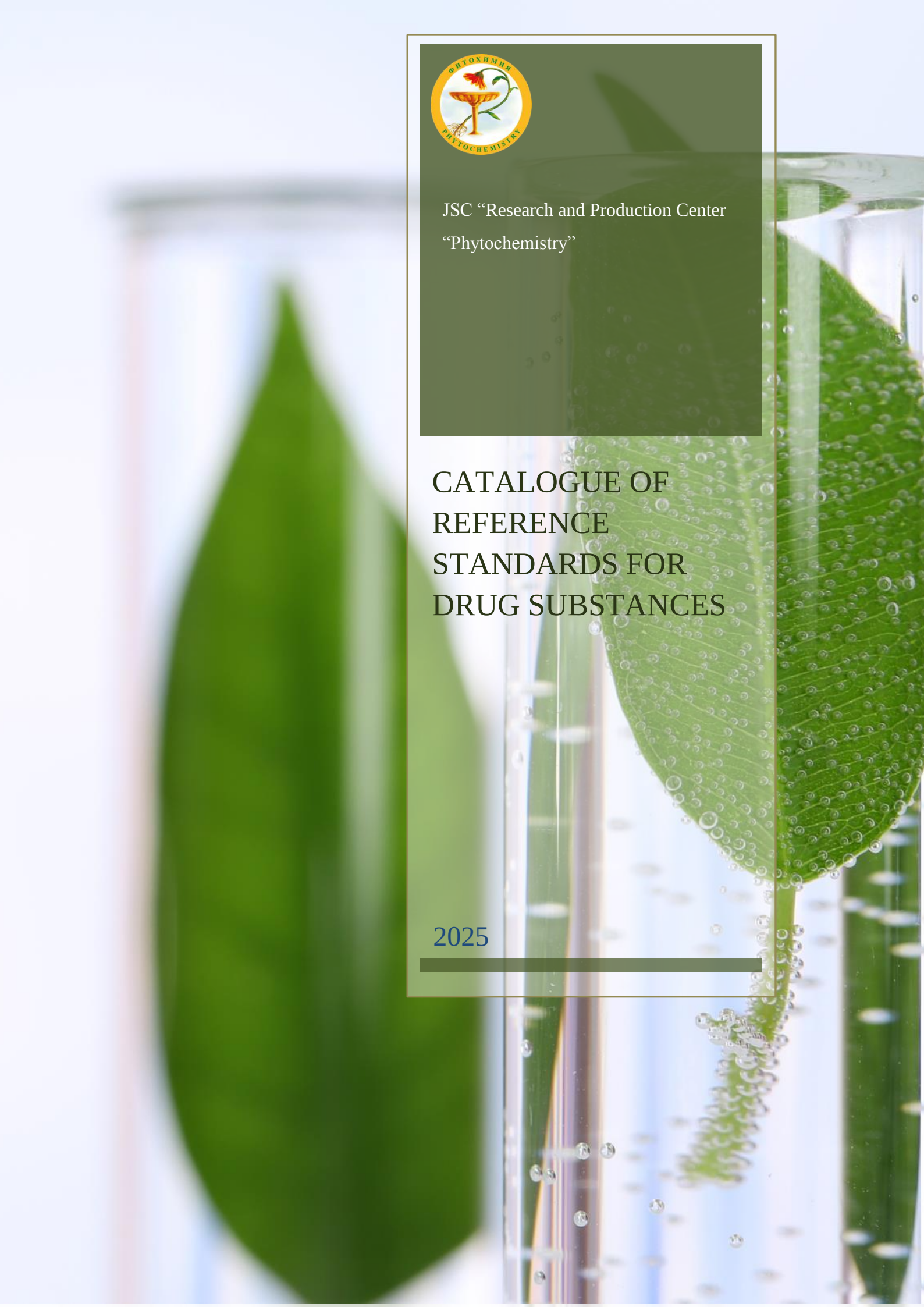

JSC “Research and Production Center “Phytochemistry”

CATALOGUE OF REFERENCE STANDARDS FOR DRUG SUBSTANCES

2025

UDC 547.91: 577.1
LBC 84.44
S 18

English

Catalogue of reference standards for drug substances / S.M. Adekenov, D.K. Nurkadirov. - Karaganda: Glasir, - 2025. – 40 p.

The catalogue provides information on 41 reference standards for drug substances (monoterpenoids, sesquiterpene lactones, alkaloids, flavonoids, ecdysteroids and their derivatives) derived from natural sources at JSC "Research and Production Center "Phytochemistry". Each reference standard is accompanied by an analytical passport (certificate of analysis), IR-, UV-, ^{1}H-, ^{13}C-NMR spectroscopy and mass spectrometry data. The reference standards for drug substances presented in the catalogue are intended for step-by-step quality control of pharmaceutical production from plant raw materials to the finished dosage form according to GMP standards.

The catalogue is designed for the specialists working in the area of bioorganic chemistry and chemistry of natural compounds, standardization and quality control of drugs, as well as employees of analytical laboratories of research institutes, centers and chemical-pharmaceutical enterprises.

Reviewers:
Professor G. Appendino
Professor P. Drasar
Professor T. Ozek

Recommended for publication by the decision of the Academic Council of JSC "Research and Production Center "Phytochemistry" (Minutes No. 1 dated April 27, 2022)

UDC 547.91:577.1
LBC 84.44

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INTRODUCTION

JSC “Research and Production Center “Phytochemistry” (hereinafter - JSC “RPC “Phytochemistry”) is one of the leading developers of original drugs based on biologically-active compounds from plant raw materials.

The main activity of JSC “RPC “Phytochemistry” is to provide scientific and technological support for the development of the domestic pharmaceutical industry and to develop and implement original drugs for pharmaceutical production.

According to GMP standards, stage-by-stage quality control of production from plant raw materials to finished dosage form using reference standards of drug substances is required.

The Republican Bank of Samples of Drug Substances at JSC “RPC “Phytochemistry” is constantly being replenished with new samples of natural compounds and their derivatives. Information on new plant substances and their derivatives can be found on the official website of the JSC “RPC “Phytochemistry” www.phyto.kz.

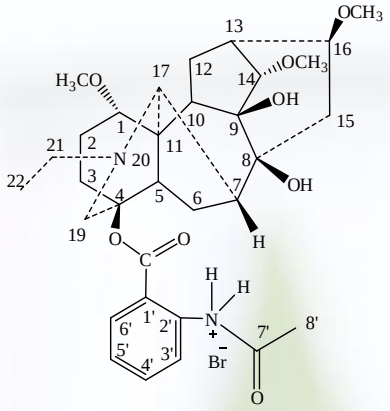
JSC “RPC “Phytochemistry” presents a new Catalogue of reference standards for drug substances 2022.

Each reference standard is accompanied by an analytical passport (certificate of analysis). The purity of samples is 98-99% according to HPLC and GC-MS.

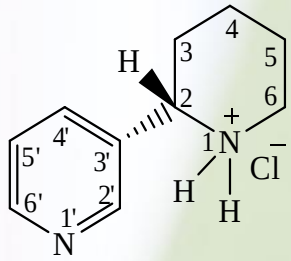
Additional characteristics about the quality of a reference standard with confirmed identity and assigned purity (including chromatographic purity, water content, residual solvents and inorganic impurities) can be requested by email to info@phyto.kz (Subject of the email: Request for additional information on Catalogue of Reference Standards for Drug Substances).

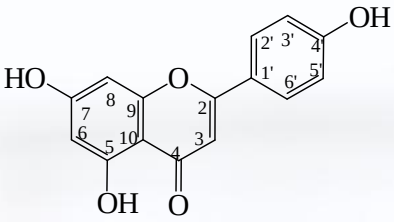
We hope that our product range will meet your expectations. The list of drug substances is regularly being expanded based on new research.

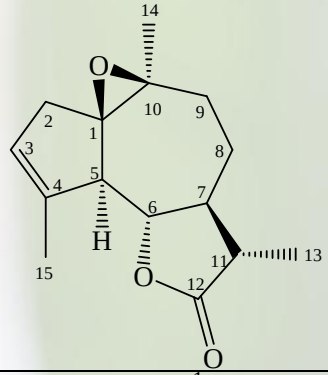
REFERENCE STANDARDS FOR DRUG SUBSTANCES

Allapinin hydrobromide		
	CAS#	97792-45-5
	Synonyms:	[4-(N-Acetylantraniloxy)-8,9-dihydroxy-1α,14α,16β-trimethoxy-N-ethyl-18-noraconane hydrobromide], [Lappaconitine hydrobromide]
	Gross formula:	$C_{32}H_{45}Br\ N_2O_8$
	Molecular weight:	665.6 g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	225-226 ºC
	White crystalline substance	
IR-spectrum (cm^{-1})	3554, 3528 (OH), 3293, 3223 (NH), 3011, 2979, 2934, 2881, 2816 (C-H), 1698 (C=O), 1635 (C=C), 1604, 1586, 1519, 1449, 1319, 1271 (C-H), 1132, 1083, 1041 (C-O), 969, 765.	
UV-spectrum (nm)	223±2, 253±2, 312±2	
^1H and ^{13}C NMR spectra	^1H NMR (500 MHz, C_2D_6OS, ppm, J1, 2, 3…n/Hz): 1.2 (3H, d, J=7.2, CH_3-22); 1.66 (1H, d, J=14.9, H-6β); 1.75 (1H, t, J=13.0, H-3β); 2.01-1.95 (1H, m, H-12β); 2.01-1.99 (1H, m, H-15β); 2.08-2.11 (1H, m, H-10); 2.13-2.10 (1H, m, H-7); 2.14-2.12 (1H, m, H-2β); 2.06 (3H, s, $\underline{CH_3}$-CONH-2'); 2.26-2.25 (1H, m, H-2α); 2.35-2.25 (1H, m, H-13); 2.26 (1H, d, J=7.6, H-21β); 2.58 (1H, d, J=7.6, H-21α); 2.41-2.38 (1H, m, H-3α); 2.78 (1H, dd, J=15.3, 7.3, H-6α); 3.07-3.04 (1H, m, H-5); 3.08-3.05 (1H, m, H-15α); 3.16-3.09 (1H, m, H-12α); 3.18-3.15 (1H, m, H-1);3.20-3.19 (1H, m, H-16), 3.25 (3H, s, 1-CH_3O), 3.28 (3H, s, 16-SH_3O), 3.38 (3H, s, 14-CH_3O), 3.5 (1H, s, H-17); 3.87 (1H, d, J=8.4, H-14), 3.56 (1H, c, H-19α), 2.52 (1H, c, H-19β); 7.17 (1H, ddd, J=8.0, 1.1, H-5'), 7.55 (1H, dd, J=8.8, 1.5, H-6'), 7.79 (1H, dd, J=8.4, H-4'), 7.92 (1H, d, J=8.4, H-3'), 8.31 (1H, c, 8-OH), 10.33 (1H, s, H at N). ^{13}C NMR (125,76 MHz, C_2D_6OS ppm): 10.78 (q, C-22); 21.81 (t, C-6); 23.14 (q, CH_3-CONH-2'); 24.88 (t, C-2); 26.84 (t, C-12); 28.43 (t, C-3); 36.22 (d, C-13); 41.84 (t, C-15); 42.44 (d, C-7); 47.21 (d, C-5); 49.46 (d, C-10); 49.48 (t, C-21); 50.72 (s, C-11); 56.15 (t, C-19); 56.22 (q, OCH_3-16); 56.59 (q, OCH_3-1); 57.78 (q, OCH_3-14); 61.66 (d, C-17); 74.20 (s, C-8); 77.09 (s, C-9); 80.26 (d, C-16); 80.60 (d, C-1); 82.65 (s, C-4); 89.22 (d, C-14); 120.56 (c, C-1'); 122.56 (d, C-3'); 124.06 (d, C-5'); 131.07 (d, C-6'); 134.21 (d, C-4'); 166.20 (c, C=O-1'); 168.99 (s, C=O-NH-2').	
Biological activity	Possesses antiarrhythmic activity.	
References	Ahmad M., Ahmad W., Ahmad M., Zeeshan M., Obaidullah, Shaheen F. Norditerpenoid alkaloids from the roots of *Aconitum heterophyllum* Wall with antibacterial activity// Journal of Enzyme Inhibition and Medicinal Chemistry. – 2008. – Vol. 23, No 6. – P. 1018–1022. doi:10.1080/14756360701810140	

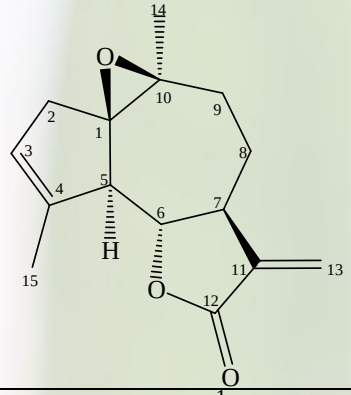
	Stolyaruk V.N., Tsorin I.B., Vititnova M.B., Nikiforova T.D., Murinov Yu.I., Yunusov M.S., Kryzhanovsky S.A. Comparative study of the antiarrhythmic activity of lappaconitine hydrobromide and the compound LMG-124 on the model of aconitine arrhythmia// Pharmacokinetics and Pharmacodynamics. – 2017. – No 2. – P. 12 – 15. https://cyberleninka.ru/article/n/sravnitelnoe-izuchenie-antiaritmicheskoy-aktivnosti-lappakonitina-gidrobromida-i-soedineniya-lmg-124-na-modeli-akonitinovoy-aritmii/viewer

Anabasine hydrochloride		
	CAS#	53912-89-3
	Synonyms:	[3-(piperidin-2-yl)pyridine hydrochloride]
	Gross formula:	$C_{10}H_{15}ClN_2$
	Molecular weight:	198.69 g/mol
	HPLC Purity:	≥98,0%
	Melting Point:	194-195 ºC
	Colorless crystalline substance	
IR-spectrum (cm^{-1})	2954, 2907, 2804, 2803 (C-H), 2478(-N+<), 2382, 2103, 1645 (C=C), 1595, 1577, 1484, 1427, 1332, 1297, 1193, 1026 (C-N), 1009, 945, 915, 806, 711, 616.	
UV-spectrum (nm)	204±2; 259±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, D_2O, ppm, J1, 2, 3…n/Hz): 1.50-1.67 (2H, m, H-5α, H-5β); 1.81-1.96 (4H, m, H-3α, H-3β, H-4α, H-4β); 3.05 (1H, ddd, J=9.56, 6.50, 3.06, H-6α); 3.37 (1H, d, J=13.0, H-6β); 4.21 (1H, dd, J=12.23, 3.06, H-2); 7.38 (1H, dd, J=7.64, 4.97, H-5'); 7.81 (1H, d, J=8.0, H-4'); 8.40 (1H, d, J=4.20, H-6'); 8.44 (1H, s, H-2'). ^{13}C NMR (125,76 MHz, D_2O, ppm): 21.50 (t, C-4); 22.16 (t, C-5); 28.98 (t, C-3); 45.64 (t, C-6); 58.28 (d, C-2); 124.7 (d, C-5'); 132.8 (s, C-3'); 136.13 (d, C-4'); 147.70 (d, C-6'); 149.66 (d, C-2').	
Biological activity	Possesses anticholinesterase activity.	
References	Wojciechowska-Nowak M., Boczon W., Rychlewska U., Warżajtis B. Spectroscopy and crystal structure of anabasine salts// Journal of Molecular Structure. – 2007. – Vol. 840, No 1-3. – P. 44–52. doi:10.1016/j.molstruc.2006.11.037 https://www.sciencedirect.com/science/article/abs/pii/S0022286006008878 Tilyabaev Z., Abduvakhabov A.A. Alkaloids of *Anabasis aphylla* and their cholinergic activities// Chemistry of Natural Compounds. – 1998. – Vol. 34, No 3. – P. 295–297. doi:10.1007/bf02282405 https://link.springer.com/article/10.1007/BF02282405	

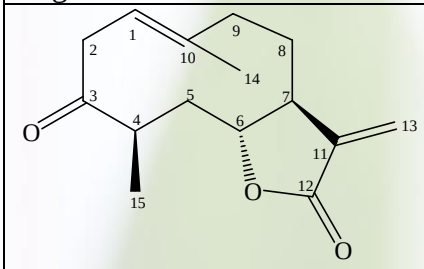
Apigenin		
	CAS#	520-36-5
	Synonyms:	[4',5,7-trihydroxyflavone]
	Gross formula:	$C_{15}H_{10}O_5$
	Molecular weight:	270.24 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	341-343 ºC
	Yellow powdery substance	
IR-spectrum (cm^{-1})	3283 (OH), 3092, 2919, 2850, 2617, 1652 (C=O), 1607, 1588, 1557, 1501 (C=C), 1444, 1399, 1354, 1297, 1269, 1163, 1115, 1030, 907.	
UV-spectrum (nm)	212±2; 269±2; 338±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 6.70 (1H, d, J=2.1, H-6); 6.76 (1H, d, J=2.1, H-8); 6.87 (1H, s, H-3); 7.16-7.14 (2H, m, J=9, H-3′, H-5′); 7.89-7.86 (2H, m, H-2′, H-6′); 11.43 (1H, s, OH-4′); 12.3 (1H, s, OH-5); 12.5 (1H, s, OH-7); ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 94.69 (d, C-6); 99.83 (d, C-8); 103.73 (d, C-3); 104.81 (s, C-10); 116.69 (d, C-3′, C-5′); 122.10 (s, C-1′); 128.76 (d, C-2′, C-6′); 158.36 (s, C-4′); 162.55 (s, C-7); 163.01 (s, C-2); 164.34 (s, C-9); 165.72 (s, C-5); 182.61 (s, C-4).	
Biological activity	Possesses antitumor activity	
References	Markham K.R., Ternai B., Stanley R., Geiger H., Mabry T.J. Carbon-13 NMR studies of flavonoids—III// Tetrahedron. – 1978. – Vol.34, No 9. – P.1389–1397. doi:10.1016/0040-4020(78)88336-7 https://www.sciencedirect.com/science/article/abs/pii/0040402078883367 Wei H., Tye L., Bresnick E., Birt F.D. Inhibitory effect of apigenin, a plant flavonoid, on epidermal ornithine decarboxylase and skin tumor promotion in mice// Cancer Research. – 1990. – Vol. 50, No 3. – P. 499-502 https://cancerres.aacrjournals.org/content/50/3/499.short	

Arborescin		
	CAS#	
	Synonyms:	[1R,3S,6S,7S,10S,11R)-3,7,12-trimethyl-2,9-dioxatetracyclo[9.3.0.01,3.06,10]tetradec-12-en-8-one]
	Gross formula:	$C_{15}H_{20}O_3$
	HPLC Purity:	248.32 g/mol
	Melting Point:	≥99,0%
	Melting Point:	139-142°C
	White crystalline substance	
IR-spectrum (cm^{-1})	3056, 3008, 2967, 2948, 2926, 2868, 2852, 2831 (C-H), 1766 (Carbonyl group of γ-lactone), 1654 (C=C), 1456, 1444, 1379, 1367, 1348, 1285, 1244, 1223, 1187, 1178, 1126, 1113, 1102, 1065, 1029 (epoxy cycle).	

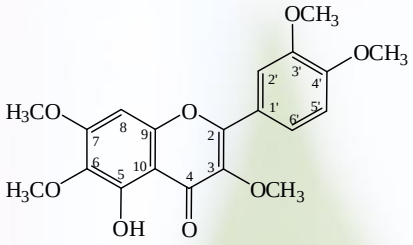
UV-spectrum (nm)	200±2
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDC1_3$, ppm, J/Hz): 1.18 (3H, d, J=6.9, CH_3-13); 1.33 (3H, s, CH_3-14); 1.45 (1H, m, H-8β); 1.64 (1H, m, H-8α); 1.76 (1H, m, H-7); 1.93 (3H, br.s, CH_3-15); 2.08 (1H, m, H-9β); 2.14 (1H, m, H-2β); 2.18 (1H, m, H-9α); 2.76 (1H, m, H-2α); 2.95 (1H, d, J=10.0, H-5); 3.15 (1H, dq, J=12.3, 6.9, H-11); 4.02 (1H, t, J = 10.0, H-6); 5.55 (1H, s, H-3). ^{13}C NMR (125 MHz, $CDC1_3$, ppm): 16.1 (q, C-13), 22.0 (t, C-8), 26.4 (q, C-14), 26.5 (q, C-15), 37.1 (t, C-9), 43.3 (t, C-2), 44.5 (d, C-11), 55.9 (d, C-7), 58.1 (d, C-5), 66.1 (s, C-10), 76.0 (s, C-1), 86.2 (d, C-6), 128.4 (d, C-3), 144.3 (s, C-4), 182.2 (s, C-12).
Biological activity	Possesses cytotoxicity
References	Adekenov S.M. Chemical study of *Artemisia austriaca* Jacq. //International Journal of Biology and Chemistry. – 2021. – Vol. 14, No 1. – P. 156-163. doi.org/10.26577/ijbch.2021.v14.i1.017 https://ijbch.kaznu.kz/index.php/kaznu/article/view/538 Tursunbekova A.E., Li K.G., Zhangabylov N.S., Adekenov S.M. Biomodification of sesquiterpene lactone of arborescine by a bacterial recombinant strain// Biotechnology in Russia. – 2004. – No 3. – P. 29–33. https://elibrary.ru/item.asp?id=8822306

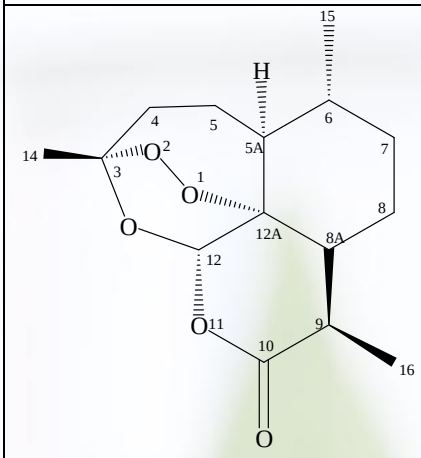
Arglabin		
	CAS#	84692-91-1
	Synonyms:	[1(10)-Epoxy-5,7α,6β(H)-guaia-3(4),11(13)-diene-6,12-olide]
	Gross formula:	$C_{15}H_{18}O_3$
	Molecular weight:	246.31 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	100-102 ºC
	Colorless crystalline substance	
IR-spectrum (cm^{-1})	2999, 2940, 2925, 2851 (C-H), 1765 (Carbonyl group of γ-lactone), 1665 (C=C), 1432, 1408, 1379, 1333, 1307, 1281, 1254, 1222, 1199, 1155, 1135, 1111, 1091, 1063 (epoxy cycle).	
UV-spectrum (nm)	203±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.33 (3H, s, CH_3-14); 1.52-1.43 (1H, m, H-8β); 1.83 (1H, dd, J=5.01, 2.51, H-8α); 1.95 (3H, s, CH_3-15); 2.04-1.97 (1H, m, H-9β); 2.14-2.10 (1H, m, H-2β); 2.21-2.15 (1H, m, H-9α); 2.27-2.23 (1H, m, H-7); 2.79-2.73 (1H, m, H-2α); 2.95-2.90 (1H, dq, J=11.20, 1.07, H-5); 3.98 (1H, dd, J=10,74, 9.74, H-6); 5.40 (1H, d, J=3.37, H-13α); 5.55 (1H, dd, J=4.50, 2.65, 1.72, H-3); 6.12 (1H, d, J=3.37, H-13β). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 18.31 (q, C-15); 21.49 (t, C-2); 22.84 (q, C-14); 33.49 (t, C-8); 39.75 (t, C-9); 51.06 (d, C-7); 52.86 (d, C-5); 62.77 (s, C-1); 72.58 (s, C-10); 82.96 (d, C-6);	

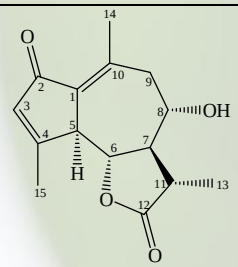
	118.39 (t, C-13); 124.98 (d, C-3); 139.15 (s, C-11); 140.57 (s, C-4); 170.55 (s, C-12).
Biological activity	Possesses antitumor activity
References	Adekenov S.M., Mukhametzhanov M.N., Kagartilitskii A.D., Kupriyanov A.N. Arglabin – a new sesquiterpene lactone from *Artemisia glabella*// Chemistry of Natural Compounds. – 1982. – Vol. 18, No 5. – P. 623-624. doi: 10.1007/BF00575063. https://link.springer.com/article/10.1007/BF00575063 Zhangabylov N.S., Dederer L.Y., Gorbacheva L.B., Vasil'eva S.V., Terekhov A.S., Adekenov S.M. Sesquiterpene lactone arglabin influences DNA synthesis in P388 leukemia cells *in vivo*// Pharmaceutical Chemistry Journal. – 2004. – Vol.38, No 12. – P. – 651–653. doi:10.1007/s11094-005-0052-9. https://link.springer.com/article/10.1007%2Fs11094-005-0052-9

Argolide		
	Synonyms:	[3-Keto-4(R),6(R),7(S)-germacra-1(10)E,11(13)-diene-6,12-olide]
	Gross formula:	$C_{15}H_{20}O_3$
	Molecular weight:	248.32 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	133-135 ºC
	Colorless crystalline substance	
IR-spectrum (cm^{-1})	2999, 2966, 2928, 2870, 2850 (C-H), 1760 (Carbonyl group of γ-lactone), 1706 (C=O), 1663 (C=C), 1455, 1404, 1387, 1358, 1342, 1324, 1269, 1241, 1222, 1162, 1128, 1107, 1094, 1058, 1009, 971.	
UV-spectrum (nm)	206±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.12 (3H, d, J=6.7, CH_3-15); 1.32-1.24 (1H, m, H-5α); 1.60-1.54 (1H, m, H-8α); 1.64 (3H, s, CH_3-14); 1.99-1.88 (1H, m, H-8β); 2.08-2.12 (1H, m, H-5β); 2.40-2.30 (2H, m, H-9α, H-9β); 2.70 (1H, d, J=10.9, H-7); 2.90-2.80 (1H, m, H-4); 3.31-3.00 (2H, m, H-2α, H-2β); 3.66 (1H, dd, J=11.4, 2.4, H-6); 5.60-5.53 (1H, m, H-1); 5.67 (1H, d, J=1.2, H-13α); 6.24 (1H, d, J=1.6, H-13β). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 15.89 (q, C-14); 18.48 (q, C-15); 34.89 (t, C-8); 39.86 (t, C-5); 39.95 (d, C-4); 40.24 (t, C-9); 42.60 (t, C-2); 43.90 (d, C-7); 81.82 (d, C-6); 117.15 (d, C-1); 123.21 (t, C-13); 140.33 (s, C-11); 141.59 (s, C-10); 170.03 (s, C-12); 208.12 (s, C-3).	
Biological activity	Possesses antibacterial activity	
References	Adekenov S.M., Aituganov K.A., Raldugin V.A., Gatilov Yu.V., Bagryanskaya I.Yu., Pentegova V.A. Argolid - a new sesquiterpene lactone from *Artemisia glabella* // Bull. of AS Kazakh SSR (ser. of chem.). – 1989. - No 6. - P. 79-87. Adekenov S.M., Aituganov K.A., Turdybekov K.M., Lindeman S.V., Struchkov Yu.T. Molecular and crystal structure of germacranolide argolide from *Artemisia glabella* // Chemistry of natural compounds. – 1991. – Vol. 27, No 5. – P. 653-657. https://link.springer.com/article/10.1007/BF00630358	

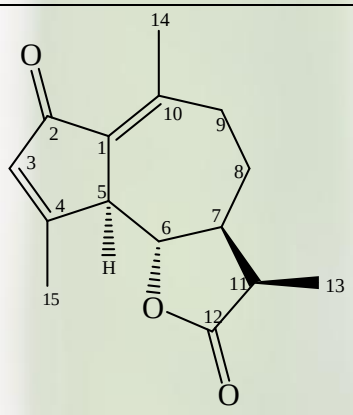
	Adekenov S.M., Abdykalykov M.A., Sadykova V.I., Bukenova R.G., Kagarlitsky A.D. Fungicidal and antimicrobial activity of natural terpenoid compounds// Russian Institute of Research and Technical Information. Deposited in VINITI. – 1985. – No 85. – P. 13.

Artemisetin		
	CAS#	479-90-3
	Synonyms:	[5-Hydroxy-2,6,7,3′,4′-pentamethoxyflavone], [Eriantin], [Quercetagetin 3,6,7,3′,4′-pentamethyl ether], [Artemitin]
	Gross formula:	$C_{20}H_{20}O_8$
	Molecular weight:	388.37 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	167-169 ºC
	Yellow powdery substance	
IR-spectrum (cm^{-1})	3015 (OH), 2951, 2924 (OCH_3), 2852, 1665, 1646 (C=O), 1589, 1557, 1511 (C=C), 1412, 1266, 1219, 1153, 1099, 1001, 931.	
UV-spectrum (nm)	256±2; 273±2; 348±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 3.84 (3H, s, OCH_3-3); 3.91 (3H, s, OCH_3-6); 3.95 (3H, s, OCH_3-7); 3.96 (6H, s, OCH_3-3’, OCH_3-4’); 6.48 (1H, s, H-8); 6.97 (1H, d, J=8.5, H-5′); 7.67 (1H, d, J = 2.1, H-2′); 7.71 (1H, dd, J = 8.5, 2.1, H-6’); 12.50 (1H, s, OH). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 56.09 (q, OCH_3-7); 56.17 (q, OCH_3-3); 56.42 (q, OCH_3-6); 60.28 (q, OCH_3-3’); 60.97 (q, OCH_3-4’); 90.43 (d, C-8); 106.66 (s, C-10); 111.32 (d, C-5′); 111.93 (d, C-2′); 122.24 (d, C-6′); 122.96 (s, C-1′); 132.36 (s, C-6); 138.90 (s, C-3); 148.85 (s, C-4′); 151.47 (s, C-5); 151.48 (s, C-3′) 152.40 (s, C-9); 155.99 (s, C-2); 158.86 (s, C-7); 178.96 (s, C-4).	
Biological activity	Possesses antioxidant activity	
References	Herz W. Notes-Isolation of 5-Hydroxy-3,6,7,3’,4’-pentamethoxyflavone from *Kuhnia eupatorioides* L. var. pyramidalis // The Journal of Organic Chemistry. – 1961. – Vol. Vol. 26, No 8. – P. 3014–3015. doi:10.1021/jo01066a624 https://pubs.acs.org/doi/pdf/10.1021/jo01066a624 Seidakhmetova R.B., Romanova M.A., Mukusheva G.K., Seitembetov T.S., Adekenov S.M. Antioxidant activity of natural flavonoids and their derivatives // Immunopathology, Allergology, Infectology. – 2018. – No 2. – P. 32-35. https://www.elibrary.ru/download/elibrary_36997033_29345223.pdf	

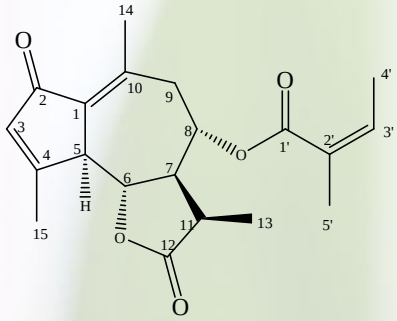
Artemisinin		
	CAS#	63968-64-9
	Synonyms:	[3R-(3α,5αβ,6β,8αβ,9α,12β,12aR)]-Octahydro-3,6,9-trimethyl-3,12-epoxy-12H-pyrano[4,3-j]-1,2-benzodioxepin-10(3H)-one, [Arteannuin], [Qinghaosu], [Qingosu], [Artemisinin].
	Gross formula:	$C_{15}H_{22}O_5$
	Molecular weight:	282.33 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	150-153 ºC
	Colorless crystalline substance	
IR-spectrum (cm^{-1})	2983, 2953, 2934, 2912, 2875, 2862, 2851 (C-H), 1737 (Carbonyl group of γ-lactone), 1456, 1440, 1396, 1384, 1361, 1348, 1279, 1253, 1212, 1199, 1183, 1117, 1028, 1012, 962.	
UV-spectrum (nm)	203±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 0.99 (3H, s, CH_3-16); 1.03-1.08 (1H, m, H-7α); 1.08-1.10 (1H, m, H-8α); 1.15 (3H, d, J=7.30, CH_3-15); 1.38 (3H, s, CH_3-14); 1.39-1.36 (1H, dd, J=10.74, 6.16, H-5α); 1.43-1.39 (1H, m, H-6); 1.44 (1H, m, H-5A); 1.73-1.78 (1H, m, H-8A); 1.79-1.75 (1H, m, H-8α); 1.89-1.84 (1H, m, H-8β); 2.03-1.96 (1H, m, H-5β); 2.10-2.04 (1H, m, H-4β); 2.45 (1H, dd, J=13.07, 3.87, H-4α); 3.38-3.28 (1H, m, H-9); 6.0 (1H, s, H-12). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 11.59 (q, C-15); 18.85 (q, C-16); 22.86 (t, C-8); 24.12 (t, C-5); 24.69 (q, C-14); 32.86 (d, C-9); 33.46 (t, C-7); 35.57 (t, C-4); 37.06 (d, C-6); 44.57 (d, C-8A); 50.05 (d, C-5A); 79.62 (s, C-12A); 94.34 (d, C-12); 105.25 (s, C-3); 173.38 (s, C-10).	
Biological activity	Possesses antimalarial activity	
References	Tu Y. From *Artemisia annua* L. to artemisinins. The discovery and development of artemisinins and antimalarial agents; Elsevier Science: San Diego, CA, USA, 2017. https://www.elsevier.com/books/from-artemisia-annua-l-to-artemisinins/tu/978-0-12-811655-5	

Austricin		
	CAS#	10180-88-8
	Synonyms:	[Deacetylmatricarin], [8-Deacetylmatricarin].
	Gross formula:	$C_{15}H_{18}O_4$
	Molecular weight:	262.3 g/mol
	HPLC Purity:	≥99,5%
	Melting Point:	150-151°C

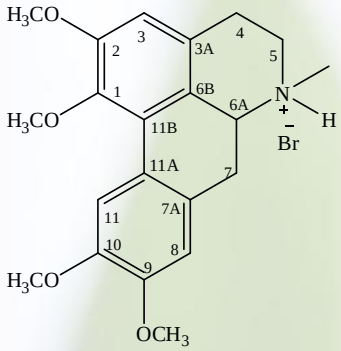
	White crystalline powder
IR-spectrum (cm^{-1})	3533 (OH), 3510, 3358, 2999, 2959, 2928, 2906, 2877 (C-H), 1768 (γ-lactone carbonyl), 1681, 1637, 1616 (dienone fragment), 1450, 1433, 1380, 1297, 1170.
UV-spectrum (nm)	257±2
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.44 (3H, d, J=7.0, CH_3-13); 2.12 (1H, dt, J=11.5, 10.0, H-7); 2.25-2.21 (1H, m, H-9β); 2.41 (3H, s, CH_3-14); 2.51-2.58 (1H, m, H-9α); 2.78 (1H, dd, J=11.0, 7.4, H-11); 2.88 (3H, s, CH_3-15); 3.37 (1H, d, J=10.0, H-5); 3.64 (1H, t, J=10.6, H-8); 3.73 (1H, t, J=10.1, H-6); 6.15 (1H, s, H-3). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 15.6 (q, C-13); 20.0 (q, C-14); 21.8 (q, C-15); 41.4 (d, C-8); 49.1 (d, C-11); 51.7 (t, C-9); 61.5 (d, C-5); 69.6 (d, C-7); 81.1 (d, C-6); 133.0 (s, C-1); 135.7 (d, C-3); 145.8 (s, C-10); 170.3 (s, C-4); 177.8 (s, C-12); 195.7 (s, C-2).
Biological activity	Possesses hypolipidemic activity.
References	Adekenov S. M. Chemical study of *Artemisia austriaca* Jacq. //International Journal of Biology and Chemistry. – 2021. – Vol. 14, No 1. – P. 156-163. doi.org/10.26577/ijbch.2021.v14.i1.017 https://ijbch.kaznu.kz/index.php/kaznu/article/view/538 Syrov V.N., Tursunova N.V., Islamova J.I. Comparative hypolipidemic and antisclerotic activity of sesquiterpene lactones leukomizin, austricin and badhyzin// Central Asia Journal of Medicine. – 2019. - Vol. 2018, Iss. 2. - P. 95-104. https://uzjournals.edu.uz/tma/vol2018/iss2/8/

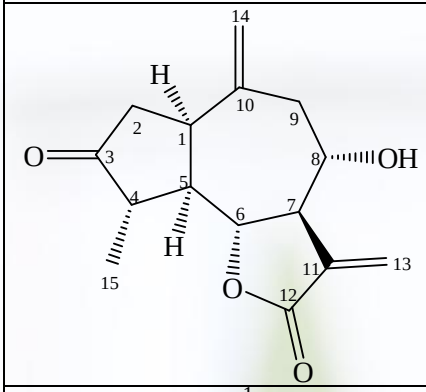
Achillin		
	CAS#	5956-04-7
	Synonyms:	[(3R,3aS,9aS,9bS)-3,3a,4,5,9a,9b-Hexahydro-3,6,9-trimethylazuleno[4,5-bfuran-2,7-dione].
	Gross formula:	$C_{15}H_{18}O_3$
	Molecular weight:	246.30 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	144-145 °C
	White powder	
IR-spectrum (cm^{-1})	2967, 2935, 2918, 2894, 2879, 2864 (C-H), 1777 (Carbonyl group of γ-lactone), 1680, 1617, 1633 (dienone fragment), 1461, 1435, 1386, 1363, 1322, 1259, 1213, 1199, 1166, 1154, 1133, 1044, 983.	
UV-spectrum (nm)	256±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.22 (3H, d, J=7.73, CH_3-13); 1.41 (1H, dd, J=12.5, 1.58, H-8α); 1.87-1.81 (1H, m, H-8β); 2.41 (3H, s, CH_3-14); 2.27 (3H, s, CH_3-15); 2.31 (1H, dt, J=14.5, 6.0, 1.72, H-9α); 2.41-2.40 (1H, m, H-9β); 2.47-2.42 (1H, m, H-7); 2.69 (1H, q, J=7.73, H-11); 3.40 (1H, d,	

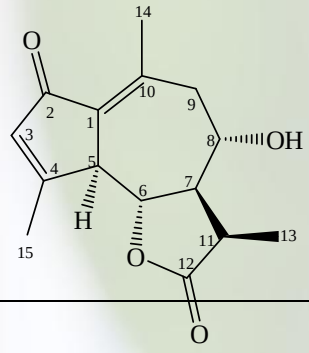
	J=9.88, H-5); 3.79 (1H, t, J=10.31, H-6); 6.15 (1H, br. s, H-3). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 10.04 (q, C-13); 19.91 (q, C-15); 21.65 (q, C-14); 23.68 (t, C-8); 37.69 (t, C-9); 39.45 (d, C-11); 52.05 (d, C-7); 53.02 (d, C-5); 83.58 (d, C-6); 131.84 (s, C-1); 135.63 (d, C-3); 152.29 (s, C-10); 170.21 (s, C-4); 178.60 (s, C-12); 196.06 (s, C-2)
Biological activity	Possesess hypolipidemic activity.
References	Martinez V., Muñoz-Zamora M. A., Joseph-Nathan P. Conformational analysis of achillin and leukodin// Journal of Natural Products. – 1988. – Vol.51, No.2 – P. 221–228. doi:10.1021/np50056a005 Ratkin A.V., Kaidash O.A., Pfarger Y.A., Ivanov V.V., Adekenov S.M., Ryazantseva N.V., Chuchalin V.S., Vengerovsky A.I. Hypolipidemic effect of sesquiterpene lactones arglabin and achillin in a model of acute hyperlipidemia // Siberian Medical Review. – 2014. – No. 5. – P. 40-43.

Badkhysin		
	CAS#	
	Synonyms:	2-Oxo-8α-angeloiloxy-5α(H),6β(H),7α(H),11α(H)-guaia-1(10),3(4)-dien-6,12-olide
	Gross formula:	$C_{20}H_{24}O_5$
	Molecular weight:	344,40
	HPLC Purity:	≥99,0%
	Melting Point:	139-140 °C
	White crystalline substance	
IR-spectrum (cm^{-1})	2973, 2963, 2923, 2909, 2890 (C-H), 1769 (Carbonyl group of γ-lactone), 1708, 1695, 1684, 1652, 1641, 1617 (dienone fragment), 1459, 1433, 1340, 1321, 1300, 1237, 1215, 1183, 1157, 1131, 1077, 1036, 1020, 977, 898, 851, 844.	
UV-spectrum (nm)	253±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, CD_3OD, ppm, J1, 2, 3…n/Hz): 1.33 (3H, s, CH_3-5'); 1.87 (3H, d, J=3.0, CH_3-4'); 1.99 (3H, d, J=7.50, CH_3-13); 2.24 (3H, s, CH_3-15); 2.25 (1H, dd, J=18.40, 9.45, H-7); 2.27 (3H, s, CH_3-14); 2.95-2.81 (2H, m, H-9α, H-9β); 3.08-3.04 (1H, m, H-11); 3.58 (1H, d, J=10.67, H-5); 4.45 (1H, dd, J=10.67, 8.23, H-8); 5.49 (1H, ddd, J=10.04, 9.74, 3.72, H-6); 6.15 (1H, s, H-3); 6.18 (1H, dd, J=7.5, 1.5, H-3'). ^{13}C NMR (125,76 MHz, CD_3OD, ppm): 13.38 (q, C-13); 16.02 (q, C-14); 19.80 (q, C-15); 20.32 (q, C-5'); 20.61 (q, C-4'); 37.30 (d, C-11); 43.62 (t, C-9); 45.17 (d, C-7); 49.12 (d, C-5); 60.84 (d, C-6); 67.13 (d, C-8); 127.04 (c, C-2'); 129.84 (s, C-1); 135.48 (d, C-3); 140.21 (d, C-3'); 145.36 (s, C-10); 166.68 (s, C-4); 169.82 (s, C-1'); 178.19 (s, C-12); 195.38 (s, C-2).	
Biological activity	Possess hypolipidemic and anthelmintic activities	
References	Serkerov S.V., Sheichenko V.I. Structure of isobadkhysin. The stereochemistry of badkhysin and isobadkhysin// Chemistry of Natural Compounds. – 1970. – Vol.6, No 4. – P.433–436.	

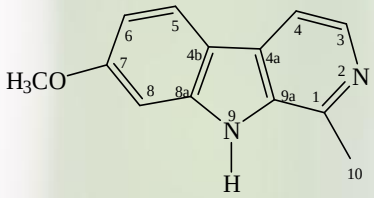
	doi:10.1007/bf00564242 Syrov V.N., Tursunova N.V., Islamova J.I. Comparative hypolipidemic and antisclerotic activity of sesquiterpene lactones leukomizin, austricin and badhyzin// Central Asia Journal of Medicine. – 2019. - Vol. 2018, Iss. 2. - P. 95-104. https://uzjournals.edu.uz/tma/vol2018/iss2/8/ Islamova Zh.I. Pharmacological evaluation of antiparasitic and prebiotic activity of plant substances of terpenoid, polyphenolic, and carbohydrate nature: Doctoral thesis in medical sciences: 14.00.17. – Tashkent. – 2020. – 220 p.

Glaucine hydrobromide		
	CAS#	5996-06-5
	Synonyms:	[(6aS)-1,2,9,10-Tetramethoxy-6-methyl-5,6,6a,7-tetrahydro-4H-dibenzo(de,g)quinoline hydrobromide]
	Gross formula:	$C_{21}H_{26}BrNO_4$
	Molecular weight:	435.10 g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	198 ºC
	White crystalline substance	
IR-spectrum (cm^{-1})	3050 (N-CH_3), 2995, 2969, 2909 (OCH_3), 2845, 2789 (N-CH_3), 2632, 2579, 2482, 1605, 1582, 1521, 1462, 1422 (C=C), 1398, 1333 (C-C), 1262 (C-N), 1110, 1069, 1045 (C-H), 1013, 962.	
UV-spectrum (nm)	221±2; 282±2; 302±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 2.84-3.15 (2H, m, H-5α, H-5β); 3.0 (3H, s, N-CH_3); 3.24-3.47 (2H, m, H-4α, H-4β); 3.59 (3H, s, OCH_3-1); 3.67 (1H, s, H-Br); 3.72-3.92 (2H, m, H-7α, H-7β); 3.84-3.89 (9H, s, OCH_3-2, OCH_3-9, OCH_3-10); 4.05 (1H, m, H-6α); 6.6 (1H, s, H-3); 6.78 (1H, s, H-8); 8.0 (1H, s, H-11). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 26.20 (t, C-4); 31,86 (t, C-7); 42.57 (q, N-CH_3); 50.09 (t, C-5); 53.09 (q, C-2, OCH_3), 56.04 (q, C-9, OCH_3); 60.37 (q, C-10, OCH_3); 61.67 (d, C-6A); 63.04 (q, C-1, OCH_3); 110.36 (d, C-3); 110.96 (d, C-8); 111.61 (d, C-11); 119.91 (s, C-11A); 122.72 (s, C-11B); 123.66 (s, C-6B); 125.90 (s, C-3a); 127.20 (s, C-7a); 145.26 (s, C-1); 148.25 (s, C-9); 148.76 (s, C-10); 153.79 (s, C-2).	
Biological activity	Possesses antimicrobial activity	
References	Turmukhambetov A.Z., Mukusheva G.K., Seidakhmetova R.B., Shults E.E., Shakirov M.M., Bagryanskaya I.Y., Gatilov Yu.V., Adekenov S.M. Synthesis and antimicrobial activity of quaternary salts of the alkaloid glaucine// Pharmaceutical Chemistry Journal. – 2009. – Vol.43, No 5. – P. 255–257. doi:10.1007/s11094-009-0283-2	

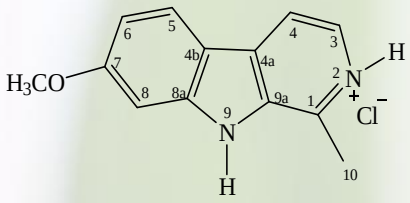
Grossheimin		
	CAS#	22489-66-3
	Synonyms:	[3-Oxo-8α-hydroxy-1,5α,4β(H)-guaia-10(14),11(13)-diene-6,12-olide].
	Gross formula:	$C_{15}H_{18}O_4$
	Molecular weight:	262.31 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	200-202 ºC
	Colorless crystalline substance	
IR-spectrum (cm^{-1})	3431 (OH), 3247, 3080, 2999, 2968, 2929, 2863 (C-H), 1756 (Carbonyl group of γ-lactone), 1724 (C=O), 1645 (C=C), 1506, 1475, 1398, 1353, 1289, 1243, 1177, 1069, 1020, 978, 947.	
UV-spectrum (nm)	203±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.18 (3H, d, J=6.73, SH_3-15); 2.19-2.31 (3H, m, H-4, H-9β, H-5); 2.42-2.55 (2H, m, H-2α, H-2β); 2.76-2.80 (1H, dd, J=18,62, 12.46, H-9α); 3.02-3.07 (1H, dd, J=12.46, 3.15, H-7); 3.12-3.16 (1H, m, H-1); 3.72-3.75 (1H, dd, J=9.31, 5.87, H-8); 3.95 (1H, t, J=17.90, 9.02, H-6); 4.71 (1H, s, H-14α); 5.02 (1H, s, H-14β); 6.30 (2H, m, H-13α, H-13β). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 15.01 (q, C-15); 40.26 (d, C-1); 43.29 (t, C-2); 47.08 (t, C-9); 48.01 (d, C-4); 49.30 (d, C-7); 51.23 (d, C-5); 73.26 (d, C-8); 82.39 (d, C-6); 115.76 (t, C-14); 125.84 (t, C-13); 136.52 (s, C-11); 143.29 (s, C-10); 169.99 (s, C-12); 219.10 (s, C-3).	
Biological activity	Posesses antitumor, anti-inflammatory, and antiparasitic activities.	
References	Adekenov S.M., Aituganov K.A., Kagarlitsky A.D., Rakhimov K.D., Vermenichev S.M. Grossheimin (from *Chartolepis intermedia* and *Centaurea ruthenica*// Chemical Pharmaceutical Journal. – 1986. – No 8. – P. 938-942. Adekenov S., Mukhametzhanova G., Asanova G., Adekenova Gulimzhan S., Medeubayeva B., Kishkentayeva A. *Chartolepis intermedia* Boiss. and *Centaurea ruthenica* Lam.–new medicina plants containing pharmacologically active compounds// Open Access Macedonian Journal of Medical Sciences. – 2022. – Vol. 10, No A. – P. 56-64.	

Grossmisin		
	CAS#	35879-92-6
	Synonyms:	[8α-Hydroxy-2-oxo-5,11α(H)-guaia-1(10),3(4)-diene-6,12-olide], [8α-Oxyachillin]
	Gross formula:	$C_{15}H_{18}O_4$
	Molecular weight:	262.31 g/mol
	HPLC Purity:	≥99,0%

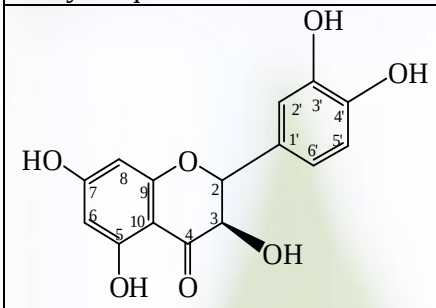
	Melting Point:	166-167 ºC
	Yellowish powdery substance	
IR-spectrum (cm^{-1})	3503 (OH), 3322, 3069, 2982, 2957, 2919, 2891 (C-H), 1785 (Carbonyl group of γ-lactone), 1753, 1680, 1636, 1608 (dienone fragment), 1446, 1380, 1293, 1261, 1222, 1197, 1062, 1032, 977, 939.	
UV-spectrum (nm)	256±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.29 (3H, d, J=7.66, CH_3-13); 2.30 (3H, s, CH_3-15); 2.44 (3H, s, CH_3-14); 2.48 (1H, dd, J=2.0, 13.5, H-9α); 2.55 (1H, dd, J=17.65, 10.4, H-7); 2.75 (1H, t, J=12.14, H-9β); 2.94 (1H, q, J=14.89, H-11); 3.41 (1H, d, J=10.10, H-5); 3.84 (1H, t, J=10.3, H-6); 3.72 (1H, t, J=9.7, H-8); 6.18 (1H, s, H-3). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 9.45 (q, C-13); 19.91 (q, C-15); 21.83 (q, C-14); 38.16 (q, C-11); 48.24 (t, C-9); 51.89 (d, C-5); 58.00 (d, C-7); 64.96 (d, C-8); 81.10 (d, C-6); 132.71 (s, C-1); 135.46 (d, C-3); 146.81 (s, C-10); 170.97 (s, C-4); 178.77 (s, C-12); 196.12 (s, C-2).	
Biological activity	Posesses hypolipidemic activity	
References	Talzhanov N.A., Dauletzhanov A.Zh., Raldugin V.A., Atazhanova G.A., Adekenov S.M. Grossmisin from *Artemisia leucodes*// In the book: "Chemistry and technology of plant substances", Syktyvkar. – 2006. – P. 185. Ratkin A.V., Kaidash O.A., Ivanov V.V., Vengerovsky A.I., Adekenov S.M., Chuchalin V.S. Effects of grossheimin and grossmisin in a model of acute ethanol-induced hyperlipidemia// Bulletin of Siberian Medicine. – 2014. – Vol.13. – №1. – P. 67-72. https://bulletin.tomsk.ru/jour/article/view/19/22	

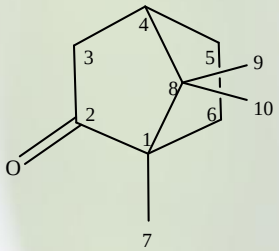
Harmine		
	CAS#	442-51-3
	Synonyms:	[7-Methoxy-1-methyl-9H-pyrido[3,4-b]indole], [Banisterine], [Leucogarmine], [Telepathine], [Yageine]
	Gross formula:	$C_{13}H_{12}N_2O$
	Molecular weight:	212.25g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	265-268 ºC
	Yellowish powdery substance	
IR-spectrum (cm^{-1})	3145, 3075 (NH), 2965 (OCH_3), 2885, 2833, 2763 (C-H), 1627, 1619 (C=N), 1564, 1511, 1483, 1453 (C=C), 1388, 1325 (C-C), 1291, 1280, 1253, 1237, 1200 (-C-N), 1164, 1136, 1105, 1025, 975.	
UV-spectrum (nm)	209±2; 241±2; 300±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 2.74 (3H, s, CH_3 at C-1); 3.88 (3H, s, OCH_3 at C-7); 6.83 (1H, dd, J=8.73, 2.29, H-6); 7.00 (1H, d, J=2.29, H-8); 7.74 (1H, d, J=5.44, H-4); 7.93 (1H, d, J=8.73, H-5); 8.06 (1H, d, J=5.44, H-3). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 18.27 (q, CH_3 at C-1);	

	54.69 (q, C-7, OCH_3 at C-7); 94.15 (d, C-8); 109.57 (d, C-6); 111.98 (d, C-4); 115.09 (s, C-4b); 122.16 (d, C-5); 128.81 (s, C-4a); 134.98 (s, C-9a); 136.68 (d, C-3); 140.77 (s, C-1); 142.84 (s, C-8a); 161.19 (s, C-7).
Biological activity	Posesses neurotropic activity.
References	Mukusheva G.K., Nurmaganbetov Z.S., Ismagulova N.M., Adekenov S.M., Ivasenko S.A., Khabarov I.A., Sakenova P.E., Nurmanganbetov Zh.S. Turmukhambetov A.Zh. Application of centrifugal partition chromatography for the isolation of harmine from *Peganum harmala* L. // In the book: "Chemistry and pharmacology of plant substances". – Syktyvkar. – 2014. – P. 7-9. Gerardy J. Effect of moclobemide on rat brain monoamine oxidase A and B: comparison with harmaline and clorgyline // Progress in neuro-psychopharmacology & biological psychiatry. – 1994. – Vol. 18, № 4. – P. 793-802. doi:10.1016/0278-5846(94)90085-x https://europepmc.org/article/med/7938567

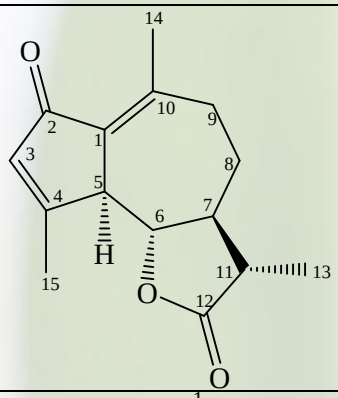
Harmine hydrochloride		
	CAS#	343-27-1
	Synonyms:	[7-Methoxy-1-methyl-9H-pyrido[3,4-b]indole-2N hydrochloride]
	Gross formula:	$C_{13}H_{13}ClN_2O$
	Molecular weight:	248.71 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	272-275 ºC
	White powdery substance	
IR-spectrum (cm^{-1})	3500 ($^{+}$NH), 3432, 3089 (NH), 2923, 2951, 2813 (OCH_3), 2763, 2722, 1631 (C=N), 1576, 1463, 1330, 1280, 1263, 1199, 1075 (C-N), 949.	
UV-spectrum (nm)	207±2; 248±2; 325±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, CD_3OD, ppm, J1, 2, 3…n/Hz): 2.93 (3H, s, CH_3); 3.95 (3H, s, OCH_3); 6.91 (1H, dd, J=8.8, 2.2, H-6); 7.00 (1H, d, J=2.15, H-8); 8.04 (1H, dd, J=8.8, 0.43, H-5); 8.12 (1H, d, J=6.37, H-4); 8.17 (1H, d, J=6.37, H-3). ^{13}C NMR (125,76 MHz, CD_3OD, ppm): 14.63 (q, CH_3-10); 55.03 (q, OCH_3-7); 93.61 (d, C-8); 113.01 (d, C-6); 113.58 (d, C-4); 113.67 (s, C-4a); 123.63 (d, C-5); 128.15 (s, C-4b); 132.96 (s, C-9a); 133.67 (d, C-3); 136.37 (s, C-1); 145.90 (s, C-8a); 163.68 (s, C-7).	
Biological activity	Posesses neurotropic, antidepressant, antiparkinsonian activities	
References	Ismagulova N.M., Nurmaganbetov Zh.S., Turmukhambetov A.Zh., Seitembetov T.S., Adekenov S.M. Synthetic derivatives of natural alkaloid harmine// Eurasian Chemico-Technological Journal. – 2009. – Vol. 11, No 3. – P. 199–205. doi: https://doi.org/10.18321/ectj281 https://www.ect-journal.kz/index.php/ectj/article/view/528/487	

	Adekenov S.M., Salimov A.K., Kovalev G.I., Abaimov D.A., Sariev A.K. Psychopharmacological properties of harmine hydrochloride// Experimental Clinical Pharmacology. – 2020. – Vol. 83, No 3. – P. 3-6. https://www.elibrary.ru/item.asp?id=42632422&

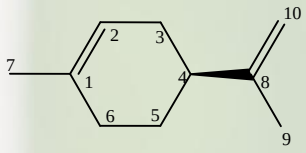
Dihydroquercetin		
	CAS#	480-18-2
	Synonyms:	[-2R-2,3,5,7,3′4′-Pentaoxyflavone], [Taxifolin], [Diquertin]
	Gross formula:	$C_{15}H_{12}O_7$
	Molecular weight:	304.25 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	222-224 ºC
	Yellow crystalline substance	
IR-spectrum (cm^{-1})	3549, 3401 (OH), 3398, 3340, 2889, 2866, 1653 (C=O), 1588, 1456, 1363 (C=C), 1258, 1163, 1119, 1018, 972.	
UV-spectrum (nm)	206±2; 290±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, C_5D_5N, ppm, J1, 2, 3…n/Hz): 4.99 (1H, d, J=11.38, H-2); 5.40 (1H, d, J=11.38, H-3); 6.30 (1H, d, J=2.15, H-8); 6.43 (1H, d, J=2.08, H-6); 7.66 (1H, s, H-2'); 7.25 (2H, m, H-5', H-6'); 11.53 (1H, s, 5-OH). ^{13}C NMR (125,76 MHz, C_5D_5N, ppm): 73.14 (d, C-3); 84.79 (d, C-2); 96.01 (d, C-8); 97.19 (d, C-6); 101.50 (s, C-7); 116.23 (d, C-2'); 116.46 (d, C-5'); 120.21 (d, C-6'); 129.44 (s, C-1'); 147.18 (s, C-4'); 147.90 (s, C-3'); 163.73 (s, C-9); 164.86 (s, C-5); 168.54 (s, C-10); 198.65 (s, C-4).	
Biological activity	Posesses antioxidant activity	
References	Outtrup H., Schaumburg K., Madsen J.Ø. Isolation of dihydromyricetin and dihydroquercetin from bark of pinus contorta// Carlsberg Research Communications. – 1985. – Vol. 50, No 6. – P. 369. doi.org/10.1007/BF02907158 https://link.springer.com/article/10.1007/BF02907158 Kurth E.F., Chan F.L. Dihydroquercetin as an antioxidant// Journal of the American Oil Chemists' Society. – 1951. – Vol. 28, No 10. – P. 433–436. doi:10.1007/bf02589681 https://link.springer.com/article/10.1007/BF02589681	

Camphor		
	CAS#	76-22-2
	Synonyms:	[2-Camphanone], [2-Bornanone]
	Gross formula:	$C_{10}H_{16}O$
	Molecular weight:	152.24 g/mol
	HPLC Purity:	≥98%
	Melting Point:	176 -178 ºC
	Yellow crystalline substance	
IR-spectrum (cm^{-1})	2960, 2873 (C-H), 1743 (C=O), 1449, 1417, 1390, 1373, 1323, 1298, 1220, 1166, 1094, 1046, 1021, 951.	
UV-spectrum (nm)	203±2	

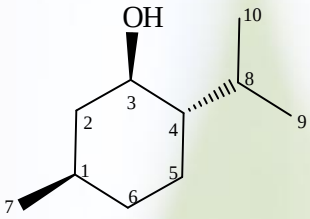
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 0.68 (3H, s, CH_3-9); 0.74 (3H, s, CH_3-7); 0.80 (3H, s, CH_3-10); 1.28-1.15 (2H, m, H-6α, H-5α), 1.56-1.48 (1H, m, H-5β), 1.67 (1H, d, J=18.26, H-3α), 1.8 (1H, m, H-6β), 1.93 (1H, t, J=4.51, 4.44, H-4); 2.19 (1H, dt, J=18.26, 3.97, 4.0, H-3β). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 9.21 (q, C-7); 19.09 (q, C-9); 19.71 (q, C-10); 27.01 (t, C-5); 29.85 (t, C-6); 42.98 (d, C-4); 43.20 (t, C-3); 46.69 (s, C-8); 57.56 (s, C-1); 219.22 (s, C-2).
Biological activity	Posesses antitussive and expectorant effects.
References	Yoneda J.D., Leal K.Z., Seidl P.R., Azeredo R.B. de V., Kleinpeter E. Camphor: a good model for illustrating NMR techniques; Canfora: um bom modelo para ilustrar tecnicas de RMN// Química Nova. – 2007. – Vol. 30, No. 8. – P. 2053-2056. https://www.scielo.br/pdf/qn/v30n8/a44v30n8.pdf Zuccarini P., Soldani G. Camphor: benefits and risks of a widely used natural product// Acta Biologica Szegediensis. – 2009. – Vol.53, No 2. – P. 77-82. http://abs.bibl.u-szeged.hu/index.php/abs/article/view/2670/2662

Leucomisin		
	CAS#	17946-87-1
	Synonyms:	[2-Oxo-5,7α,6,11β(H)-guaia-1(10),3(4)-diene-12,6-olide], [Leucodin]
	Gross formula:	$C_{15}H_{18}O_3$
	Molecular weight:	246,30 g/mol
	HPLC Purity:	≥98 %
	Melting Point:	196-199ºC
	White powder	
IR-spectrum (cm^{-1})	2978, 2943, 2864, 1777 (Carbonyl group of γ-lactone), 1682, 1636, 1615 (dienone fragment), 1448, 1377, 1318, 1293, 1255, 1204, 1116, 1033, 986.	
UV-spectrum (nm)	256±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500.16 MHz, $CDCl_3$, δ, ppm, J/Hz): 1.24 (3H, d, J=6.9, CH_3-13); 1.38-1.31 (1H, m, H-8α); 1.94-1.90 (1H, m, H-8β); 2.00-1.95 (1H, m, H-9α); 2.24 (1H, dd, J=12.5, 6.9, H-11); 2.27 (3H, s, CH_3-15); 2.29 (1H, m, H-7); 2.38-2.37 (1H, m, H-9β); 2.41 (3H, s, CH_3-14); 3.39 (1H, d, J=10.2, H-5); 3.62 (1H, t, J=9.95, H-6); 6.14 (1H, br. s, H-3). ^{13}C NMR (125.76 MHz, $CDCl_3$, δ, ppm): 12.4 (q, C-13); 19.9 (q, C-15); 21.7 (q, C-14); 26.0 (t, C-8); 37.6 (t, C-9); 41.2 (d, C-11); 52.6 (d, C-7); 56.4 (d, C-5); 84.3 (d, C-6); 131.9 (s, C-1); 135.6 (d, C-3); 152.4 (s, C-10); 170.2 (s, C-4); 177.8 (s, C-12); 196.1 (s, C-2).	
Biological activity	Posesses hypolipidemic activity	
References	Plugar V. N., Rashker Y.V., Saitbaeva I.M., Mallabaev A.	

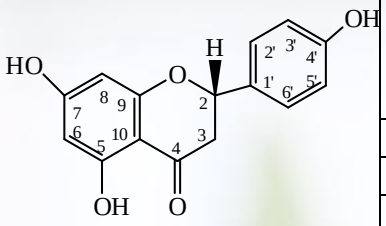
	Fragmentation of sesquiterpene lactones related to leucomisin// Chemistry of Natural Compounds. – 1987. – Vol. 23, No 1. – P. 80–84. doi:10.1007/bf00602463 https://link.springer.com/article/10.1007/BF00602463 Kirmukov A.G., Aĭzikov M.I., Rasulova S.A., Sidyakin G.P., Shamianov I.D., Malikov V.M., The angioprotector and hypolipidemic activity of leucomisin in experimental atherosclerosis// Farmakologiia i Toksikologiia. – 1991. – Vol. 54, No 3. – P. 35-37. doi:https://europepmc.org/article/med/1915817 Rodnova E.A., Ivanov V.V., Ledyukova S.I., Chuchalin V.S., Ratkin A.V., Rakhimova B.B., Khabarov I.A., Adekenov S.M. Lipidemic effect of leucomisin on the model of acute ethanol-induced hyperlipidemia// Bulletin of Siberian Medicine. – 2013. - Vol. 12, No 1. – P. 43–48. https://cyberleninka.ru/article/n/gipolipidemicheskoe-deystvie-leukomizina-na-modeli-ostroy-giperlipidemii-indutsirovannoy-etanolom/viewer Patent of the Republic of Kazakhstan No. 23091. A method of obtaining antiatherosclerotic and hypolipidemic agent "Aterolide" from *Artemisia leucodes* Schrenk./ S.M. Adekenov, Publ. 15.11.2010 https://kzpatents.com/7-ip23091-sposob-polucheniya-antiateroskleroticheskogo-i-gipolipidemicheskogo-sredstva-aterolid-iz-polyni-belovatojj-artemisia-leucodes-schrenk.html

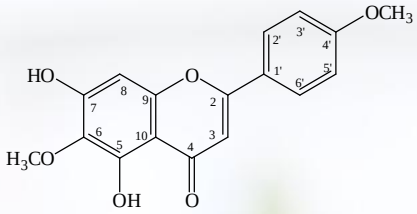
(R)-(+)-Limonene		
	CAS#	138-86-3
	Synonyms:	[(R)-4-Isopropenyl-1-methyl-1-cyclohexene], [(+)-*p*-Mentha-1,8-diene]
	Gross formula:	$C_{10}H_{16}$
	Molecular weight:	136.24 g/mol
	HPLC Purity:	≥98%
	Colourless liquid with a citrus odor	
IR-spectrum (cm^{-1})	3083, 3010, 2965, 2919, 2855, 2834 (C-H), 1644 (C=C), 1436, 1375, 1310, 1198, 1154, 1051, 1015, 914, 887, 797	
UV-spectrum (nm)	207±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.52-1.42 (1H, m, H-5α); 1.65 (3H, s, CH_3-7); 1.72 (3H, s, H-9); 1.82-1.77 (1H, m, H-5β); 1.98-1.86 (2H, m, H-3α, H-6α); 2.12-2.00 (3H, m, H-3β, H-4, H-6β); 4.70 (2H, m, H-10α, 10β); 5.40 (1H, m, H-2). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 20.92 (q, C-9); 23.59 (q, C-7); 27.98 (t, C-5); 30.67 (t, C-3); 30.88 (t, C-6); 41.16 (d, C-4); 108.46 (t, C-10); 120.73 (d, C-2); 133.86 (s, C-1); 150.39 (s, C-8).	
Biological activity	Possesses antiviral activity against herpes simplex virus type 1 (HSV-1) *in vitro*.	
References	Skakovsky E.D., Tychinskaya L.Yu., Molchanova O.A., Lamotkin S.A., Shutova A.G. NMR analysis of essential oils from needles of introduced species of Abies (Pinaceae) // Proceedings of the	

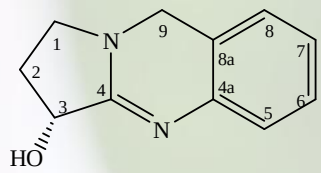
	National Academy of Sciences of Belarus. Biological Sciences Series. – 2014. – No. 2. – P. 22–27. Akram A., Schnitzler P. Antiviral activity of monoterpenes beta-pinene and limonene against herpes simplex virus *in vitro*// Iranian Journal of microbiology. – 2014. – Vol. 6, No 3. – P. 149-155 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4393490/pdf/IJM-6-149.pdf

(-)-Menthol		
	CAS#	2216-51-5
	Synonyms:	[2-Isopropyl-5-methylcyclohexanol], [(1R,2S,5R)-2-Isopropyl-5-methylcyclohexanol], [5-Methyl-2-(1-methylethyl) cyclohexanol].
	Gross formula:	$C_{10}H_{20}O$
	Molecular weight:	156.27 g/mol
	HPLC Purity:	≥98%
	Melting Point:	42-43°C
	A colorless crystalline substance with a characteristic peppermint odor	
IR-spectrum (cm^{-1})	3253 (OH), 2958, 2928, 2870 (C-H), 2721, 1448, 1464 (-CH_2-cyclohexane), 1383, 1368, 1312, 1292, 1226, 1173, 1078, 995.	
UV-spectrum (nm)	200±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, CD_3OD, ppm, J1, 2, 3…n/Hz): 0.78 (3H, d, J=6.87, CH_3-7); 0.87-0.80 (1H, m, H-6α); 0.89 (3H, d, J=7, H-9); 0.91 (3H, d, J=7.4, H-10); 1.05-0.92 (2H, m, H-2α, H-5α); 1.11-1.05 (1H, m, H-4); 1.44-1.34 (1H, m, H-1); 1.68-1.58 (2H, m, H-6β, H-5β); 1.94-1.89 (1H, m, H-2β); 2.24-2.17 (1H, m, H-8); 3.29 (1H, t, J=3.29, 1.72, H-3). ^{13}C NMR (125,76 MHz, CD_3OD, ppm): 16.16 (q, C-7); 21.10 (q, C-9); 22.31 (q, C-10); 23.19 (t, C-5); 25.90 (d, C-8); 31.72 (d, C-1); 34.62 (t, C-6); 45.12 (t, C-2); 50.21 (d, C-4); 71.63 (d, C-3).	
Biological activity	Possesses anti-inflammatory activity	
References	Härtner J., Reinscheid U.M. Conformational analysis of menthol diastereomers by NMR and DFT computation// Journal of Molecular Structure. – 2008. –Vol. 872, No 2-3. – P. 145–149. doi:10.1016/j.molstruc.2007.02.029 https://www.sciencedirect.com/science/article/abs/pii/S0022286007001925 Kwan E.E., Huang S.G. Structural elucidation with NMR spectroscopy: practical strategies for organic chemists// European Journal of Organic Chemistry. – 2008. – Vol. 2008, No 16. – P. 2671–2688. doi:10.1002/ejoc.200700966 Juergens U.R., Stöber M., Vetter H. The anti-inflammatory activity of L-menthol compared to mint oil in human monocytes *in vitro*: a novel perspective for its therapeutic use in inflammatory diseases// European Journal of Medical Research. – 1998. –Vol. 3, No 12. – P. 539-545.	

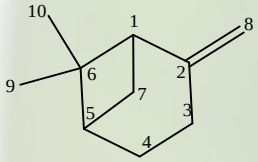
	https://europepmc.org/article/med/9889172

Naringenin		
	CAS#	67604-48-2
	Synonyms:	[4′,5,7-Trihydroxyflavanone], [(±)-2,3-Dihydro-5,7-dihydroxy-2-(4-hydroxyphenyl)-4H-1-benzopyran-4-one].
	Gross formula:	$C_{15}H_{12}O_5$
	Molecular weight:	272.26g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	250-252 ºC
	Yellow powdery substance	
IR-spectrum (cm^{-1})	3358 (OH), 2928, 1642 (C=O), 1516 (C=C), 1464, 1377, 1342, 1273, 1161, 1087, 1066, 1046, 975.	
UV-spectrum (nm)	202±2; 285±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, C_5D_5N, ppm, J1, 2, 3…n/Hz): 2.81 (1H, dd, J=10.02, 7.91, H-3a); 3.21 (1H, dd, J=10.02, 3.01, H-3b); 5.41 (1H, dd, J=7.91, 3.01, H-2), 6.32 (1H, d, J =2.08, H-8), 6.41 (1H, d, J=2.08, H-6), 7.15-7.17 (2H, m, H-3', H-5'), 7.45-7.47 (2H, m, H-2', H-6'). ^{13}C NMR (125,76 MHz, C_5D_5N, ppm): 43.13 (t, C-3); 79.47 (d, C-2); 95.94 (d, C-8); 97.05 (d, C-6); 102.69 (s, C-10); 116.24 (d, C-3', C-5'); 128.68 (d, C-2', C-6'); 129.59 (s, C-1'); 159.37 (s, C-4'); 163.87 (s, C-9); 164.99 (s, C-7); 168.41 (s, C-5); 196.36 (s, C-4).	
Biological activity	Possesses antioxidant activity	
References	Wawer I., Zielinska A. ^{13}C CP/MAS NMR studies of flavonoids// Magnetic Resonance in Chemistry. – 2001. – Vol. 39, No 7. – P. 374–380. doi:10.1002/mrc.871 Cordenonsi L.M., Sponchiado R.M., Campanharo S.C., Garcia C.V., Raffin R.P., Schapoval E.E.S. Study of flavonoids presente in Pomelo (*Citrus máxima*) by DSC, UV-VIS, IR, ^{1}H and ^{13}C NMR and MS// Drug Analytical Research. Porto Alegre. – 2017. – Vol. 1, No 1. – P. 31-37. https://www.lume.ufrgs.br/handle/10183/196208 Cavia-Saiz M., Busto M.D., Pilar-Izquierdo M. C., Ortega N., Perez-Mateos M., Muñiz P. Antioxidant properties, radical scavenging activity and biomolecule protection capacity of flavonoid naringenin and its glycoside naringin: a comparative study// Journal of the Science of Food and Agriculture. – 2010. – Vol. 90, No 7. – P. 1238–1244. doi:10.1002/jsfa.3959 https://onlinelibrary.wiley.com/doi/abs/10.1002/jsfa.3959	

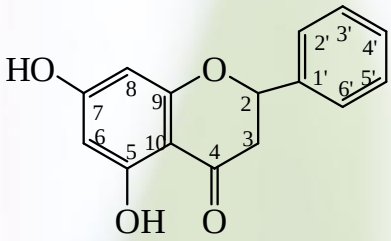
Pectolinarigenin		
	CAS#	520-12-7
	Synonyms:	[5,7-Dihydroxy-4',6-dimethoxyflavone], [4'-Methylcapillarizin], [6-Methoxyacacetin], [Hortensin]
	Gross formula:	$C_{17}H_{14}O_6$
	Molecular weight:	314.29 g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	206-208 ºC
	Yellow powdery substance	
IR-spectrum (cm^{-1})	3132 (OH), 2939, 2830 (O-CH_3), 1655 (C=O), 1596, 1562 (C=C), 1492, 1458, 1356, 1297, 1252, 1201, 1175, 1122, 1032, 1005, 972.	
UV-spectrum (nm)	214±2; 258±2; 275±2	
^1H and ^{13}C NMR spectra	^1H NMR (500 MHz, C_5D_5N, ppm, J1, 2, 3…n/Hz): 3.77 (3H, s, OCH_3-4'); 3.95 (3H, s, OCH_3-6); 6.75 (1H, s, H-8); 6.98 (1H, s, H-3); 7.23 (1H, d, J=8.6, H-2',); 7.28 (1H, d, J=8.6, H-3',); 7.63 (1H, d, J=8.6, H-5',); 7.92 (1H, d, J=8.6, H-6'); 13.65 (1H, s, OH-5). ^{13}C NMR (125,76 MHz, C_5D_5N, ppm): 56.23 (q, OCH_3-4'); 60.43 (q, OCH_3-6); 91.50 (d, C-8); 103.59 (d, C-3); 106.20 (s, C-10); 116.78 (d, C-3', C-5'); 121.47 (s, C-1'); 128.83 (d, C-2', C-6'); 132.92 (s, C-6); 152.43 (s, C-9); 153.52 (s, C-5); 159.18 (s, C-7); 162.74 (s, C-4'); 164.65 (s, C-2); 182.99 (s, C-4).	
Biological activity	Possesses hepatoprotective activity	
References	Lu M., Kong Q., Xu X., Lu H., Lu Z., Yu W., Zuo B., Su J., Guo R. Pectolinarigenin - a flavonoid compound from *Cirsium Japonicum* with potential anti-proliferation activity in mcf-7 breast cancer cell// Tropical Journal of Pharmaceutical Research. – 2014. – Vol. 13, No 2. – P. 225-228. doi:10.4314/tjpr.v13i2.9 https://www.ajol.info/index.php/tjpr/article/view/101486 Yoo Y.-M., Nam J.-H., Kim M.-Y., Choi J., Park H.-J. Pectolinarin and pectolinarigenin of cirsium setidens prevent the hepatic injury in rats caused by D-galactosamine via an antioxidant Mechanism// Biological & Pharmaceutical Bulletin. – 2008. – Vol. 31, No 4. – P. 760–764. doi:10.1248/bpb.31.760 https://www.jstage.jst.go.jp/article/bpb/31/4/31_4_760/_pdf/-char/ja	

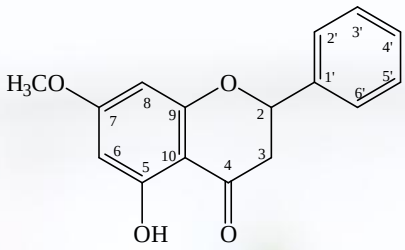
Peganine		
	CAS#	6159-56-4
	Synonyms:	[1,2,3,9-Tetrapyrrolo[2,1-b]quinazolin-3-ol-9], [Vasicine]
	Gross formula:	$C_{11}H_{12}N_2O$
	Molecular weight:	188.23 g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	210-213°C

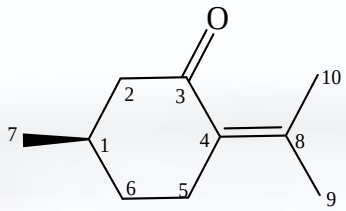
	Colorless crystalline substance
IR-spectrum (cm^{-1})	3059 (OH), 2940, 2870, 2732 (C-H), 1686, 1632 (C=N), 1573, 1597, 1501, 1483, 1457 (C=C), 1387, 1330 (C-C), 1306, 1280, 1232 (-C-N), 1185, 1174, 1106, 1061, 1033, 992.
UV-spectrum (nm)	204±2, 225±2, 231±2, 302±2
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 2.16-2.08 (1H, m, H-2α); 2.40-2.34 (1H, m, H-2β); 3.24-3.18 (2H, m, H-1α, H-1β); 3.38-3.32 (1H, m, H-1β); 4.52 (1H, d, J=13.17, H-9α); 4.54 (1H, d, J=13.7, H-9β); 4.74 (1H, dd, J=7.45, 7.45, H-3); 6.84 (1H, d, J=7.45, H-5); 6.97-6.95 (1H, m, H-8); 7.14 (2H, d, J=3.44, H-6, H-7); 8.15 (1H, s, OH at C-3). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 28.99 (t, C-2); 47.24 (t, C-9); 48.25 (t, C-1); 70.37 (d, C-3); 119.16 (s, C-8a); 123.88 (d, C-5); 124.23 (d, C-8); 125.91 (d, C-7); 128.52 (d, C-6); 142.55 (s, C-4a); 164.0 (s, C-4).
Biological activity	Possesses antimicrobial activity
References	Herraiz T., Guillén H., Arán V.J., Salgado A. Identification, occurrence and activity of quinazoline alkaloids in *Peganum harmala*// Food and Chemical Toxicology. – 2017. – Vol. 103. – P. 261-269. doi: 10.1016/j.fct.2017.03.010 Turmukhambetov A. Zh. Alkaloids of Kazakhstan plants. Isolation, chemical modification and biological activity. Karaganda: "Glasir", 2009. – 180 p. - ISBN 9965-886-63-6:

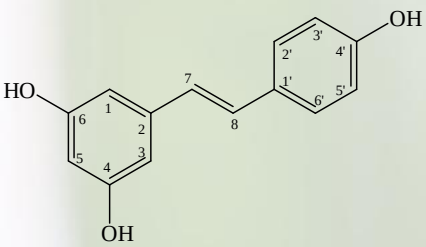
β-Pinene		
	CAS#	127-91-3
	Synonyms:	[6,6-Dimethyl-2-methylenebicyclo[3.1.1]heptane], [Norpinene], [Terebenthene], [Rosemarel], [2(10)-Pinene].
	Gross formula:	$C_{10}H_{16}$
	Molecular weight:	136.24g/mol
	HPLC Purity:	≥98%
	A colorless liquid with a characteristic odor	
IR-spectrum (cm^{-1})	3436, 3315, 2920 (C-H), 1711, 1668 (C=C), 1465, 1383, 1368, 1055, 1024, 903.	
UV-spectrum (nm)	207±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, CD_3OD, ppm, J1, 2, 3…n/Hz): 0.71 (3H, s, CH_3-10); 1.23 (3H, s, CH_3-9); 1.44-1.39 (1H, m, H-7α); 1.90-1.78 (2H, m, H-4α, H-4β); 2.00-1.92 (1H, m, H-5); 2.28-2.16 (1H, m, H-3α); 2.37-2.28 (1H, m, H-7β); 2.46-2.38 (1H, m, H-1); 2.60-2.47 (1H, m, H-3β); 4.53-4.50 (1H, m, H-8α); 4.61-4.57 (1H, m, H-8β). ^{13}C NMR (125,76 MHz, CD_3OD, ppm): 20.96 (q, C-10); 23.16 (t, C-4); 23.24 (t, C-3); 25.21 (q, C-9); 26.39 (t, C-7); 40.26 (d, C-5); 40.43 (s, C-6); 51.76 (d, C-1); 105.31 (t, C-8); 151.78 (s, C-2).	
Biological activity	Possesses antiviral activity against herpes simplex virus type 1 (HSV-1) *in vitro*	
References	Kolehmainen E., Laihia K., Laatikainen R., Vepsäläinen J., Niemitz M., Suontamo R. Complete spectral analysis of the ^{1}H	

	NMR 16-spin system of β-pinene// Magnetic Resonance in Chemistry. – 1997. – Vol. 35, No 7. – P. 463–467. doi:10.1002/(sici)1097-458x(199707)35:7<463::aid-omr110>3.0.co;2-t https://onlinelibrary.wiley.com/doi/abs/10.1002/(SICI)1097-458X(199707)35:7%3C463::AID-OMR110%3E3.0.CO;2-T Astani A., Schnitzler P. Antiviral activity of monoterpenes beta-pinene and limonene against herpes simplex virus *in vitro*// Iranian journal of microbiology. – 2014. – Vol. 6, No 3. – P. 149–155. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4393490/

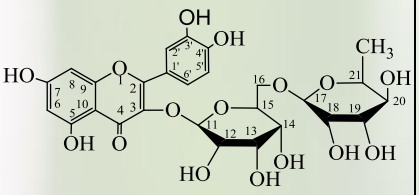
Pinocembrin		
	CAS#	480-39-7
	Synonyms:	[5,7-Dihydroxyflavanone], [Dihydroxychrysin], [Galangin flavanone].
	Gross formula:	$C_{15}H_{12}O_4$
	Molecular weight:	256.26 g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	196-198 ºC
	Colorless crystalline substance	
IR-spectrum (cm^{-1})	3092 (OH), 1632 (C=O), 1603, 1585, 1488, 1466 (C=C), 1217, 1168, 1089, 1066, 1015, 976.	
UV-spectrum (nm)	212±2; 290±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 2.82 (1H, dd, J=17.0, 3.0, H-3β); 3.09 (1H, dd, J=17.0, 13.0, H-3α); 5.42 (1H, dd, J=13.0, 3.0, H-2); 6.00 (1H, d, J=2.2, H-6); 6.01 (1H, d, J=2.2, H-8); 7.48-7.38 (5H, m, H-2', H-3', H-4', H-5', H-6'); 12.0 (1H, s, 5-OH). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 43.40 (t, C-3); 79.34 (d, C-2); 95.62 (d, C-6); 96.86 (d, C-8); 103.31 (s, C-10); 126.26 (d, C-3', C-5'); 129.01 (d, C-2', C-6'); 129.06 (d, C-4'); 138.30 (s, C-1'); 163.28 (s, C-7); 164.41 (s, C-9); 164.67 (s, C-5); 196.02 (s, C-4).	
Biological activity	Possesses antioxidant activity	
References	Kattaev N.S., Nikonov G.K. Flavonoids of *Glycyrrhiza glabra*// Chemistry of Natural Compounds. – 1974. – Vol. 10, No 1. – P. 94–95. doi:10.1007/bf00568245 https://link.springer.com/article/10.1007/BF00568245 Aiello F., Armentano B., Polerà N., Carullo G., Loizzo M.R., Bonesi M., Cappello M.S., Capobianco L., Tundis R. From vegetable waste to new agents for potential health applications: antioxidant properties and effects of extracts, fractions and pinocembrin from *Glycyrrhiza glabra* L. Aerial parts on viability of five human cancer cell lines// Journal of Agricultural and Food Chemistry. – 2017. – Vol. 65, No 36. – P. 7944–7954. doi:10.1021/acs.jafc.7b03045 https://pubs.acs.org/doi/abs/10.1021/acs.jafc.7b03045	

Pinostrobin		
	CAS#	480-37-5
	Synonyms:	[5-Hydroxy-7-methoxyflavanone], [5-Hydroxy-7-methoxy-2-phenylchroman-4-one], [5-Hydroxy-7-methoxy-2-phenyl-2,3-dihydro-4H-chromen-4-one]
	Gross formula:	$C_{16}H_{14}O_4$
	Molecular weight:	270,28 g/mol
	HPLC Purity:	≥99,5%
	Melting Point:	96-99 ºC
	Colorless crystalline substance	
IR-spectrum (cm^{-1})	3091 (OH), 2934 (OCH_3), 1650 (C=O), 1622, 1574 (C=C), 1500, 1435, 1386, 1366, 1343, 1317, 1255, 1155, 1283, 1095, 890.	
UV-spectrum (nm)	213 ±2; 288 ±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 2.82 (1H, dd, J=17.2, 3.1, H-3β); 3.08 (1H, dd, J =17.2, 13.0, H-3a); 3.80 (3H, s, OCH_3-7); 5.42 (1H, dd, J=13.0, 3.1, H-2); 6.06 (1H, d, J=2.2, H-6); 6.07 (1H, d, J=2.2, H-8); 7.47-7.39 (5H, m, H-4', H-2', H-6', H-3', H-5'); 12.00 (1H, s, OH-5). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 43.47 (t, C-3); 55.79 (s, OCH_3-7); 79.32 (d, C-2); 94.37 (d, C-6); 95.24 (d, C-8); 103.24 (s, C-10); 126.24 (d, C-4'); 126.98 (d, C-2', C-6'); 128.98 (d, C-3', C-5'); 138.48 (s, C-1'); 162.88 (d, C-5); 164.24 (s, C-7); 168.08 (s, C-9); 195.87 (s, C-4).	
Biological activity	Possesses hepatoprotective activity	
References	Yamovoi V.I., Kul'magambetova E.A., Kulyyasov A.T., Turdybekov K.M., Adekenov S.M. Molecular structure of a novel polymorphic modification of pinostrobin// Chemistry of Natural Compounds. – 2001. – Vol. 37, No 5. – P. 424–427. doi:10.1023/a:1014407007160 https://link.springer.com/article/10.1023/A%3A1014407007160 Lutskii V.I., Tyukavkina N.A., Shostakovskii M.F. Pinocembrin and pinostrobin from the heartwood of *Pinus sibirica*// Chemistry of Natural Compounds. – 1968. – Vol. 4, No 6. – P. 325–325. doi:10.1007/bf00569825 https://link.springer.com/article/10.1007/BF00569825 Eurasian patent No. 022691 dated February 29, 2016. S.M. Adekenov "Method of obtaining a hepatoprotective agent based on pinostrobin from *Populus balsamifera* L.". - Appl. 22.01.2013. - Publ. 29.02.2016. https://easpatents.com/12-22691-sposob-polucheniya-gepatoprotektornogo-sredstva-na-osnove-pinostrobina-iz-pochek-topolya-balzamicheskogo-populus-balsamifera-l.html	

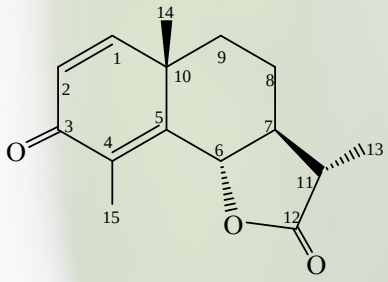
Pulegone		
	CAS#	89-82-7
	Synonyms:	[2-Isopropylidene-5-methylcyclohexanone], [Cyclohexanone], [*p*-Menth-4(8)-en-3-one].
	Gross formula:	$C_{10}H_{16}O$
	Molecular weight:	152.23 g/mol
	HPLC Purity:	≥98%
	A colorless liquid with a characteristic odor	
IR-spectrum (cm^{-1})	3348, 2954, 2926, 2871 (C-H), 1713 (C=O), 1681 (C=C), 1616, 1456, 1442, 1374, 1339, 1286, 1209, 1129, 1095, 987.	
UV-spectrum (nm)	252±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 0.91 (3H, s, CH_3-7); 1.31-1.20 (1H, m, H-6α); 1.73 (3H, s, CH_3-10); 1.83-1.80 (1H, m, H-6β); 1.91 (3H, s, CH_3-9), 2.00-1.94 (2H, m, H-1, H-5α); 2.24-2.16 (1H, m, H-5β); 2.48-2.39 (1H, m, H-2β); 2.70-2.64 (1H, m, H-2α). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 21.87 (q, C-7); 22.18 (q, C-9); 23.09 (q, C-10); 28.73 (t, C-5); 31.72 (d, C-1); 32.88 (t, C-6); 50.96 (t, C-2); 131.95 (s, C-4); 141.88 (s, C-8); 204.43 (s, C-3).	
Biological activity	Possesses psychotropic and analgesic effects.	
References	Kozlov N.G., Basalaeva L.I., Atazhanova G.A., Adekenov S.M. Synthesis of derivatives of the monoterpenoid pulegone// Chemistry of Natural Compounds. – 2015. – Vol. 51, No 3. – P. 488–490. doi:10.1007/s10600-015-1321-9 https://www.degruyter.com/document/doi/10.1515/znc-2011-7-806/html Sousa D.P., Nóbrega F.F.F., Lima M.R.V., Almeida R.N. Pharmacological activity of (R)-(+)-pulegone, a chemical constituent of essential oils// Zeitschrift Für Naturforschung. – 2011. – Vol. 66, No 7-8. – P. 353–359. doi:10.1515/znc-2011-7-806 https://www.degruyter.com/document/doi/10.1515/znc-2011-7-806/html	

Resveratrol		
	CAS#	501-36-0
	Synonyms:	[5-(4-Hydroxystyryl)benzene-1,3-diol], [trans-3,4',5-Trihydroxystilbene], [5-[(1E)-2-(4-Hydroxyphenyl)ethenyl]-1,3-benzenediol]
	Gross formula:	$C_{14}H_{12}O_3$
	Molecular weight:	228.25g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	242-245 ºC
	Colorless crystalline substance	
IR-spectrum (cm^{-1})	3292 (OH), 1606 (C=C), 1589, 1513, 1463, 1444, 1327, 1265, 1249, 1174, 1106, 1010, 988.	

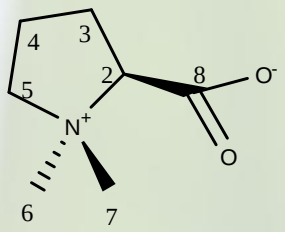
UV-spectrum (nm)	217±2; 306±2
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, CD_3OD, ppm, J1, 2, 3…n/Hz): 6.13 (1H, t, J=2.10, 2.29, H-3); 6.42-6.43 (2H, m, H-1, H-5); 6.73-6.77 (2H, m, H-3', H-5'); 6.79 (1H, d, J=16.61, H-8); 6.93 (1H, d, J=16.61, H-7), 7.32-7.34 (2H, m, H-2', H-6') ^{13}C NMR (125,76 MHz, CD_3OD, ppm): 101.26 (d, C-3); 104.38 (d, C-1); 115.13 (d, C-3',C-5'); 125,64 (d, C-8); 127.46 (d, C-2',S-6'); 128.02 (d, C-7); 129.04 (s, C-1'); 139.96 (s, C-6); 157.06 (s, C-4'); 158.30 (s, C-4).
Biological activity	Possesses antioxidant and antimicrobial activity.
References	Nonaka G., Minami M., Nishioka I. Studies on rhubarb (Rhei Rhizoma). III. Stilbene glycosides// Chemical & pharmaceutical bulletin. – 1977. – Vol. 25, No 9. – P. 2300–2305. doi:10.1248/cpb.25.2300 https://www.jstage.jst.go.jp/article/cpb1958/25/9/25_9_2300/_pdf/-char/ja Djavan B., Marihart S., Kuehhas F., Rom M., Partin A., Schalken J., Sekeres T. Resveratrol und neu synthetisierte resveratrol-analoga zur therapie des prostatakarzinoms// Der Urologe. – 2007. – Vol. 46, No 9. – P. 1101–1103. doi:10.1007/s00120-007-1446-y https://link.springer.com/article/10.1007/s00120-007-1446-y Filip V. Resveratrol and its antioxidant and antimicrobial effectiveness// Food Chemistry. – 2003. – Vol. 83, No 4. – P. 585–593. doi:10.1016/s0308-8146(03)00157-2 https://www.sciencedirect.com/science/article/abs/pii/S0308814603001572

Rutin		
	CAS#	153-18-4
	Synonyms:	[3-Rhamnoglucosyl-3,5,7,3′,4′-pentaoxyflavone], [3,3′,4′,5,7-Pentahydroxyflavone 3-rutinoside], [3-Rutinosylquercetin], [Globulariacitrin], [Ilixanthin], [Myrticalorin], [Osiritrin], [Paliuroside], [Phytomelin], [Quercetin 3-rhamnoglucoside], [Quercetin 3-rutinoside], [Rutoside], [Sophorin], [Tanrutin], [Violaquercitrin].
	Gross formula:	$C_{27}H_{30}O_{16}$
	Molecular weight:	610.52 g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	188-190 ºC
	Yellow powdery substance	
IR-spectrum (cm^{-1})	3425 (OH), 2922, 1653 (C=O), 1599, 1574, 1574 (C=C), 1504, 1456, 1364, 1235, 1203, 1169, 1158, 1085, 1092, 1014, 1001, 969.	

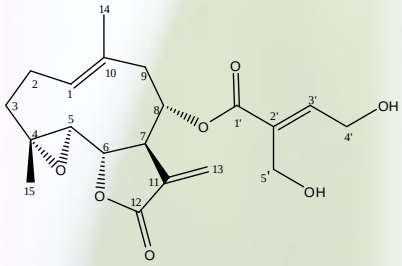
UV-spectrum (nm)	208±2; 260±2
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, CD_3OD, ppm, J1, 2, 3…n/Hz): 1.08 (3H, d, J=6.0, CH_3-21), 3.25-3.63 (10H, m, 6H glucose +4H rhamnose), 4.50 (1H, d, J=2.0, H-15 rhamnose), 5.10 (1H, d, J= 7.0, H-17 glucose), 6.18 (1H, d, J=2.5, H-6), 6.38 (1H, d, J=2.5, H-8), 6.85 (1H, d, J= 9.0, H-2'), 7.61 (1H, dd, J= 9.0, H-6'), 7.65 (1H, d, J= 9.0, H-5'). ^{13}C NMR (125,76 MHz, CD_3OD, ppm): 16.56 (q, CH_3); 67.19 (t, C-16); 68.37 (d, C-14); 70.03 (d, C-19); 70.75 (d, C-20); 70.87 (d, C-18); 72.57 (d, C-21); 74.38 (d, C-12); 75.85 (d, C-13); 76.82 (d, C-15); 93.50 (d, C-8); 98.58 (d, C-6); 101.07 (s, C-10); 103.37 (d, C-11); 104.27 (d, C-17); 111.69 (d, C-2'); 116.33 (d, C-5'); 121.75 (d, C-6'); 122.20 (s, C-1'); 134.28 (s, C-3); 144.50 (s, C-3'); 148.47 (s, C-4'); 157.16 (s, C-2); 157.99 (s, SC-9); 164.68 (s, C-7); 161.64 (s, C-5); 178.07 (s, C-4).
Biological activity	Possesses antioxidant activity
References	Suzuki H., Ikeda T., Matsumoto T., Noguchi M. Isolation and identification of rutin from cultured cells of *Stevia rebaudiana* Bertoni// Agricultural and Biological Chemistry. – 1976. – Vol. 40, No 4. – P. 819 – 820. doi:10.1080/00021369.1976.10862133 https://www.tandfonline.com/doi/abs/10.1080/00021369.1976.10862133 Kimura Y., Kubo M., Tani T., Arichi S., Okuda H. Studies on scutellariae radix. IV. Effects on lipid peroxidation in rat liver// Chemical and Pharmaceutical Bulletin. – 1981. – Vol. 29, No 9. – P. 2610-2617. doi:10.1248/cpb.29.2610 https://www.jstage.jst.go.jp/article/cpb1958/29/9/29_9_2610/_pdf/-char/ja Torel J., Cillard J., Cillard P. Antioxidant activity of flavonoids and reactivity with peroxy radical// Phytochemistry. – 1986. – Vol. 25, No 2. – P. 383–385. doi:10.1016/s0031-9422(00)85485-0 https://www.sciencedirect.com/science/article/abs/pii/S0031942200854850

α-Santonin		
	CAS#	481-06-1
	Synonyms:	[3-Oxo-6,11β(H),7α(H)-eudesm-1(2),4(5)-diene-6,12-olide], [Semenen].
	Gross formula:	$C_{15}H_{18}O_3$
	Molecular weight:	246.31 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	171-172 ºC
	Colorless crystalline substance	
IR-spectrum (cm^{-1})	2974, 2936, 2870 (C-H), 1785 (Carbonyl group of γ-lactone), 1658 (C=O), 1629, 1612 (C=C), 1457, 1406, 1376, 1267, 1244, 1193, 1179, 1153, 1135, 1103, 1033, 991.	
UV-spectrum (nm)	240±2	

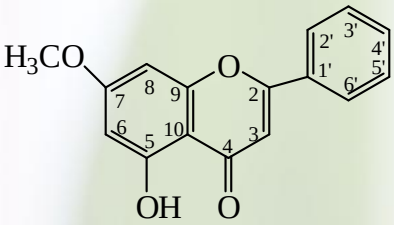
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.19 (3H, d, J=6.87, SH_3-13); 1.26 (3H, s, CH_3-14); 1.44 (1H, dt, J=13.75, 13.46, 5.15, H-9α); 1.65 (1H, dq, J=12.6, 12.03, 3.44, H-8α); 1.75 (1H, dq, J=12.03, 11.46, 3.44, H-7); 1.85 (1H, dq, J=13.46, 3.44, 2.29, H-9β); 1.99-1.94 (1H, m, H-8β); 2.04 (3H, s, CH_3-15); 2.38 (1H, dq, J=5.15, H-10); 4.76 (1H, dd, J=10.88, 1.15, H-6); 6.16 (1H, d, J=9.74, H-2); 6.64 (1H, d, J=9.74, H-1). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 10.98 (q, C-15); 12.57 (q, C-13); 22.91 (t, C-8); 25.18 (q, C-14); 37.87 (t, C-9); 41.00 (s, C-10); 41.48 (d, C-11); 53.59 (d, C-7); 81.45 (d, C-6); 125.83 (d, C-2); 128.56 (s, C-4); 151.31 (s, C-5); 155.03 (d, C-1); 177.79 (s, C-12); 186.39 (s, C-3).
Biological activity	Possesses anthelmintic activity
References	Adekenov S.M., Kupriyanov A.N., Gafurov N.M., Kurmanova, R.S. Sesquiterpene lactones of *Artemisia saissanica*// Chemistry of Natural Compounds. – 1990. – Vol. 26, No 6. – P. 716–717. doi:10.1007/bf00630095 Krotov A.L. On the mechanism of the action of santonin on Ascaris// Meditsinskaya Parazitologiya i Parazitarnye Bolezni. – 1957. – Vol. 26, No.2. – P.185-193. https://www.cabdirect.org/cabdirect/abstract/19570801002

Stachydrine		
	CAS#	471-87-4
	Synonyms:	[1,1-Dimethylpyrrolidinium-1-ium-2-carboxylate], [Inner salt of 2-carboxy-1,1-dimethylpyrrolidine hydroxide], [2-Carboxylate-1,1-dimethylpyrrolidine], [1-Methylproline methylbetaine], [Cadabine].
	Gross formula:	$C_7H_{13}NO_2$
	Molecular weight:	143.18 g/mol
	HPLC Purity:	≥99,5%
	Melting Point:	224-226 °C
	White powder	
IR-spectrum (cm^{-1})	3412 (NH), 3047 (C-H), 1621 (C=O), 1472, 1430, 1396, 1367, 1247, 1193, 1025, 955.	
UV-spectrum (nm)	205±2; 270±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, CD_3OD, ppm, J1, 2, 3…n/Hz): 2.17-2.09 (2H, m, H-4α, H-4β); 2.34-2.25 (1H, m, H-3α); 2.53-2.44 (1H, m, H-3β); 3.13 (3H, s, CH_3-6); 3.31 (3H, s, CH_3-7); 3.53-3.45 (1H, m, H-5b); 3.71-3.65 (1H, m, H-5a); 4.01 (1H, dd, J=10.45, 8.73, H-2). ^{13}C NMR (125,76 MHz, CD_3OD, ppm): 18.46 (t, C-4); 25.18 (t, C-3); 45.00 (q, CH_3-6); 51.37 (q, CH_3-7); 66.69 (t, C-5); 76.35 (d, C-2); 169.42 (s, C-8).	
Biological activity	Possesses antitumor activity	

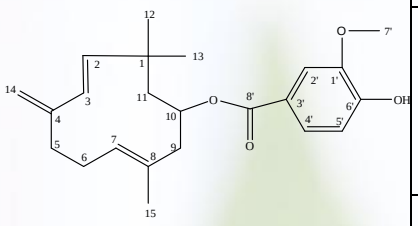
References	Kuchta K., Ortwein J., Hennig L., Rauwald H.W. ^{1}H-q NMR for direct quantification of stachydrine in *Leonurus japonicas* and *L. cardiaca*// Fitoterapia. – 2014. – Vol. 96. – P.8-17. doi:10.1016/j.fitote.2014.03.023 https://www.semanticscholar.org/paper/%C2%B9H-qNMR-for-direct-quantification-of-stachydrine-in-Kuchta-Ortwein/12a0e07bf328ffe2968cc6158e7a186a6f731eeb Rathee P., Rathee D., Rathee D., Rathee S. *In vitro* anticancer activity of stachydrine isolated from *Capparis decidua* on prostate cancer cell lines// Natural Product Research. – 2011. – Vol. 26, No 18. – P. 1737–1740. doi:10.1080/14786419.2011.608673 https://www.tandfonline.com/doi/abs/10.1080/14786419.2011.608673

Stizolicin		
	CAS#	30994-28-6
	Synonyms:	[(1S,2R,4R,7Z,10S,11R)-4,8-Dimethyl-12-methyldiene-13-oxo-3,14-dioxatricyclo[9.3.0.02,4]tetradec-7-en-10-yl], (E)-4-Hydroxy-2-(hydroxymethyl)but-2-enoate, 2-Butenoic acid, 4-hydroxy-2-(hydroxymethyl)-, 1a,2,3,6,7,7a,8,9,10a,10b-Decahydro-1a,5-dimethyl-8-methylene-9-oxooxireno(9,10)cyclodeca(1,2-b)furan-7-yl ester, (1aR-(1aR,4E,7S(E),7aR,10aS,10bR)).
	Gross formula:	$C_{20}H_{26}O_7$
	Molecular weight:	378.42
	HPLC Purity:	≥99,0%
	Melting Point:	152-154 °C
	White crystalline substance	
IR-spectrum (cm^{-1})	3479, 3452 (OH-group), 2981, 2967, 2950, 2939, 2920, 2897, 2883, 2862 (C-H), 1765 (Carbonyl group of γ-lactone), 1717, 1663, 1651 (dienone fragment), 1472, 1462, 1439, 1394, 1383, 1366, 1330, 1284, 1239, 1194, 1157, 1072, 1031, 1024, 950.	
UV-spectrum (nm)	201±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, CD_3OD, ppm, J1, 2, 3…n/Hz): 1.28 (3H, s, CH_3-15); 1.30-1.27 (1H, m, H-3a); 1.81 (3H, s, CH_3-14); 2.14-1.98 (1H, m, H-3b); 2.2-2.28 (1H, m, H-2a); 2.54-2.42 (2H, m, H-2b, H-9a); 2.69 (1H, d, J=12.03, H-9b); 2.83 (1H, d, J=9.45, H-5); 3.57 (1H, m, H-7); 4.26 (1H, d, J=9.00, H-6); 4.40-4.34	

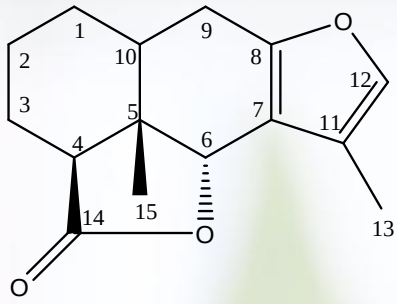
	(4H, m, H-4'a, H-4'b, H-5'a, H-5'b)4.58-4.51 (1H, m, H-8); 5.43 (1H, d, J=12.03, H-1); 5.78 (1H, d, J=2.94, H-13a); 6.18 (1H, d, J=3.44, H-13b); 6.93 (1H, t, J=6.00, H-3'). ^{13}C NMR (125,76 MHz, CD_3OD, ppm): 16.27 (q, C-15); 17.05 (q, C-14); 23.92 (t, C-2); 35.60 (t, C-3); 46.38 (d, C-7); 49.02 (t, C-9); 55.33 (t, C-4'); 58.06 (t, C-5'); 61.18 (s, C-4); 66.19 (d, C-5); 73.69 (d, C-8); 80.92 (d, C-6); 124.74 (c, C-2'); 127.16 (t, C-13); 129.66 (d, C-1); 131.17 (s, C-10); 133.90 (s, C-11); 145.69 (d, C-3'); 166.49 (s, C-1'); 170.20 (s, C-12).
Biological activity	Possesses cytotoxicity
References	Cassady J.M., Bean M.F., McLaughlin J.L., Aynehchi Y. Structure revision and cytotoxicity of the germacranolide, stizolicin, from *Stizolophus balsamitus* (*Asteraceae*)// Experientia. – 1984. – Vol. 40, No 9. – P. 930-931 https://link.springer.com/article/10.1007/BF00629927

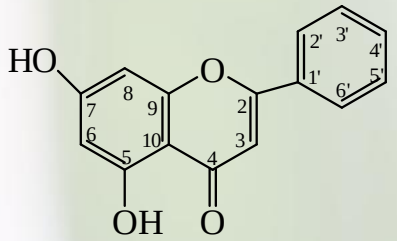
Tectochrysin		
	CAS#	520-28-5
	Synonyms:	[5-Hydroxy-7-methoxyflavone], [5-Hydroxy-7-methoxy-2-phenyl-4H-1-benzopyran-4-one], [5-Hydroxy-7-methoxyflavone], [7-Methylchrysin]
	Gross formula:	$C_{16}H_{12}O_4$
	Molecular weight:	268.26 g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	176-178 ºC
	Yellow powdery substance	
IR-spectrum (cm^{-1})	3313, 3069 (OH), 3013, 2921, 2954 (OCH_3), 2846, 1667 (C=O), 1587 (C=C), 1495, 1451, 1436, 1422, 1371, 1351, 1269, 1202, 1159, 1119, 1082, 1034, 997.	
UV-spectrum (nm)	211±2; 268±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 3.88 (3H, s, OCH_3-7); 6.37 (1H, d, J=2.29, H-6); 6.50 (1H, d, J=2.24, H-8); 6.66 (1H, s, H-3); 7.57-7.51 (3H, m, H-3', H-4', H-5'); 7.90-7.95 (2H, m, H-2', H-6'); 12.7 (1H, s, OH). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 55.93 (q, OMe); 92.78 (d, C-8); 98.23 (d, C-6), 105.81 (d, C-3); 105.97 (s, C-10); 126.39 (d, C-2', C-6'); 127.66 (d, C-4'); 129.19 (d, C-3', C-5'); 131.95 (s, C-1'); 157.89 (s, C-9); 162.27 (s, C-5); 164.08 (s, C-2); 165.69 (s, C-7); 182.61 (s, C-4).	
Biological activity	Possesses antioxidant activity	
References	Mabry T.J., Markham K.R., Thomas M.B. The NMR spectra of flavonoids. The Systematic identification of flavonoids. – Springer, Berlin, Heidelberg. – 1970. – P. 274–343. doi:10.1007/978-3-642-88458-0_9 https://link.springer.com/chapter/10.1007%2F978-3-642-88458-0_9	

	Lee S., Kim K.S., Park Y., Shin K.H., Kim B.-K. *In vivo* anti-oxidant activities of tectochrysin// Archives of Pharmacal Research. – 2003. – Vol. 26, No 1. – P 43–46. doi:10.1007/bf03179930 https://link.springer.com/article/10.1007/BF03179930

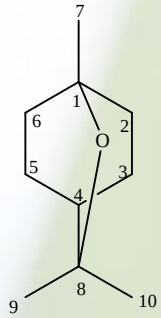
Ferocinin		
	CAS#	
	Synonyms:	[3,3,10-Trimethylcycloundeca-4(5),6(14),9(10)-triene-1'-hydroxy-2'-methoxybenzoate].
	Gross formula:	$C_{23}H_{30}O_4$
	Molecular weight:	370.48 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	105,6-107,1 ºC
	White powder	
IR-spectrum (cm^{-1})	3527, 3500, 3449 (OH), 2966, 2955, 2937, 2866, 2853 (C-H), 1699 (aromatic acid carbonyl ester), 1649 (C=C) 1599, 1509, 1466, 1450, 1426, 1383, 1361, 1309, 1280, 1211, 1113, 1099, 1021, 995.	
UV-spectrum (nm)	206±2; 217±2; 251±2; 292±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.03 (3H, s, CH_3-13); 1.11 (3H, s, CH_3-12); 1.60 (3H, s, CH_3-15); 1.84 (1H, dd, J=14.5, 6.4, H-11α); 1.91 (1H, br.d, J=14.5, H-11β); 2.23-2.15 (3H, m, H-6α, H-6β, H-9α); 2.28 (1H, dt, J=13.0, 4.5, H-5α); 2.43-2.39 (2H, m, H-5β, H-9β); 3.94 (3H, s, CH_3-7'); 4.86 (1H, d, J=2.8, H-14α); 4.92 (1H, d, J=2.8, H-14β); 4.95-4.93 (1H, m, H-10); 5.40 (1H, t, J=8.0, H-7); 5.50 (1H, d, J=16.2, H-2); 5.94 (1H, d, J=16.2, H-3); 6.93 (1H, dd, J=8.3, 1.9, H-5'); 7.54 (1H, d, J=1.7, H-2'); 7.61 (1H, dd, J=8.3, 1.9, H-4'). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 17.56 (q, C-15); 22.49 (q, C-12); 30.24 (t, C-6); 30.67 (q, C-13); 31.36 (t, C-5); 35.29 (s, C-1); 47.74 (t, C-9); 52.23 (t, C-11); 56.16 (q, C-7'); 71.51 (d, C-10); 111.73 (d, C-2'); 114.04 (d, C-5'); 114.20 (t, C-14); 123.05 (s, C-1'); 124.06 (s, C-6'); 125.83 (d, C-3); 129.29 (d, C-7); 131.00 (s, C-8); 142.57 (d, C-2); 146.21 (s, C-4); 148.14 (s, C-3'); 149.93 (d, C-4'); 165.56 (s, C-8').	
Biological activity	Possesses cytotoxicity	
References	Adekenov S.M., Kishkentayeva A.S., Zhakanov M.M., Bagryanskaya I.Y. 3-Methoxy-4,5-methylenedioxypropiophenone and ferocinin from *Ferula kelleri*// Chemistry of Natural Compounds. – 2020. – Vol. 56, No 5. – P. 896-898. doi:10.1007/s10600-020-03178-w Adekenov S.M., Mantler S.N., Zhakhanov M.M., Adekenova A.S. Ferocinin as a chemotaxonomic marker of Ferula L. species // 90 Years - From Plant to Medicinal Product: Achievements and Prospects. – 2021. – P. 502–508. Golovina L.A., Nikonov G.K. Esters of *Ferula ceratophylla*//	

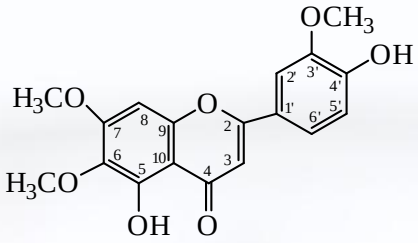
	Chemistry of Natural Compdound .– 1977. – Vol. 13, No 5. – P. 591–592. https://doi.org/10.1007/BF00569608

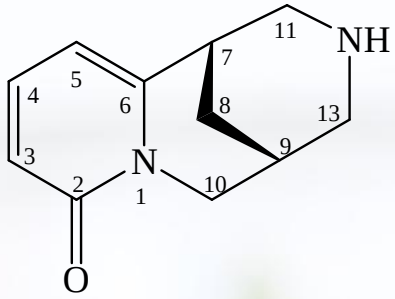
Furanoeremophilanolide		
	CAS#	
	Synonyms:	[Furanoeremophilan-14β,6α-olide]
	Gross formula:	$C_{15}H_{18}O_3$
	Molecular weight:	246.30 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	
	White powdery substance	
IR-spectrum (cm^{-1})	3143, 3103, 3000, 2954, 2938, 2884, 2874 (C-H), 1772 (γ-lactone ring), 1681, 1639 (C=C), 1580, 1565, 1547, 1452, 1353, 1304, 1258, 1186, 1064, 944.	
UV-spectrum (nm)	215±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.26 (3H, s, CH_3-14); 1.59-1.45 (3H, m, H-1α, H-2α, H-3α); 1.94-1.85 (2H, m, H-1β, H-3β); 1.81-1.75 (1H, m, H-2β); 2.02 (3H, s, CH_3-15); 2.32 (1H, dd, J=12.0, 3.0 H-4); 5.09 (1H, c, H-6); 2.70-2.60 (2H, m, H-9α, H-9β); 2.28-2.22 (1H, m, H-10); 7.25 (1H, s, H-12); ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 8.39 (q, C-13); 18.86 (t, C-1); 20.16 (q, C-15); 20.60 (t, C-2); 23.26 (t, C-9); 25.35 (t, C-3); 37.07 (d, C-10); 41.43 (d, C-4); 41.56 (s, C-5); 81.80 (d, C-6); 114.78 (s, C-11); 120.21 (s, C-7); 138.70 (d, C-12); 150.92 (s, C-8); 176.90 (s, C-14).	
Biological activity	Possesses anti-inflammatory activity	
References	Wu L., Liao Z., Liu C., Jia H., Sun J. Eremophilane sesquiterpene from the genus *Ligularia*// Chemistry & Biodiversity.–2016.–Vol.13.–P.645-671. doi:10.1002/cbdv.201500169	

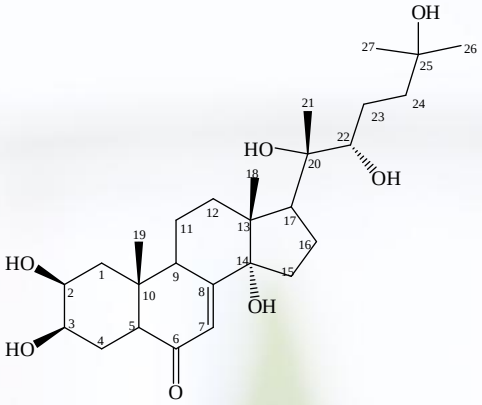
Chrysin		
	CAS#	480-40-0
	Synonyms:	[5,7-Dihydroxyflavone].
	Gross formula:	$C_{15}H_{10}O_4$
	Molecular weight:	254.24 g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	276-278 ºC
	Yellow powdery substance	
IR-spectrum (cm^{-1})	3552, 3504, 3309 (OH), 2920, 2712, 2629, 1657, 1633 (C=O), 1610, 1576 (C=C), 1499, 1356, 1312, 1260, 1219, 1169, 1124, 1091, 1071, 1031, 1009, 975.	
UV-spectrum (nm)	211±2; 268±2; 312±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, C_3D_6O, ppm, J1, 2, 3…n/Hz): 6.2 (1H, s,	

	H-8); 6.5 (1H, s, H-6); 6.9 (1H, s, H-3); 7.5-7.6 (3H, m, H-4', H-3', H-5'); 8.0-8.1 (2H, m, H-2', H-6'); 10.9 (1H, s, 5-OH). ^{13}C NMR (125,76 MHz, C_3D_6O, ppm): 94.67 (d, C-8); 99.60 (d, C-6); 104.54 (s, C-10); 105.76 (d, C-3); 126.96 (d, C-2', C-6'); 129.67 (d, C-3', C-5'); 131.29 (d, C-4'); 132.54 (s, C-1'); 158.03 (s, C-9); 162.02 (s, C-5); 163.75 (s, C-2); 165.00 (s, C-7); 182.40 (s, C-4).
Biological activity	Possesses antioxidant, anti-inflammatory and anti-apoptotic activities.
References	Wawer I., Zielinska A. 13C CP/MAS NMR studies of flavonoids// Magnetic Resonance in Chemistry. – 2001. – Vol. 39, No 7. – P. 374–380. doi:10.1002/mrc.871

1,8-cineol		
	CAS#	470-82-6
	Synonyms:	[1,3,3-Trimethyl-2-oxabicyclo(2.2.2)octane], [Eucalyptol], [1,8-Epoxy-p-menthane].
	Gross formula:	$C_{10}H_{18}O$
	Molecular weight:	154.25 g/mol
	HPLC Purity:	≥98%
	Colourless liquid	
IR-spectrum (cm^{-1})	2969, 2926, 2882 (C-H), 1465, 1376, 1306, 1272, 1234, 1215, 1168, 1080, 1054,1016, 986.	
UV-spectrum (nm)	202±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, $CDCl_3$, ppm, J1, 2, 3…n/Hz): 1.03 (3H, s, CH_3-7); 1.22 (6H, s, CH_3-9, CH_3-10); 1.39 (1H, s, H-4); 1.50-1.46 (4H, m, H-2α, H-3α, H-5α, H-6α); 1.68-1.61 (2H, m, H-2β, H-6β); 2.04-1.98 (2H, m, H-3β, H-5β). ^{13}C NMR (125,76 MHz, $CDCl_3$, ppm): 23.02 (s, C-3, t, C-5); 27.67 (q, C-7); 28.97 (q, C-9, C-10); 31.57 (t, C-2, C-6); 32.98 (d, C-4); 69.88 (s, C-1); 73.73 (s, C-8).	
Biological activity	Possesses anti-inflammatory activity	
References	Malz F., Jancke H. Validation of quantitative NMR// Journal of Pharmaceutical and Biomedical Analysis. – 2005. – Vol. 38, No 5. – P. 813–823. doi:10.1016/j.jpba.2005.01.043 Juergens U.R., Stober M., Schmidt-Schilling L., Kleuver T., Vetter H. Antiinflammatory effects of eucalyptol (1.8-cineol) in bronchial asthma: inhibition of arachidonic acid metabolism in human blood monocytes *ex vivo*// European Journal of Medical Research. – 1998. – Vol. 3. – P. 407–412.	

Cirsilineol		
	CAS#	41365-32-6
	Synonyms:	[5,4'-Dihydroxy-6,7,3'-trimethoxyflavone], [Eupatrin], [Anisomelin], [Fastigenin], [6-Methoxyluteolin 3',7-dimethyl ether]
	Gross formula:	$C_{18}H_{16}O_7$
	Molecular weight:	344.32 g/mol
	HPLC Purity:	≥99,0%
	Melting Point:	203-204 ºC
	Yellow powdery substance	
IR-spectrum (cm^{-1})	3135 (OH), 2941 (OCH_3), 2829, 1654 (C=O) 1598, 1562 (C=C), 1494, 1457, 1356, 1299, 1282, 1252, 1202, 1176, 1122, 1036, 1002, 971.	
UV-spectrum (nm)	213±2; 274±2; 343±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, C_5D_5N, ppm, J1, 2, 3…n/Hz): 3.76 (3H, s, OCH_3-6); 3.78 (3H, s, OCH_3-7); 3.95 (3H, s, OCH_3-3'); 6.91 (1H, s, H-3); 6.98 (1H, s, H-8), 7.22 (1H, d, J=2.2 , H-2'); 7.28 (1H, d, J=7.16 , H-5'); 7.92 (1H, dd, J=7.16, 2.0, H-6'); 13.0 (1H, s, OH at C-5). ^{13}C NMR (125,76 MHz, C_5D_5N, ppm): 55.86 (t, OCH_3-3'); 56.22 (t, OCH_3-7); 60.42 (t, OCH_3-6); 91.50 (d, C-8), 103.84 (d, C-3); 106.24 (s, C-10); 110.09 (d, C-2'); 116.78 (d, C-5'); 121.24 (d, C-6'); 122.28 (s, C-1'); 132.93 (s, C-6); 148.88 (s, C-3'); 152.43 (s, C-9); 153.52 (s, C-5); 159.19 (s, C-7); 162.73 (s, C-4'); 164.67 (s, C-2); 182.99 (s, C-4).	
Biological activity	Possesses hepatoprotective activity	
References	Kul'magambetova E.A., Pribytkova L.N., Adekenov S.M. Flavonoids of *Artemisia glabella*// Chemistry of Natural Compounds. – 2000. – Vol. 36, No 1. – P. 95–96. doi:10.1007/bf02234914 https://link.springer.com/article/10.1007/BF02234914 Baisarov G.M., Mukusheva G.K., Zhumataeva A.R., Schults E.E., Seidakhmetova R.B., Adekenov S.M. Flavonoid compounds of *Artemisia glabella* Kar. et Kir., synthesis based on them and their biological activity// Khimiya Rastitel'nogo Syr'ya. – 2018. – No 3. – P.215–222. https://cyberleninka.ru/article/n/flavonoidnye-soedineniya-artemisia-glabella-kar-et-kir-sintezy-na-ih-osnove-i-ih-biologicheskaya-aktivnost/viewer	

Cytisine		
	CAS#	485-35-8
	Synonyms:	[3-Hydroxy-11-norcystisine], [Baptitoxin], [Laburnine], [Sophorine], [Ulexine].
	Gross formula:	$C_{11}H_{14}N_2O$
	Molecular weight:	190.25 g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	154-157 ºC
	Yellow crystalline substance	
IR-spectrum (cm^{-1})	3314, 3280 (NH), 2932, 2912, 2895, 2834, 2802, 2746 (C-H), 1646 (C=O), 1563, 1539 (C=C), 1478, 1441, 1346, 1310, 1297, 1263, 1175, 1157, 1139, 1074, 1011, 978.	
UV-spectrum (nm)	202±2; 235±2; 310±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, CD_3OD, ppm, J1, 2, 3…n/Hz): 2.05-2.15 (2H, m, H-8a, H-8β); 2.49-2.43 (1H, m, H-9); 3.05 (1H, d, J=11.0, H-11α); 3.08 (1H, d, J=4.0, H-13α); 3.10 (1H, d, J=4.00, H-13β); 3.16 (1H, d, J=11.0, H-11β); 3.17 (1H, br.s, H-7); 3.97 (1H, dd, J=4.0, 1.0, H-10α); 4.03 (1H, d, J=15.5, H-10β); 6.53 (1H, d, J=8.0, 1.3, H-5); 6.55 (1H, dd, J=6.0, 1.3, H-3); 7.58 (1H, dd, J=8.9, 7.0, H-4). ^{13}C NMR (125,76 MHz, CD_3OD, ppm): 25.37 (t, C-8); 27.58 (d, C-9); 35.15 (d, C-7); 49.80 (t, C-10); 51.81 (t, C-11); 52.84 (t, C-13); 106.83 (d, C-5); 115.45 (d, C-3); 139.96 (d, C-4); 151.79 (s, C-6); 164.51 (s, C-2).	
Biological activity	Possesses neurotropic activity	
References	Przybył A. K., Kubicki M. A comparative study of dynamic NMR spectroscopy in analysis of selected N-alkyl-, N-acyl-, and halogenated cytisine derivatives // Journal of Molecular Structure. – 2011. – Vol. 985, No 2-3. – P. 157–166. doi:10.1016/j.molstruc.2010.10.036 https://www.sciencedirect.com/science/article/abs/pii/S0022286010008380 Romanova M.A., R.B. Seidakhmetova, Toktarkhan N.A., Zhanymkhanova P.Zh., Adekenov S.M. The study of neurotropic action of alkaloids and their derivatives // News of the National Academy of Sciences of the Republic of Kazakhstan. Series of biological and medical. – 2019. – Vol. 3, No 333. – P. 56-63. doi.org/10.32014/2019.2519-1629.31 http://rmebrk.libgateway.psu.kz/journals/5173/10569.pdf#page=56	

Ecdysterone		
	CAS#	5289-74-7
	Synonyms:	[2β,3β,14α,20R,22R,25-Hexahydroxy-5β(H)-cholest-7-en-6-one], [Commisterone], [Crustecdysone], [Beta-Ecdysone], [20-Hydroxyecdysone], [Isoinokosterone], [Polypodin A], [Polypodin C], [Viticosterone].
	Gross formula:	$C_{27}H_{44}O_7$
	Molecular weight:	480.64 g/mol
	HPLC Purity:	≥98,5%
	Melting Point:	241-243ºC
	Colorless crystalline substance	
IR-spectrum (cm^{-1})	3371 (OH), 2964 (C-H), 2873, 1652 (C=C), 1444, 1382, 1321, 1262, 1227, 1145, 1104, 1054, 1025, 996, 951, 922, 895, 880, 845, 804, 686, 614.	
UV-spectrum (nm)	244±2	
^{1}H and ^{13}C NMR spectra	^{1}H NMR (500 MHz, DMSO d-6, ppm, J1, 2, 3…n/Hz): 0.87 (3H, s, CH_3-18); 0.94 (3H, s, CH_3-19); 1.18-1.17 (9H, s, CH_3-21, CH_3-26, CH_3-27); 1.22-1.31 (1H, m, H-24a); 1.35-1.45 (1H, m, H-11a); 1.53-1.55 (1H, m, H-23b); 1.56-1.62 (1H, m, H-11b); 1.63-1.65 (1H, m, H-12a); 1.67-1.70 (1H, m, H-15a); 1.70-1.75 (1H, m, H-1a); 1.72-1.82 (2H, m, H-4a, H-4b); 1.74-1.81 (1H, m, H-16a); 1.72-1.78 (1H, m, H-1b); 1.76-1.84 (1H, m, H-23a); 1.82-1.83 (1H, m, H-15b); 1.86-1.98 (1H, d, J=11.17, H-24b); 1.93-2.03 (1H, m, H-16b); 2.07-2.15 (1H, ddd, J=12.89, 6.44, 5.01, H-12β); 2.37-2.39 (1H, dd, J=16.59, 5.01, H-5); 2.35-2.39 (1H, m, H-17); 3.12-3.15 (1H, m, H-9); 3.32-3.33 (1H, m, H-22); 3.79-3.84 (1H, dt, J=11.89, 7.02, H-2); 3.92-3.94 (1H, m, H-3); 5.79 (1H, d, J=2.0, H-7). ^{13}C NMR (125,76 MHz, DMSO d-6, ppm): 17.69 (q, C-18); 20.59 (q, C-21);20.78 (t, C-16); 21.51 (t, C-11); 24.09 (q, C-19); 26.59 (t, C-23); 29.49 (q, C-27); 30.59 (q, C-26); 30.84 (t, C-15); 31.36 (t, C-12); 32.09 (t, C-4); 33.68 (d, C-9); 37.10 (t, C-1); 38.15 (s, C-10); 41.93 (t, C-24); 47.36 (s, C-13); 49.19 (d, C-17); 50.62 (d, C-5); 67.08 (d, C-2); 67.23 (d, C-3); 69.23 (c, C-25); 76.20 (s, C-20); 76.68 (d, C-22); 83.48 (s, C-14); 120.97 (d, C-7); 165.83 (s, C-8); 203.29 (s, C-6).	
Biological activity	Possesses anabolic activity	
References	Buděšínský M., Vokáč K., Harmatha J., Cvačka J. Additional minor ecdysteroid components of Leuzea carthamoides. Steroids. – 2008. – Vol. 73, No 5. – P. 502–514. doi:10.1016/j.steroids.2007.12.021 Syrov V.N., Kurmukov A.G. Anabolic activity of phytoecdysone-ecdysterone isolated from *Rhaponticum*	

	carthamoides (Willd.) Iljin// Farmakologiia i toksikologiia. – 1976. – Vol. 39, No 6. – P. 690-693. https://pubmed.ncbi.nlm.nih.gov/1030669/

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