

Table S13. 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 111/120.6	
				³ RT, min	⁴ A, %
Aliphatic hydrocarbons					
Paraffins					
CH4	Methane	74-82-8	16	1.60	0.746
C2H6	Ethane	74-84-0	30	2.34	0.015
C3H8	n-Propane	74-98-6	44	3.99	0.004
C5H12	n-Pentane	109-66-0	72	7.60	0.038
C6H14	n-Hexane	110-54-3	86	12.05	0.001
C7H16	n-Heptane	142-82-5	100	16.19	0.011
C8H18	n-Octane	111-65-9	114	20.33	0.021
C9H20	n-Nonane	111-84-2	128	24.26	0.022
C10H22	n-Decane	124-18-5	142	27.81	0.124
C11H24	n-Undecane	1120-21-4	156	31.24	0.012
C12H26	n-Dodecane	112-40-3	170	34.95	0.080
C13H28	n-Tridecane	629-50-5	184	38.64	0.026
C14H30	n-Tetradecane	629-59-4	198	45.14	0.044
C15H32	n-Pentadecane	629-62-9	212	55.40	0.032
C16H34	n-Hexadecane	544-76-3	226	71.94	0.073
C17H36	7-Methylhexadecane	26730-20-1	240	78.85	0.103
C17H36	n-Heptadecane	629-78-7	240	98.72	0.004
Olefins					
C2H4	Ethylene	74-85-1	28	2.03	0.004
C4H8	2-Methyl-1-propene	115-11-7	56	5.74	0.003
C4H8	2-Butene	107-01-7	56	5.87	0.010
C5H8	1,3-Pentadiene	1574-41-0	68	8.45	0.020
C6H12	1-Hexene	592-41-6	84	11.69	0.001
C6H10	(E)-2-Methyl-1,3-pentadiene	926-54-5	82	12.77	0.004
C7H14	1-Heptene	592-76-7	98	15.79	0.014
C8H16	1-Octene	111-66-0	112	19.60	0.013
C9H18	1-Nonene	124-11-8	126	23.94	0.009
C10H20	1-Decene	872-05-9	140	27.61	0.010
C11H22	1-Undecene	821-95-4	154	31.01	0.010
C12H24	1-Dodecene	112-41-4	168	34.20	0.021
C13H26	1-Tridecene	2437-56-1	182	38.32	0.009
C14H28	1-Tetradecene	1120-36-1	196	44.67	0.029
C15H30	1-Pentadecene	13360-61-7	210	54.60	0.068
Cyclic hydrocarbons					
Cycloalkanes (naphthenes) and cycloalkenes					
C5H10	Cyclopentane	287-92-3	70	8.23	0.002
C10H16	dl-Limonene	138-86-3	136	28.00	0.004
Arenes					

C ₆ H ₆	Benzene	71-43-2	78	12.40	0.014
C ₇ H ₈	Toluene	108-88-3	92	16.91	0.007
C ₇ H ₇ F	(Fluoromethyl)benzene	350-50-5	110	20.72	0.001
C ₈ H ₁₀	Ethylbenzene	100-41-4	106	21.01	0.003
C ₈ H ₁₀	p-Xylene	106-42-3	106	21.30	0.008
C ₈ H ₁₀	o-Xylene	95-47-6	106	21.48	0.002
C ₈ H ₈	Styrene	100-42-5	104	21.86	0.005
C ₈ H ₁₀	m-Xylene	108-38-3	106	21.90	0.003
C ₈ H ₉ F	3-Fluoro-o-xylene	443-82-3	124	22.23	<0.001
C ₈ H ₉ F	5-Fluoro-m-xylene	461-97-2	124	23.71	<0.001
C ₈ H ₉ F	p-Fluoroethylbenzene	459-47-2	124	22.89	0.002
C ₉ H ₁₂	Propylbenzene	103-65-1	120	24.89	0.002
C ₁₀ H ₁₂	(2-Methyl-2-propenyl)-benzene	3290-53-7	132	27.15	0.005
C ₁₀ H ₁₄	Butylbenzene	104-51-8	134	28.71	0.004
C ₁₁ H ₁₆	Pentylbenzene	538-68-1	148	32.14	<0.001
C ₁₁ H ₁₄	(1-Ethyl-2-propenyl)-benzene	19947-22-9	146	34.41	0.012
C ₁₂ H ₁₈	Hexylbenzene	1077-16-3	162	36.41	0.004
C ₁₃ H ₂₀	Heptylbenzene	1078-71-3	176	41.68	0.004
Oxygenated hydrocarbons					
<i>Alcohols</i>					
CH ₄ O	Methanol	67-56-1	32	4.24	0.128
C ₂ H ₆ O	Ethanol	64-17-5	46	6.10	0.036
C ₃ H ₈ O	Isopropyl Alcohol	67-63-0	60	7.73	0.015
C ₃ H ₈ O	1-Propanol	71-23-8	60	8.80	0.005
C ₄ H ₁₀ O	1-Butanol	71-36-3	74	12.55	0.026
C ₅ H ₆ O ₂	2-Furanmethanol	98-00-0	98	18.97	0.005
C ₆ H ₆ O	Phenol	108-95-2	94	24.42	0.018
C ₇ H ₈ O	4-Methylphenol	106-44-5	108	28.03	0.007
<i>Ethers and esters</i>					
C ₅ H ₈ O ₂	Methyl methacrylate	80-62-6	100	14.26	0.007
C ₅ H ₈ O	3,4-Dihydro-2H-pyran	110-87-2	84	16.41	0.008
C ₄ H ₆ O ₂	Butyrolactone	96-48-0	86	20.10	0.003
C ₄ H ₄ O ₂	α-Crotonolactone	20825-71-2	84	20.35	0.004
C ₆ H ₁₀ O ₂	γ-Hexalactone	695-06-7	114	26.90	0.005
C ₆ H ₁₀ O ₂	δ-Hexalactone	823-22-3	114	29.58	0.035
C ₇ H ₁₂ O ₂	γ-Heptalactone	105-21-5	128	30.62	0.003
C ₁₀ H ₁₈ O ₃	Ethyl ester 2-acetyl-4-methylpentanoic acid	1522-34-5	186	32.65	0.054
C ₈ H ₁₄ O ₂	γ-Octalactone	104-50-7	142	34.10	0.006
C ₉ H ₁₆ O ₂	γ-Nonalactone	104-61-0	156	38.52	0.011
C ₁₀ H ₁₈ O ₂	γ-Decalactone	706-14-9	170	45.25	0.013
C ₁₁ H ₂₀ O ₂	γ-Undecalatone	104-67-6	184	55.89	0.002
C ₁₂ H ₂₂ O ₂	γ-Dodecalactone	2305-05-7	198	73.08	0.016
C ₁₅ H ₂₈ O ₄	3-Methylbut-2-yl 3-	(390641)	272	101.05	0.009

	methylpentyl ester succinic acid				
<i>Aldehydes</i>					
C ₂ H ₄ O	Acetaldehyde	75-07-0	44	5.04	0.252
C ₃ H ₄ O	2-Propenal	107-02-8	56	6.98	0.006
C ₃ H ₆ O	n-Propanal	123-38-6	58	7.25	0.072
C ₄ H ₆ O	2-Methyl-2-propenal	78-85-3	70	9.39	0.004
C ₄ H ₈ O	2-Methylpropanal	78-84-2	72	9.48	0.005
C ₄ H ₈ O	n-Butanal	123-72-8	72	10.34	0.053
C ₅ H ₁₀ O	3-Methylbutanal	590-86-3	86	13.38	0.001
C ₅ H ₁₀ O	n-Pentanal	110-62-3	86	14.40	0.010
C ₅ H ₄ O ₂	2-Furaldehyde	98-01-1	96	16.96	0.002
C ₅ H ₄ O ₂	3-Furaldehyde	498-60-2	96	17.77	0.012
C ₆ H ₁₂ O	n-Hexanal	66-25-1	100	18.79	0.016
C ₇ H ₁₄ O	n-Heptanal	111-71-7	114	22.99	0.018
C ₇ H ₆ O	Benzaldehyde	100-52-7	106	23.69	0.034
C ₈ H ₁₆ O	2-Ethylhexanal	123-05-7	128	25.52	0.024
C ₈ H ₁₆ O	n-Octanal	124-13-0	128	26.88	0.034
C ₉ H ₁₈ O	n-Nonanal	124-19-6	142	30.42	0.043
C ₁₀ H ₂₀ O	n-Decanal	112-31-2	156	33.72	0.075
C ₁₁ H ₂₂ O	n-Undecanal	112-44-7	170	37.72	0.025
C ₁₂ H ₂₄ O	n-Dodecanal	112-54-9	184	43.79	0.022
C ₁₃ H ₂₆ O	n-Tridecanal	10486-19-8	198	53.42	0.033
C ₁₄ H ₂₈ O	n-Tetradecanal	124-25-4	212	68.84	0.049
C ₁₅ H ₃₀ O	n-Pentadecanal	2765-11-9	226	94.01	0.060
<i>Ketones</i>					
C ₃ H ₆ O	2-Propanone	67-64-1	58	7.32	0.118
C ₄ H ₆ O	2-Butenone	78-94-4	70	9.94	0.002
C ₄ H ₆ O ₂	2,3-Butanedione	431-03-8	86	10.32	0.002
C ₄ H ₈ O	2-Butanone	78-93-3	72	10.36	0.005
C ₅ H ₁₀ O	2-Pentanone	107-87-9	86	14.15	0.001
C ₅ H ₈ O	Cyclopentanone	120-92-3	84	16.68	0.004
C ₆ H ₁₂ O	2-Hexanone	591-78-6	100	18.52	0.008
C ₇ H ₁₄ O	2-Heptanone	110-43-0	114	22.69	0.014
C ₅ H ₆ O ₃	Dihydro-3-methyl-2,5-furandione	4100-80-5	114	25.87	0.021
C ₈ H ₁₆ O	2-Octanone	111-13-7	128	26.55	0.024
C ₉ H ₁₈ O	2-Nonanone	821-55-6	142	30.09	0.018
C ₁₀ H ₂₀ O	2-Decanone	693-54-9	156	33.38	0.018
C ₈ H ₄ O ₃	1,3-Isobenzofurandione	85-44-9	148	35.13	0.083
C ₁₁ H ₂₂ O	2-Undecanone	53452-70-3	170	37.19	0.019
C ₁₂ H ₂₄ O	2-Dodecanone	6175-49-1	184	42.96	0.007
C ₁₃ H ₂₆ O	3-Tridecanone	1534-26-5	198	46.40	0.038
C ₁₃ H ₂₆ O	2-Tridecanone	593-08-8	198	51.89	0.087
C ₁₄ H ₂₈ O	2-Tetradecanone	2345-27-9	212	66.60	0.038

C ₁₅ H ₃₀ O	2-Pentadecanone	2345-28-0	226	90.09	0.110
<i>Carboxylic acids</i>					
C ₂ H ₄ O ₂	Acetic acid	64-19-7	60	11.14	1.755
C ₃ H ₆ O ₂	n-Propanoic acid	79-09-4	74	15.38	0.003
C ₄ H ₈ O ₂	n-Butanoic acid	107-92-6	88	19.07	0.051
C ₅ H ₁₀ O ₂	3-Methylbutanoic acid	503-74-2	102	22.10	0.020
C ₅ H ₁₀ O ₂	n-Pentanoic acid	109-52-4	102	23.09	0.343
C ₆ H ₁₂ O ₂	n-Hexanoic acid	142-62-1	116	26.60	0.103
C ₇ H ₁₄ O ₂	n-Heptanoic acid	111-14-8	130	30.09	0.068
C ₈ H ₁₆ O ₂	n-Octanoic acid	124-07-2	144	33.17	0.125
C ₉ H ₁₈ O ₂	n-Nonanoic acid	112-05-0	158	36.74	0.125
C ₁₀ H ₂₀ O ₂	n-Decanoic acid	334-48-5	172	42.13	0.097
C ₁₁ H ₂₂ O ₂	n-Undecanoic acid	112-37-8	186	51.31	0.032
C ₁₂ H ₂₄ O ₂	n-Dodecanoic acid	143-07-7	200	64.17	0.208
C ₁₃ H ₂₆ O ₂	n-Tridecanoic acid	638-53-9	214	88.78	0.024
C ₁₄ H ₂₈ O ₂	n-Tetradecanoic acid	544-63-8	228	120.15	0.614
Heterocyclic compounds					
<i>Dioxanes</i>					
C ₄ H ₈ O ₂	1,4-Dioxane	123-91-1	88	13.33	0.001
<i>Furans</i>					
C ₅ H ₆ O	2-Methylfuran	534-22-5	82	10.14	0.001
C ₅ H ₆ O	3-Methylfuran	930-27-8	82	10.42	<0.001
C ₆ H ₈ O	2-Ethylfuran	3208-16-0	96	13.95	<0.001
C ₆ H ₆ O	2-Vinylfuran	1487-18-9	94	14.80	<0.001
C ₈ H ₁₂ O	2-Butylfuran	4466-24-4	124	22.29	<0.001
C ₉ H ₁₄ O	2-Pentylfuran	3777-69-3	138	26.17	0.003
Nitrogenated compounds					
N ₂	Nitrogen	7727-37-9	28	1.48	0.940
C ₂ H ₃ N	Acetonitrile	75-05-8	41	6.52	0.011
C ₃ H ₅ N	Propargylamine	2450-71-7	55	9.03	0.001
C ₄ H ₅ N	Pyrrole	109-97-7	67	14.18	0.012
C ₂ H ₅ NO	Acetamide	60-35-5	59	14.73	0.022
C ₅ H ₅ N	Pyridine	110-86-1	79	14.90	0.003
C ₅ H ₇ N	3-Methyl-1H-pyrrole	616-43-3	81	14.76	0.001
C ₃ H ₅ NO ₂	2-Oxo-propionamide	x	87	16.78	0.019
C ₆ H ₉ N	2,3-Dimethyl-1H-pyrrole	600-28-2	95	18.01	0.001
C ₆ H ₇ N	2-Methylpyridine	109-06-8	93	18.34	0.002
C ₃ H ₄ N ₂	1H-Pyrazole	288-13-1	68	22.20	0.011
C ₄ H ₇ NO	2-Pyrrolidinone	616-45-5	85	25.60	0.101
C ₆ H ₈ N ₂ O	2-Methoxy-6-methylpyrazine	2882-21-5	124	27.03	0.009
C ₄ H ₅ NO ₂	Succinimide	123-56-8	99	27.98	0.061
Sulfonated compounds					
H ₂ S	Hydrogen sulfide	7783-06-4	34	2.89	0.010
COS	Carbonyl sulfide	463-58-1	60	3.31	0.007

O ₂ S	Sulfur dioxide	7446-09-5	64	4.94	0.126
CH ₄ S	Methanethiol	74-93-1	48	5.35	0.005
CS ₂	Carbon disulfide	75-15-0	76	7.68	0.003
C ₃ H ₈ S	(Methylthio)ethane	624-89-5	76	10.84	0.002
C ₂ H ₆ S ₂	Dimethyl disulfide	624-92-0	94	15.11	0.003
C ₅ H ₆ S	2-Methylthiophene	554-14-3	98	16.38	0.001
C ₅ H ₆ S	3-Methylthiophene	616-44-4	98	17.82	0.002
C ₆ H ₈ S	2-Ethylthiophene	872-55-9	112	21.26	0.002
Inorganic compounds					
<i>Oxides</i>					
CO ₂	Carbon dioxide	124-38-9	44	1.76	11.221
H ₂ O	Water	7732-18-5	18	2.89	80.193
<i>Noble gases</i>					
Ar	Argon	7440-37-1	40	1.45	0.002
<i>Unknown compounds</i>					
	Unknown			70.34	0.080
	Unknown			97.36	0.027

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).