

Table S9. Results of GC–MS analysis of volatiles extracted by mechanical shock crushing from arsenopyrite (Blagodatnoye deposit, Yenisei ridge).

Formula	Name	<sup>1</sup> CAS/(NIST)	<sup>2</sup> MW	Arsenopyrite 112/191.2	
				<sup>3</sup> RT, min	<sup>4</sup> A, %
Aliphatic hydrocarbons					
Paraffins					
CH4	Methane	74-82-8	16	1.72	1.166
C2H6	Ethane	74-84-0	30	2.58	0.005
C4H10	n-Butane	106-97-8	58	6.16	0.003
C5H12	n-Pentane	109-66-0	72	8.63	0.003
C6H14	n-Hexane	110-54-3	86	12.06	0.004
C7H16	n-Heptane	142-82-5	100	16.09	0.002
C9H20	2,6-Dimethylheptane	1072-05-5	128	17.54	0.002
C8H16	3-Methyleneheptane	1632-16-2	112	19.58	0.009
C8H18	n-Octane	111-65-9	114	20.18	0.003
C9H20	n-Nonane	111-84-2	128	24.06	0.004
C10H22	n-Decane	124-18-5	142	27.64	0.004
C11H24	n-Undecane	1120-21-4	156	30.96	0.002
C12H26	n-Dodecane	112-40-3	170	34.07	0.002
C13H28	n-Tridecane	629-50-5	184	38.07	0.003
C14H30	3-Methyltridecane	6418-41-3	198	42.20	0.047
C14H30	n-Tetradecane	629-59-4	198	44.13	0.004
C15H32	n-Pentadecane	629-62-9	212	53.65	0.005
C16H34	n-Hexadecane	544-76-3	226	66.66	0.050
C17H36	n-Heptadecane	629-78-7	240	95.72	0.010
C18H38	4-Methylheptadecane	26429-11-8	254	106.19	0.041
Olefins					
C2H4	Ethylene	74-85-1	28	2.46	0.005
C4H8	1-Butene	106-98-9	56	5.78	0.002
C4H8	2-Methyl-1-propene	115-11-7	56	5.96	0.008
C5H10	1-Pentene	109-67-1	70	8.19	0.003
C5H8	1,3-Pentadiene	1574-41-0	68	8.49	0.003
C5H8	(E)-1,3-Pentadiene	2004-70-8	68	8.73	0.001
C5H8	(Z)-1,3-Pentadiene	1574-41-0	68	8.79	<0.001
C6H12	2-Methyl-2-pentene	625-27-4	84	11.04	0.001
C6H12	1-Hexene	592-41-6	84	11.67	0.003
C6H12	3-Methyl-2-pentene	922-61-2	84	11.77	0.001
C7H14	1-Heptene	592-76-7	98	15.74	0.001
C8H16	4-Methyl-3-heptene	4485-16-9	112	19.43	0.002
C8H16	1-Octene	111-66-0	112	19.75	0.007
C8H16	(E)-4-Octene	14850-23-8	112	19.97	0.007
C8H16	2-Octene	111-67-1	112	20.28	0.003
C9H18	1-Nonene	124-11-8	126	23.78	0.002
C10H20	1-Decene	872-05-9	140	27.44	0.001

C <sub>11</sub> H <sub>22</sub>	1-Undecene	821-95-4	154	30.77	0.001
C <sub>12</sub> H <sub>24</sub>	1-Dodecene	112-41-4	168	33.87	0.001
C <sub>13</sub> H <sub>26</sub>	1-Tridecene	2437-56-1	182	37.80	0.002
C <sub>15</sub> H <sub>30</sub>	1-Pentadecene	13360-61-7	210	52.94	0.009
C <sub>16</sub> H <sub>32</sub>	1-Hexadecene	629-73-2	224	65.15	0.010
C <sub>17</sub> H <sub>34</sub>	1-Heptadecene	6765-39-5	238	92.97	0.007
<b>Cyclic hydrocarbons</b>					
<i>PAH (Polycyclic aromatic hydrocarbons)</i>					
C <sub>10</sub> H <sub>8</sub>	Naphthalene	91-20-3	128	32.29	0.003
C <sub>11</sub> H <sub>10</sub>	1-Methylnaphthalene	90-12-0	142	36.10	0.001
C <sub>11</sub> H <sub>10</sub>	2-Methylnaphthalene	91-57-6	142	36.64	0.002
C <sub>14</sub> H <sub>10</sub>	Phenanthrene	85-01-8	178	88.92	0.002
<i>Arenes</i>					
C <sub>6</sub> H <sub>6</sub>	Benzene	71-43-2	78	12.62	0.006
C <sub>7</sub> H <sub>8</sub>	Toluene	108-88-3	92	17.09	0.002
C <sub>7</sub> H <sub>7</sub> F	(Fluoromethyl)benzene	350-50-5	110	20.73	<0.001
C <sub>8</sub> H <sub>10</sub>	Ethylbenzene	100-41-4	106	21.13	0.001
C <sub>8</sub> H <sub>10</sub>	p-Xylene	106-42-3	106	21.38	0.009
C <sub>8</sub> H <sub>10</sub>	o-Xylene	95-47-6	106	21.63	0.004
C <sub>8</sub> H <sub>10</sub>	m-Xylene	108-38-3	106	22.03	0.002
C <sub>8</sub> H <sub>8</sub>	Styrene	100-42-5	104	22.05	0.001
C <sub>9</sub> H <sub>12</sub>	Propylbenzene	103-65-1	120	24.95	0.001
C <sub>10</sub> H <sub>14</sub>	p-Cymene	99-87-6	134	27.79	0.006
C <sub>10</sub> H <sub>14</sub>	o-Cymene	527-84-4	134	28.71	0.001
C <sub>10</sub> H <sub>14</sub>	Butylbenzene	104-51-8	134	28.71	0.003
C <sub>11</sub> H <sub>16</sub>	Pentylbenzene	538-68-1	148	32.12	0.004
C <sub>12</sub> H <sub>18</sub>	Hexylbenzene	1077-16-3	162	35.52	0.002
<b>Oxygenated hydrocarbons</b>					
<i>Alcohols</i>					
CH <sub>4</sub> O	Methanol	67-56-1	32	4.88	0.051
C <sub>2</sub> H <sub>6</sub> O	Ethanol	64-17-5	46	6.51	0.007
C <sub>3</sub> H <sub>8</sub> O	2-Propanol	67-63-0	60	8.09	0.001
C <sub>3</sub> H <sub>8</sub> O	1-Propanol	71-23-8	60	9.13	0.001
C <sub>4</sub> H <sub>10</sub> O	1-Butanol	71-36-3	74	12.92	0.005
C <sub>6</sub> H <sub>6</sub> O	Phenol	108-95-2	94	24.80	0.002
C <sub>8</sub> H <sub>18</sub> O	2-Ethyl-1-hexanol	104-76-7	130	28.18	0.015
<i>Ethers and esters</i>					
C <sub>5</sub> H <sub>8</sub> O <sub>2</sub>	Methyl methacrylate	80-62-6	100	14.50	0.001
C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	Butyrolactone	96-48-0	86	21.00	<0.001
C <sub>8</sub> H <sub>14</sub> O <sub>2</sub>	γ-Octalactone	104-50-7	142	34.59	0.001
C <sub>9</sub> H <sub>16</sub> O <sub>2</sub>	γ-Nonalactone	104-61-0	156	39.13	0.002
C <sub>10</sub> H <sub>18</sub> O <sub>2</sub>	γ-Decalactone	706-14-9	170	45.94	0.002
C <sub>12</sub> H <sub>22</sub> O <sub>2</sub>	γ-Dodecalactone	2305-05-7	198	74.05	0.002
C <sub>13</sub> H <sub>16</sub> O <sub>2</sub>	Cyclohexyl ester benzoic acid	2412-73-9	204	86.83	0.003
C <sub>14</sub> H <sub>20</sub> O <sub>2</sub>	Heptyl ester benzoic	7155-12-6	220	95.07	0.014

	acid				
C <sub>15</sub> H <sub>22</sub> O <sub>2</sub>	Octyl ester benzoic acid	94-50-8	234	109.22	0.013
C <sub>16</sub> H <sub>22</sub> O <sub>4</sub>	Diisobutyl phthalate	84-69-5	278	129.19	0.067
<i>Aldehydes</i>					
C <sub>2</sub> H <sub>4</sub> O	Acetaldehyde	75-07-0	44	4.91	0.034
C <sub>3</sub> H <sub>4</sub> O	2-Propenal	107-02-8	56	7.19	0.001
C <sub>3</sub> H <sub>6</sub> O	n-Propanal	123-38-6	58	7.59	0.005
C <sub>4</sub> H <sub>6</sub> O	2-Methyl-2-propenal	78-85-3	70	9.71	<0.001
C <sub>4</sub> H <sub>8</sub> O	2-Methylpropanal	78-84-2	72	9.79	0.002
C <sub>4</sub> H <sub>8</sub> O	n-Butanal	123-72-8	72	10.59	0.004
C <sub>5</sub> H <sub>8</sub> O	2-Methyl-2-butenal	1115-11-3	84	13.49	<0.001
C <sub>5</sub> H <sub>10</sub> O	3-Methylbutanal	590-86-3	86	13.74	0.002
C <sub>5</sub> H <sub>10</sub> O	n-Pentanal	110-62-3	86	14.72	0.001
C <sub>5</sub> H <sub>8</sub> O	3-Methyl-2-butenal	107-86-8	84	17.22	<0.001
C <sub>5</sub> H <sub>4</sub> O <sub>2</sub>	Furfural	98-01-1	96	17.52	<0.001
C <sub>6</sub> H <sub>10</sub> O	2-Methyl-2-pentenal	623-36-9	98	18.17	<0.001
C <sub>5</sub> H <sub>4</sub> O <sub>2</sub>	3-Furaldehyde	498-60-2	96	18.38	0.001
C <sub>6</sub> H <sub>12</sub> O	n-Hexanal	66-25-1	100	19.05	0.004
C <sub>7</sub> H <sub>14</sub> O	n-Heptanal	111-71-7	114	23.18	0.002
C <sub>6</sub> H <sub>6</sub> O <sub>2</sub>	5-Methyl-2-furancarboxaldehyde	620-02-0	110	23.45	<0.001
C <sub>7</sub> H <sub>6</sub> O	Benzaldehyde	100-52-7	106	24.16	0.009
C <sub>8</sub> H <sub>16</sub> O	2-Ethylhexanal	123-05-7	128	25.65	0.016
C <sub>8</sub> H <sub>16</sub> O	n-Octanal	124-13-0	128	26.99	0.004
C <sub>9</sub> H <sub>18</sub> O	n-Nonanal	124-19-6	142	30.47	0.005
C <sub>10</sub> H <sub>20</sub> O	n-Decanal	112-31-2	156	33.72	0.005
C <sub>11</sub> H <sub>22</sub> O	n-Undecanal	112-44-7	170	37.69	0.004
C <sub>12</sub> H <sub>24</sub> O	n-Dodecanal	112-54-9	184	43.53	0.004
C <sub>15</sub> H <sub>30</sub> O	n-Pentadecanal	2765-11-9	226	90.89	0.011
<i>Ketones</i>					
C <sub>3</sub> H <sub>6</sub> O	2-Propanone	67-64-1	58	7.68	0.007
C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	2,3-Butanedione	431-03-8	86	10.66	<0.001
C <sub>4</sub> H <sub>8</sub> O	2-Butanone	78-93-3	72	10.74	0.003
C <sub>5</sub> H <sub>8</sub> O	Cyclopentanone	120-92-3	84	16.99	<0.001
C <sub>6</sub> H <sub>12</sub> O	2-Hexanone	591-78-6	100	18.78	0.001
C <sub>7</sub> H <sub>14</sub> O	2-Heptanone	110-43-0	114	22.88	0.002
C <sub>8</sub> H <sub>16</sub> O	2-Octanone	111-13-7	128	25.68	0.003
C <sub>9</sub> H <sub>18</sub> O	2-Nonanone	821-55-6	142	30.16	0.001
C <sub>10</sub> H <sub>20</sub> O	2-Decanone	693-54-9	156	33.37	0.001
C <sub>8</sub> H <sub>4</sub> O <sub>3</sub>	1,3-Isobenzofurandione	85-44-9	148	36.04	0.015
C <sub>11</sub> H <sub>22</sub> O	2-Undecanone	53452-70-3	170	37.17	0.002
C <sub>13</sub> H <sub>26</sub> O	2-Tridecanone	593-08-8	198	51.42	0.006
C <sub>14</sub> H <sub>28</sub> O	2-Tetradecanone	2345-27-9	212	61.23	0.008
C <sub>15</sub> H <sub>30</sub> O	2-Pentadecanone	2345-28-0	226	87.38	0.011
<i>Carboxylic acids</i>					

C <sub>2</sub> H <sub>4</sub> O <sub>2</sub>	Acetic acid	64-19-7	60	11.39	0.023
C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	n-Propanoic acid	79-09-4	74	15.37	0.001
C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	n-Butanoic acid	107-92-6	88	19.03	0.014
C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	3-Methylbutanoic acid	503-74-2	102	22.07	0.001
C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	n-Pentanoic acid	109-52-4	102	23.01	0.004
C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	n-Hexanoic acid	142-62-1	116	26.53	0.015
C <sub>7</sub> H <sub>14</sub> O <sub>2</sub>	n-Heptanoic acid	111-14-8	130	29.93	0.004
C <sub>8</sub> H <sub>16</sub> O <sub>2</sub>	n-Octanoic acid	124-07-2	144	32.99	0.017
C <sub>9</sub> H <sub>18</sub> O <sub>2</sub>	n-Nonanoic acid	112-05-0	158	36.50	0.012
C <sub>10</sub> H <sub>20</sub> O <sub>2</sub>	n-Decanoic acid	334-48-5	172	41.75	0.016
C <sub>11</sub> H <sub>22</sub> O <sub>2</sub>	n-Undecanoic acid	112-37-8	186	50.01	0.001
C <sub>12</sub> H <sub>24</sub> O <sub>2</sub>	n-Dodecanoic acid	143-07-7	200	62.75	0.025
C <sub>14</sub> H <sub>28</sub> O <sub>2</sub>	n-Tetradecanoic acid	544-63-8	228	118.95	0.031
<b>Heterocyclic compounds</b>					
<i>Furans</i>					
C <sub>5</sub> H <sub>6</sub> O	2-Methylfuran	534-22-5	82	10.36	0.001
C <sub>6</sub> H <sub>8</sub> O	2-Ethylfuran	3208-16-0	96	14.17	0.001
C <sub>8</sub> H <sub>12</sub> O	2-Butylfuran	4466-24-4	124	22.31	0.001
C <sub>9</sub> H <sub>14</sub> O	2-Pentylfuran	3777-69-3	138	26.13	0.002
<b>Nitrogenated compounds</b>					
N <sub>2</sub>	Nitrogen	7727-37-9	28	1.65	0.408
H <sub>3</sub> N	Ammonia	7664-41-7	17	2.86	0.030
C <sub>2</sub> H <sub>3</sub> N	Acetonitrile	75-05-8	41	6.74	0.005
C <sub>5</sub> H <sub>5</sub> N	Pyridine	110-86-1	79	15.60	0.001
C <sub>2</sub> H <sub>5</sub> NO	Acetamide	60-35-5	59	16.35	0.001
C <sub>6</sub> H <sub>8</sub> N <sub>2</sub> O	2-Methoxy-6-methyl-pyrazine	2882-21-5	124	27.83	0.001
C <sub>4</sub> H <sub>5</sub> NO <sub>2</sub>	Succinimide	123-56-8	99	28.93	0.001
C <sub>7</sub> H <sub>15</sub> NO	Heptanamide	628-62-6	129	31.12	<0.001
C <sub>8</sub> H <sub>17</sub> NO	N-hexylacetamide	7501-79-3	143	34.44	<0.001
C <sub>9</sub> H <sub>19</sub> NO	Nonanamide	1120-07-6	157	38.82	0.001
C <sub>10</sub> H <sub>21</sub> NO	Decanamide	2319-29-1	171	55.60	0.001
C <sub>13</sub> H <sub>27</sub> NO <sub>2</sub>	Octyl ester N-methyl-N-propylarbamic acid	(437270)	229	68.54	0.009
C <sub>13</sub> H <sub>27</sub> NO	Tridecanamide	34778-57-9	213	97.87	0.002
<b>Sulfonated compounds</b>					
H <sub>2</sub> S	Hydrogen sulfide	7783-06-4	34	2.90	0.001
O <sub>2</sub> S	Sulfur dioxide	7446-09-5	64	4.36	0.026
CS <sub>2</sub>	Carbon disulfide	75-15-0	76	7.69	0.001
C <sub>4</sub> H <sub>4</sub> S	Thiophene	110-02-1	84	12.39	<0.001
C <sub>2</sub> H <sub>6</sub> S <sub>2</sub>	Dimethyl disulfide	624-92-0	94	15.42	<0.001
C <sub>5</sub> H <sub>6</sub> S	2-Methylthiophene	554-14-3	98	16.57	<0.001
C <sub>5</sub> H <sub>6</sub> S	3-Methylthiophene	616-44-4	98	16.92	0.001
<b>Inorganic compounds</b>					
<i>Oxides</i>					

CO <sub>2</sub>	Carbon dioxide	124-38-9	44	1.92	1.047
H <sub>2</sub> O	Water	7732-18-5	18	3.11	96.402
<i>Noble gases</i>					
Ar	Argon	7440-37-1	40	1.65	0.001
<b>Unknown compounds</b>					
	Unknown			101.81	0.028
	Unknown			118.35	0.007

Note: <sup>1</sup>CAS/(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); <sup>2</sup>MW – nominal mass; <sup>3</sup>RT – retention time; <sup>4</sup>A – normalized area (the area ratio of the individual gas mixture components to the sum of the areas of all the components in the chromatogram).