

Table S1. 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 111/90.3	
				³ RT, min	⁴ A, %
Aliphatic hydrocarbons					
Paraffins					
CH4	Methane	74-82-8	16	1.58	1.109
C2H6	Ethane	74-84-0	30	2.31	0.028
C5H12	n-Pentane	109-66-0	72	7.61	0.001
C6H14	2-Methylpentane	107-83-5	86	8.58	0.002
C6H14	n-Hexane	110-54-3	86	12.07	0.002
C7H16	n-Heptane	142-82-5	100	16.18	0.003
C8H18	n-Octane	111-65-9	114	20.33	0.007
C9H20	n-Nonane	111-84-2	128	24.26	0.010
C10H22	n-Decane	124-18-5	142	27.88	0.016
C11H24	n-Undecane	1120-21-4	156	31.24	0.004
C12H26	n-Dodecane	112-40-3	170	34.43	0.005
C13H28	n-Tridecane	629-50-5	184	38.64	0.010
C14H30	n-Tetradecane	629-59-4	198	45.10	0.010
C15H32	3-Methyltetradecane	18435-22-8	212	53.38	0.017
C15H32	n-Pentadecane	629-62-9	212	55.36	0.010
C16H34	n-Hexadecane	544-76-3	226	71.72	0.034
Olefins					
C2H4	Ethylene	74-85-1	28	2.11	0.003
C4H8	2-Methyl-1-propene	115-11-7	56	5.70	0.001
C4H8	2-Butene	107-01-7	56	5.87	0.003
C5H8	1,3-Pentadiene	1574-41-0	68	8.45	0.004
C5H8	(E)-1,3-Pentadiene	2004-70-8	68	8.63	0.001
C5H8	(Z)-1,3-Pentadiene	1574-41-0	68	8.94	0.001
C6H12	1-Hexene	592-41-6	84	11.69	0.005
C6H10	(E)-2-Methyl-1,3-pentadiene	926-54-5	82	12.74	0.001
C7H14	1-Heptene	592-76-7	98	15.79	0.004
C8H16	1-Octene	111-66-0	112	19.98	0.002
C9H18	1-Nonene	124-11-8	126	23.94	0.004
C10H20	1-Decene	872-05-9	140	27.61	0.005
C11H22	1-Undecene	821-95-4	154	31.01	0.004
C12H24	1-Dodecene	112-41-4	168	34.16	0.004
C13H26	1-Tridecene	2437-56-1	182	38.27	0.006
C14H28	1-Tetradecene	1120-36-1	196	44.57	0.011
C15H30	1-Pentadecene	13360-61-7	210	54.56	0.013
Cyclic hydrocarbons					
Cycloalkanes (naphthenes) and cycloalkenes					
C5H10	Cyclopentane	287-92-3	70	8.25	0.003
C10H16	dl-Limonene	138-86-3	136	28.00	0.002

<i>Arenes</i>					
C ₆ H ₆	Benzene	71-43-2	78	12.40	0.004
C ₇ H ₈	Toluene	108-88-3	92	16.92	0.003
C ₇ H ₇ F	(Fluoromethyl)benzene	350-50-5	110	20.73	<0.001
C ₈ H ₁₀	Ethylbenzene	100-41-4	106	21.01	0.001
C ₈ H ₁₀	p-Xylene	106-42-3	106	21.30	0.002
C ₈ H ₁₀	o-Xylene	95-47-6	106	21.58	0.001
C ₈ H ₁₀	m-Xylene	108-38-3	106	21.86	0.001
C ₈ H ₈	Styrene	100-42-5	104	21.90	0.001
C ₈ H ₉ F	3-Fluoro-o-xylene	443-82-3	124	22.28	<0.001
C ₈ H ₉ F	5-Fluoro-m-xylene	461-97-2	124	22.64	<0.001
C ₈ H ₉ F	p-Fluoroethylbenzene	459-47-2	124	22.91	0.001
C ₉ H ₁₂	Propylbenzene	103-65-1	120	24.87	0.002
C ₁₀ H ₁₂	(2-Methyl-2-propenyl)benzene	3290-53-7	132	27.17	0.004
C ₁₀ H ₁₄	Butylbenzene	104-51-8	134	28.73	0.001
C ₁₂ H ₁₈	Hexylbenzene	1077-16-3	162	36.26	0.006
Oxygenated hydrocarbons					
<i>Alcohols</i>					
CH ₄ O	Methanol	67-56-1	32	4.29	0.167
C ₂ H ₆ O	Ethanol	64-17-5	46	6.23	0.019
C ₃ H ₈ O	Isopropyl Alcohol	67-63-0	60	7.78	0.006
C ₄ H ₁₀ O	1-Butanol	71-36-3	74	12.57	0.006
C ₅ H ₆ O ₂	2-Furanmethanol	98-00-0	98	18.99	0.001
C ₆ H ₆ O	Phenol	108-95-2	94	24.44	0.009
C ₇ H ₈ O	2-Methylphenol	95-48-7	108	25.95	0.001
C ₇ H ₈ O	3-Methylphenol	108-39-4	108	27.20	0.001
C ₇ H ₈ O	4-Methylphenol	106-44-5	108	28.03	0.003
C ₈ H ₁₀ O ₂	2-Phenoxyethanol	122-99-6	138	32.80	0.001
<i>Ethers and esters</i>					
C ₅ H ₈ O ₂	Methyl methacrylate	80-62-6	100	14.28	0.002
C ₅ H ₈ O	3,4-Dihydro-2H-pyran	110-87-2	84	16.44	0.003
C ₄ H ₆ O ₂	Butyrolactone	96-48-0	86	20.13	0.003
C ₆ H ₁₀ O ₂	γ-Hexalactone	695-06-7	114	26.92	0.002
C ₆ H ₁₀ O ₂	Tetrahydro-6-methyl-2H-pyran-2-one	823-22-3	114	29.61	0.010
C ₇ H ₁₂ O ₂	γ-Heptalactone	105-21-5	128	30.62	0.001
C ₈ H ₁₄ O ₂	γ-Octalactone	104-50-7	142	34.11	0.002
C ₉ H ₁₆ O ₂	γ-Nonalactone	104-61-0	156	38.54	0.004
C ₁₀ H ₁₈ O ₂	γ-Decalactone	706-14-9	170	45.30	0.004
C ₁₁ H ₂₀ O ₂	γ-Undecalatone	104-67-6	184	50.04	0.054
C ₁₂ H ₂₂ O ₂	γ-Dodecalactone	2305-05-7	198	73.20	0.005
C ₁₅ H ₂₈ O ₄	3-Methylbut-2-yl 3-methylpentyl ester succinic acid	(390641)	272	101.06	0.003
C ₁₄ H ₁₈ O ₄	Dipropyl phthalate	131-16-8	250	131.92	0.026

<i>Aldehydes</i>					
C ₂ H ₄ O	Acetaldehyde	75-07-0	44	5.07	0.134
C ₃ H ₄ O	2-Propenal	107-02-8	56	6.98	0.003
C ₃ H ₆ O	n-Propanal	123-38-6	58	7.28	0.007
C ₄ H ₆ O	2-Methyl-2-propenal	78-85-3	70	9.39	0.001
C ₄ H ₈ O	2-methylpropanal	78-84-2	72	9.49	0.002
C ₄ H ₈ O	n-Butanal	123-72-8	72	10.26	0.001
C ₅ H ₁₀ O	3-Methylbutanal	590-86-3	86	13.42	0.007
C ₅ H ₁₀ O	n-Pentanal	110-62-3	86	14.41	0.004
C ₅ H ₄ O ₂	Furfural	98-01-1	96	16.96	<0.001
C ₅ H ₄ O ₂	3-Furaldehyde	498-60-2	96	17.79	0.006
C ₆ H ₁₂ O	n-Hexanal	66-25-1	100	18.80	0.007
C ₇ H ₁₄ O	n-Heptanal	111-71-7	114	22.99	0.010
C ₇ H ₆ O	Benzaldehyde	100-52-7	106	23.71	0.015
C ₈ H ₁₆ O	2-Ethylhexanal	123-05-7	128	25.54	0.004
C ₈ H ₁₆ O	n-Octanal	124-13-0	128	26.88	0.215
C ₉ H ₁₈ O	n-Nonanal	124-19-6	142	30.44	0.024
C ₁₀ H ₂₀ O	n-Decanal	112-31-2	156	33.73	0.025
C ₁₁ H ₂₂ O	n-Undecanal	112-44-7	170	37.77	0.010
C ₁₂ H ₂₄ O	n-Dodecanal	112-54-9	184	43.86	0.006
C ₁₃ H ₂₆ O	n-Tridecanal	10486-19-8	198	53.62	0.009
C ₁₄ H ₂₈ O	n-Tetradecanal	124-25-4	212	68.79	0.010
C ₁₅ H ₃₀ O	n-Pentadecanal	2765-11-9	226	93.85	0.018
<i>Ketones</i>					
C ₃ H ₆ O	2-Propanone	67-64-1	58	7.32	0.012
C ₄ H ₆ O	2-Butenone	78-94-4	70	9.96	0.001
C ₄ H ₆ O ₂	2,3-Butanedione	431-03-8	86	10.34	0.001
C ₄ H ₈ O	2-Butanone	78-93-3	72	10.37	0.002
C ₅ H ₁₀ O	2-Pentanone	107-87-9	86	14.16	0.004
C ₅ H ₈ O	Cyclopentanone	120-92-3	84	16.69	0.001
C ₆ H ₁₂ O	2-Hexanone	591-78-6	100	18.52	0.003
C ₇ H ₁₄ O	2-Heptanone	110-43-0	114	22.71	0.004
C ₅ H ₆ O ₃	Dihydro-3-methyl-2,5-furandione	4100-80-5	114	25.90	0.014
C ₈ H ₁₆ O	2-Octanone	111-13-7	128	26.57	0.015
C ₈ H ₁₄ O ₂	6-methyl-2,4-heptanedione	3002-23-1	142	29.51	0.001
C ₉ H ₁₈ O	2-Nonanone	821-55-6	142	30.11	0.014
C ₁₀ H ₂₀ O	2-Decanone	693-54-9	156	33.38	0.006
C ₈ H ₄ O ₃	1,3-Isobenzofurandione	85-44-9	148	35.13	0.068
C ₁₁ H ₂₂ O	2-Undecanone	53452-70-3	170	37.19	0.006
C ₁₂ H ₂₄ O	2-Dodecanone	6175-49-1	184	42.98	0.004
C ₁₃ H ₂₆ O	3-Tridecanone	1534-26-5	198	47.53	0.006
C ₁₃ H ₂₆ O	2-Tridecanone	593-08-8	198	52.02	0.013
C ₁₄ H ₂₈ O	3-Tetradecanone	629-23-2	212	62.91	0.043

C ₁₄ H ₂₈ O	2-Tetradecanone	2345-27-9	212	66.55	0.021
C ₁₅ H ₃₀ O	2-Pentadecanone	2345-28-0	226	90.17	0.055
<i>Carboxylic acids</i>					
C ₂ H ₄ O ₂	Acetic acid	64-19-7	60	11.14	0.182
C ₃ H ₆ O ₂	n-Propanoic acid	79-09-4	74	15.46	0.004
C ₄ H ₈ O ₂	n-Butanoic acid	107-92-6	88	19.12	0.022
C ₅ H ₁₀ O ₂	3-Methylbutanoic acid	503-74-2	102	22.16	0.006
C ₅ H ₁₀ O ₂	n-Pentanoic acid	109-52-4	102	23.11	0.014
C ₆ H ₁₂ O ₂	n-Hexanoic acid	142-62-1	116	26.60	0.048
C ₇ H ₁₄ O ₂	n-Heptanoic acid	111-14-8	130	30.13	0.020
C ₈ H ₁₆ O ₂	n-Octanoic acid	124-07-2	144	33.23	0.037
C ₉ H ₁₈ O ₂	n-Nonanoic acid	112-05-0	158	36.84	0.036
C ₁₀ H ₂₀ O ₂	n-Decanoic acid	334-48-5	172	42.24	0.030
C ₁₁ H ₂₂ O ₂	n-Undecanoic acid	112-37-8	186	51.50	0.006
C ₁₂ H ₂₄ O ₂	n-Dodecanoic acid	143-07-7	200	64.70	0.177
C ₁₄ H ₂₈ O ₂	n-Tetradecanoic acid	544-63-8	228	122.43	0.143
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	10.16	<0.001
C ₆ H ₈ O	2-Ethylfuran	3208-16-0	96	13.98	<0.001
C ₆ H ₆ O	2-Vinylfuran	1487-18-9	94	14.68	<0.001
C ₈ H ₁₂ O	2-Butylfuran	4466-24-4	124	23.31	<0.001
C ₉ H ₁₄ O	2-Pentylfuran	3777-69-3	138	26.17	0.002
Nitrogenated compounds					
N ₂	Nitrogen	7727-37-9	28	1.53	0.639
H ₃ N	Ammonia	7664-41-7	17	2.51	0.131
C ₂ H ₃ N	Acetonitrile	75-05-8	41	6.52	0.009
C ₃ H ₅ N	Propargylamine	2450-71-7	55	9.04	<0.001
C ₄ H ₅ N	Pyrrole	109-97-7	67	14.21	0.007
C ₂ H ₅ NO	Acetamide	60-35-5	59	14.81	0.007
C ₅ H ₅ N	Pyridine	110-86-1	79	14.91	0.001
C ₅ H ₇ N	3-Methyl-1H-pyrrole	616-43-3	81	14.78	<0.001
C ₃ H ₅ NO ₂	2-Oxo-propionamide	x	87	16.79	0.005
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	<0.001
C ₆ H ₇ N	3-Methylpyridine	108-99-6	93	19.97	<0.001
C ₆ H ₇ N	4-Methylpyridine	108-89-4	93	20.07	<0.001
C ₃ H ₄ N ₂	1H-Pyrazole	288-13-1	68	22.24	0.009
C ₅ H ₁₁ NO	Pentanamide	626-97-1	101	25.62	0.005
C ₄ H ₇ NO	2-Pyrrolidinone	616-45-5	85	25.70	0.014
C ₆ H ₈ N ₂ O	2-Methoxy-6-methylpyrazine	2882-21-5	124	27.07	0.005
C ₄ H ₅ NO ₂	Succinimide	123-56-8	99	28.03	0.009

C ₁₁ H ₂₃ NO	Undecanamide	x	185	97.76	0.008
Sulfonated compounds					
H ₂ S	Hydrogen sulfide	7783-06-4	34	2.88	0.008
COS	Carbonyl sulfide	463-58-1	60	3.29	0.004
O ₂ S	Sulfur dioxide	7446-09-5	64	5.37	0.024
CH ₄ S	Methanethiol	74-93-1	48	5.37	0.007
C ₂ H ₆ S	Dimethyl sulfide	75-18-3	62	7.61	0.005
CS ₂	Carbon disulfide	75-15-0	76	7.68	0.006
C ₃ H ₈ S	(Methylthio)ethane	624-89-5	76	10.74	<0.001
C ₂ H ₆ S ₂	Dimethyl disulfide	624-92-0	94	15.11	0.001
Inorganic compounds					
<i>Oxides</i>					
CO ₂	Carbon dioxide	124-38-9	44	1.75	14.765
H ₂ O	Water	7732-18-5	18	3.04	81.082
<i>Noble gases</i>					
Ar	Argon	7440-37-1	40	1.50	0.003

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).