

Table S11. Results of GC–MS analysis of volatiles extracted by mechanical shock crushing from quartz (Blagodatnoye deposit, Yenisei ridge).

Formula	Name	¹ CAS/(NIST)	² MW	Quartz 111/60.8	
				³ RT, min	⁴ A, %
Aliphatic hydrocarbons					
Paraffins					
CH4	Methane	74-82-8	16	1.61	0.022
C5H12	n-Pentane	109-66-0	72	7.75	0.042
C6H14	2-Methylpentane	107-83-5	86	8.65	0.004
C6H14	n-Hexane	110-54-3	86	12.17	0.012
C7H16	n-Heptane	142-82-5	100	16.29	0.012
C8H18	n-Octane	111-65-9	114	20.45	0.039
C9H20	n-Nonane	111-84-2	128	24.37	0.031
C10H22	n-Decane	124-18-5	142	28.00	0.090
C11H24	n-Undecane	1120-21-4	156	31.37	0.030
C12H26	n-Dodecane	112-40-3	170	34.56	0.019
C13H28	n-Tridecane	629-50-5	184	38.87	0.044
C14H30	n-Tetradecane	629-59-4	198	45.49	0.020
C15H32	n-Pentadecane	629-62-9	212	55.89	0.032
C16H34	5-Methylpentadecane	25117-33-3	226	65.85	0.511
C16H34	n-Hexadecane	544-76-3	226	72.73	0.038
C17H36	n-Heptadecane	629-78-7	240	110.52	0.143
Olefins					
C2H2	Acetylene	74-86-2	26	2.08	0.007
C2H4	Ethylene	74-85-1	28	2.36	0.012
C4H8	2-Butene	107-01-7	56	5.94	0.009
C5H8	1,3-Pentadiene	1574-41-0	68	8.50	0.018
C5H8	(E)-1,3-Pentadiene	2004-70-8	68	8.80	0.001
C5H8	(Z)-1,3-Pentadiene	1574-41-0	68	9.04	0.001
C6H12	1-Hexene	592-41-6	84	11.79	0.016
C6H10	(E)-2-Methyl-1,3-pentadiene	926-54-5	82	12.87	0.005
C7H14	1-Heptene	592-76-7	98	15.89	0.009
C8H16	1-Octene	111-66-0	112	20.07	0.009
C9H18	1-Nonene	124-11-8	126	24.06	0.008
C10H20	1-Decene	872-05-9	140	27.73	0.017
C11H22	1-Undecene	821-95-4	154	31.12	0.006
C12H24	1-Dodecene	112-41-4	168	34.33	0.007
C13H26	1-Tridecene	2437-56-1	182	38.54	0.020
C14H28	1-Tetradecene	1120-36-1	196	44.90	0.021
C15H30	1-Pentadecene	13360-61-7	210	55.10	0.054
C17H34	1-Heptadecene	6765-39-5	238	99.77	0.173
Cyclic hydrocarbons					
Cycloalkanes (naphthenes) and cycloalkenes					
C5H10	Cyclopentane	287-92-3	70	8.31	0.010

C ₁₀ H ₁₆	dl-Limonene	138-86-3	136	28.13	0.010
<i>Arenes</i>					
C ₆ H ₆	Benzene	71-43-2	78	12.54	0.013
C ₇ H ₈	Toluene	108-88-3	92	17.06	0.012
C ₇ H ₇ F	(Fluoromethyl)benzene	350-50-5	110	20.86	0.001
C ₈ H ₁₀	Ethylbenzene	100-41-4	106	21.16	0.003
C ₈ H ₁₀	p-Xylene	106-42-3	106	21.30	0.014
C ₈ H ₁₀	o-Xylene	95-47-6	106	21.50	0.001
C ₈ H ₁₀	m-Xylene	108-38-3	106	21.66	0.002
C ₈ H ₈	Styrene	100-42-5	104	22.03	0.003
C ₈ H ₉ F	3-Fluoro-o-xylene	443-82-3	124	22.43	<0.001
C ₈ H ₉ F	p-Fluoroethylbenzene	459-47-2	124	23.13	0.004
C ₈ H ₉ F	5-Fluoro-m-xylene	461-97-2	124	23.28	0.001
C ₉ H ₁₂	Propylbenzene	103-65-1	120	24.87	0.003
C ₁₀ H ₁₂	(2-methyl-2-propenyl)benzene	3290-53-7	132	27.37	0.005
C ₁₀ H ₁₄	Butylbenzene	104-51-8	134	28.86	0.008
C ₁₀ H ₁₂	2-Butenylbenzene	1560-06-1	132	29.26	0.007
C ₁₅ H ₂₂	1-(1,5-Dimethyl-4-hexenyl)-4-methylbenzene	644-30-4	202	52.05	0.010
C ₁₁ H ₁₄ O ₂	(Z)-1,2-Dimethoxy-4-propenylbenzene	6380-24-1	178	53.63	0.030
<i>Polycyclic aromatic hydrocarbons (PAH)</i>					
C ₁₄ H ₁₀	Phenanthrene	85-01-8	178	88.53	0.004
Oxygenated hydrocarbons					
<i>Alcohols</i>					
CH ₄ O	Methanol	67-56-1	32	4.29	0.350
C ₂ H ₆ O	Ethanol	64-17-5	46	6.15	0.072
C ₃ H ₈ O	Isopropyl Alcohol	67-63-0	60	7.90	0.010
C ₃ H ₈ O	1-Propanol	71-23-8	60	8.91	0.006
C ₄ H ₁₀ O	1-Butanol	71-36-3	74	12.70	0.023
C ₅ H ₆ O ₂	2-Furanmethanol	98-00-0	98	19.17	0.005
C ₆ H ₆ O	Phenol	108-95-2	94	24.61	0.045
C ₇ H ₈ O	2-Methylphenol	95-48-7	108	26.13	0.002
C ₇ H ₈ O	3-Methylphenol	108-39-4	108	27.37	0.003
C ₇ H ₈ O	4-Methylphenol	106-44-5	108	28.21	0.016
C ₈ H ₁₀ O ₂	2-Phenoxyethanol	122-99-6	138	32.97	0.015
C ₁₂ H ₂₄ O	1-Methylcycloundecanol	76154-15-9	184	57.17	0.227
C ₁₁ H ₁₆ O ₂	4-Pentylresorcinol	533-24-4	180	83.89	0.038
C ₁₁ H ₁₆ O ₂	5-Pentylresorcinol	500-66-3	180	92.12	0.093
C ₁₂ H ₁₈ O ₂	2-Hexylresorcinol	x	194	100.17	0.265
C ₁₂ H ₁₈ O ₂	4-Hexylresorcinol	136-77-6	194	107.70	0.236
C ₁₂ H ₁₈ O ₂	5-Hexylresorcinol	x	194	117.92	0.082
<i>Ethers and esters</i>					
C ₅ H ₈ O ₂	Methyl methacrylate	80-62-6	100	14.43	0.005

C ₅ H ₈ O	3,4-Dihydro-2H-pyran	110-87-2	84	16.64	0.014
C ₄ H ₆ O ₂	Butyrolactone	96-48-0	86	20.42	0.006
C ₆ H ₁₀ O ₂	γ-Hexalactone	695-06-7	114	27.17	0.006
C ₆ H ₁₀ O ₂	δ-Hexalactone	823-22-3	114	29.88	0.031
C ₈ H ₁₄ O ₂	γ-Octalactone	104-50-7	142	34.36	0.010
C ₉ H ₁₆ O ₂	γ-Nonalactone	104-61-0	156	38.92	0.014
C ₁₀ H ₁₈ O ₂	γ-Decalactone	706-14-9	170	45.87	0.009
C ₁₂ H ₁₄ O ₄	Diethyl Phthalate	84-66-2	222	69.53	0.032
C ₁₂ H ₂₂ O ₂	γ-Dodecalactone	2305-05-7	198	74.66	0.018
C ₁₅ H ₃₀ O ₂	3-Methylbutyl ester pentadecanoic acid	2306-91-4	242	86.90	1.434
C ₁₆ H ₃₀ O ₄	Di(2-methylpent-3-yl) ester succinic acid	(349400)	286	116.57	0.060
C ₁₄ H ₁₈ O ₄	Dipropyl ester 1,2-benzenedicarboxylic acid	131-16-8	250	127.73	1.051
<i>Aldehydes</i>					
C ₂ H ₄ O	Acetaldehyde	75-07-0	44	4.76	0.366
C ₃ H ₄ O	2-Propenal	107-02-8	56	7.10	0.011
C ₃ H ₆ O	n-Propanal	123-38-6	58	7.37	0.036
C ₄ H ₆ O	2-Methyl-2-propenal	78-85-3	70	9.54	0.013
C ₄ H ₈ O	2-Methylpropanal	78-84-2	72	9.61	0.005
C ₄ H ₈ O	n-Butanal	123-72-8	72	10.39	0.003
C ₅ H ₁₀ O	3-Methylbutanal	590-86-3	86	13.57	0.026
C ₅ H ₁₀ O	n-Pentanal	110-62-3	86	14.58	0.017
C ₅ H ₄ O ₂	Furfural	98-01-1	96	17.16	0.002
C ₅ H ₄ O ₂	3-Furaldehyde	498-60-2	96	18.01	0.028
C ₆ H ₁₂ O	n-Hexanal	66-25-1	100	18.97	0.025
C ₇ H ₁₄ O	n-Heptanal	111-71-7	114	23.16	0.035
C ₇ H ₆ O	Benzaldehyde	100-52-7	106	23.91	0.040
C ₈ H ₁₆ O	2-Ethylhexanal	123-05-7	128	25.69	0.014
C ₈ H ₁₆ O	n-Octanal	124-13-0	128	27.05	0.038
C ₆ H ₄ O ₃	2,5-Furandicarboxaldehyde	823-82-5	124	27.32	0.012
C ₉ H ₁₈ O	n-Nonanal	124-19-6	142	30.44	0.090
C ₁₀ H ₂₀ O	n-Decanal	112-31-2	156	33.90	0.109
C ₁₁ H ₂₂ O	n-Undecanal	112-44-7	170	37.99	0.249
C ₁₂ H ₂₄ O	n-Dodecanal	112-54-9	184	44.21	0.030
C ₁₃ H ₂₆ O	n-Tridecanal	10486-19-8	198	54.01	0.042
C ₁₄ H ₂₈ O	n-Tetradecanal	124-25-4	212	69.92	0.070
C ₁₅ H ₃₀ O	n-Pentadecanal	2765-11-9	226	95.46	0.147
<i>Ketones</i>					
C ₃ H ₆ O	2-Propanone	67-64-1	58	7.43	0.031
C ₄ H ₆ O	2-Butenone	78-94-4	70	10.11	0.009
C ₄ H ₆ O ₂	2,3-Butanedione	431-03-8	86	10.49	0.096
C ₄ H ₈ O	2-Butanone	78-93-3	72	10.52	0.004

C ₅ H ₁₀ O	2-Pentanone	107-87-9	86	14.33	0.013
C ₃ H ₆ O ₂	1-Hydroxy- 2-propanone	116-09-6	74	16.03	0.008
C ₅ H ₈ O	Cyclopentanone	120-92-3	84	16.89	0.011
C ₆ H ₁₂ O	2-Hexanone	591-78-6	100	18.70	0.015
C ₇ H ₁₄ O	2-Heptanone	110-43-0	114	22.86	0.017
C ₅ H ₈ O ₂	3-Methyldihydro-2(3H)-furanone	1679-47-6	100	26.17	0.045
C ₈ H ₁₆ O	2-Octanone	111-13-7	128	26.72	0.048
C ₈ H ₁₄ O ₂	6-Methyl-2,4-heptanedione	3002-23-1	142	29.78	0.005
C ₉ H ₁₈ O	2-Nonanone	821-55-6	142	30.27	0.044
C ₈ H ₁₄ O ₂	2,4-Octanedione	14090-87-0	142	30.86	0.014
C ₉ H ₁₀ O	1-(2-Methylphenyl)-ethanone	577-16-2	134	32.07	0.008
C ₁₀ H ₂₀ O	2-Decanone	693-54-9	156	33.55	0.052
C ₈ H ₄ O ₃	1,3-Isobenzofurandione	85-44-9	148	35.46	0.036
C ₁₁ H ₂₂ O	2-Undecanone	53452-70-3	170	37.46	0.050
C ₁₂ H ₂₄ O	2-Dodecanone	6175-49-1	184	43.39	0.036
C ₁₃ H ₂₂ O	6,10-Dimethyl-5,9-undecadien-2-one	689-67-8	194	47.93	0.031
C ₁₃ H ₂₆ O	2-Tridecanone	593-08-8	198	52.75	0.039
C ₁₄ H ₂₈ O	2-Tetradecanone	2345-27-9	212	67.53	0.044
C ₁₅ H ₃₀ O	2-Pentadecanone	2345-28-0	226	91.69	0.175
<i>Carboxylic acids</i>					
C ₂ H ₄ O ₂	Acetic acid	64-19-7	60	11.22	0.292
C ₃ H ₆ O ₂	n-Propanoic acid	79-09-4	74	15.49	0.008
C ₄ H ₈ O ₂	n-Butanoic acid	107-92-6	88	19.14	0.069
C ₅ H ₁₀ O ₂	3-Methylbutanoic acid	503-74-2	102	22.19	0.027
C ₅ H ₁₀ O ₂	n-Pentanoic acid	109-52-4	102	23.18	0.036
C ₆ H ₁₂ O ₂	n-Hexanoic acid	142-62-1	116	26.70	0.149
C ₇ H ₁₄ O ₂	n-Heptanoic acid	111-14-8	130	30.22	0.042
C ₈ H ₁₆ O ₂	n-Octanoic acid	124-07-2	144	33.38	0.083
C ₉ H ₁₈ O ₂	n-Nonanoic acid	112-05-0	158	37.09	0.125
C ₁₀ H ₂₀ O ₂	n-Decanoic acid	334-48-5	172	43.13	0.059
C ₁₁ H ₂₂ O ₂	n-Undecanoic acid	112-37-8	186	52.77	<0.001
C ₁₂ H ₂₄ O ₂	n-Dodecanoic acid	143-07-7	200	67.30	0.078
C ₁₄ H ₂₈ O ₂	n-Tetradecanoic acid	544-63-8	228	125.34	0.190
Heterocyclic compounds					
<i>Dioxanes</i>					
C ₄ H ₈ O ₂	1,4-Dioxane	123-91-1	88	13.50	0.001
<i>Furans</i>					
C ₅ H ₆ O	2-Methylfuran	534-22-5	82	10.27	0.001
C ₆ H ₆ O	2-Vinylfuran	1487-18-9	94	14.93	0.001
C ₉ H ₁₄ O	2-Pentylfuran	3777-69-3	138	26.30	0.005
Nitrogenated compounds					

N ₂	Nitrogen	7727-37-9	28	1.55	0.748
H ₃ N	Ammonia	7664-41-7	17	2.61	0.091
C ₂ H ₃ N	Acetonitrile	75-05-8	41	6.50	0.054
C ₃ H ₅ N	Propargylamine	2450-71-7	55	9.19	0.001
C ₄ H ₅ N	Pyrrole	109-97-7	67	14.38	0.022
C ₅ H ₇ N	3-Methyl-1H-pyrrole	616-43-3	81	14.93	0.002
C ₂ H ₅ NO	Acetamide	60-35-5	59	15.06	0.066
C ₅ H ₅ N	Pyridine	110-86-1	79	15.11	0.005
C ₃ H ₅ NO ₂	2-Oxo-propionamide	x	87	17.02	0.054
C ₆ H ₉ N	2,3-Dimethyl-1H-pyrrole	600-28-2	95	18.20	0.002
C ₆ H ₇ N	2-Methylpyridine	109-06-8	93	18.54	0.002
C ₆ H ₇ N	3-Methylpyridine	108-99-6	93	20.18	0.004
C ₆ H ₇ N	4-Methylpyridine	108-89-4	93	20.93	0.002
C ₃ H ₄ N ₂	1H-Pyrazole	288-13-1	68	22.48	0.017
C ₅ H ₁₁ NO	3-Methylbutanamide	541-46-8	101	23.01	0.005
C ₅ H ₁₁ NO	Pentanamide	626-97-1	101	25.87	0.012
C ₄ H ₇ NO	2-Pyrrolidinone	616-45-5	85	26.02	0.016
C ₄ H ₅ NO ₂	Succinimide	123-56-8	99	28.30	0.021
Sulfonated compounds					
H ₂ S	Hydrogen sulfide	7783-06-4	34	3.03	0.004
COS	Carbonyl sulfide	463-58-1	60	3.56	0.002
O ₂ S	Sulfur dioxide	7446-09-5	64	5.02	0.047
CH ₄ S	Methanethiol	74-93-1	48	5.44	0.024
C ₂ H ₆ S	Dimethyl sulfide	75-18-3	62	7.71	0.001
CS ₂	Carbon disulfide	75-15-0	76	7.78	0.001
C ₂ H ₆ S ₂	Dimethyl disulfide	624-92-0	94	15.26	0.002
Inorganic compounds					
<i>Oxides</i>					
CO ₂	Carbon dioxide	124-38-9	44	1.81	5.495
H ₂ O	Water	7732-18-5	18	2.99	84.096
<i>Noble gases</i>					
Ar	Argon	7440-37-1	40	1.55	0.005

Note: ¹CAS/(NIST) – unique numerical identifier of chemical compounds included in the register Chemical Abstracts Service (<https://www.cas.org>) or NIST number (a unique number given to each spectrum in the NIST archive); ²MW – nominal mass; ³RT – retention time; ⁴A – normalized area (the area ratio of the individual gas mixture components to the sum of the areas of all the components in the chromatogram).