *R. laxa Retz.* – ш. рыхлый, *R. acicularis Lindl.* – (ш. иглистый), *R. majalis Herrm. (R. cinnamomea L.)* – ш. майский (ш. коричный) и *R. pimpinellifolia L. (R. spinosissima L.)* – ш. бедренцелистый. Казахстанские виды рода *Rosa L.*

Плоды шиповника отличаются высоким содержанием биологически активных веществ и широко применяются как в медицине, так и в кулинарии.

В данной работе проводится сравнительный анализ плодов шиповника *Rosa canina L.*, заготовленного осенью 2018 года.

Растительное сырье собрано в южном регионе Республики Казахстан (Алматинская область). Измельченное воздушно-сухое сырье экстрагировали гексаном и хлороформом в соотношении сырье-реагент (1:10) в аппарате Сокслета. Полученный экстракт концентрировали в мягких условиях до густого концентрата, который анализировали на газовом хроматографе с масс-селективным детектором.

Анализы проводили на газовом хроматографе с масс-спектрометрическим детектором 6890N/5973C (Agilent, США). Идентификацию пиков, обнаруженных на хроматограммах, проводили при помощи библиотек масс-спектров NIST<sup>®</sup>11 и Wiley 10.

В статье впервые изучен и проведен сравнительный анализ липофильных веществ, содержащихся в плодах растения *Rosa canina L.*, заготовленного в Алматинской области.

В состав экстрактов входят преимущественно углеводороды, производные высших карбоновых кислот, высшие спирты и некоторые другие вещества, в частности, бутил тетрадециловый эфир соляной кислоты, [4-(2-метилпентаноилсульфамил) фенил] амид 2-метилпентановой кислоты в гексановом экстракте и бутил ундециловый эфир серной кислоты, Эйкозил трифторацетат и этоксикарбонил-3-метил-4-азафлуоренон, 2-флуоренилимим в хлороформном экстракте.

Дальнейшие работы будут продолжены с целью определения потенциальной биологической активности полученных экстрактов.

**Ключевые слова:** *Rosa canina L.*, СКФ-экстракция, никотин, GC-MS, химический состав.

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