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A step towards the molecular detection of life on Mars

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2012

document version

Publisher's PDF, also known as Version of record

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citation for published version (APA)

Oliveira Lebre Direito, M. S. (2012). *A step towards the molecular detection of life on Mars*. [PhD-Thesis - Research and graduation internal, Vrije Universiteit Amsterdam].

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Supplementary material

Supplementary Table 1 (Chapter 4). Position of minerals in incubator with respective chemical formulae. Except for quartz minerals in chambers 1, 8 and 16 (position controls), all other minerals were distributed at random.

Chambers	Minerals	Chemical formula
1	Quartz.1A	SiO ₂
	Quartz.1B	SiO ₂
	Quartz.1C	SiO ₂
2	Goethite.2	FeO(OH)
	Diopside.2	CaMgSi ₂ O ₆ ,
	Magnetite.2	Fe ₃ O ₄
3	Fluorapatite.3	Ca ₅ (PO ₄) ₃ F
	Diopside.3	CaMgSi ₂ O ₆ ,
	Goethite.3	FeO(OH)
4	Labradorite.4	(Ca,Na)(Al,Si) ₄ O ₈
	Jarosite.4	KFe ₃ (SO ₄) ₂ (OH) ₆
	Quartz.4	SiO ₂
5	Magnetite.5	Fe ₃ O ₄
	Forsterite.5	Mg ₂ SiO ₄
	Fluorapatite.5	Ca ₅ (PO ₄) ₃ F
6	Fluorapatite.6	Ca ₅ (PO ₄) ₃ F
	Forsterite.6	Mg ₂ SiO ₄
	Montmorillonite.6	(Na,Ca) _{0.33} (Al,Mg) ₂ (Si ₄ O ₁₀)(OH) ₂ ·nH ₂ O
7	Kaolinite.7	Al ₂ Si ₂ O ₅ (OH) ₄
	Hematite.7	Fe ₂ O ₃
	Montmorillonite.7	(Na,Ca) _{0.33} (Al,Mg) ₂ (Si ₄ O ₁₀)(OH) ₂ ·nH ₂ O
8	Quartz.8A	SiO ₂
	Quartz.8B	SiO ₂
	Quartz.8C	SiO ₂
9	Orthoclase.9	(K,Na)AlSi ₃ O ₈
	Quartz.9	SiO ₂
	Hematite.9	Fe ₂ O ₃
10	Kaolinite.10	Al ₂ Si ₂ O ₅ (OH) ₄
	Magnetite.10	Fe ₃ O ₄
	Diopside.10	CaMgSi ₂ O ₆ ,
11	Forsterite.11	Mg ₂ SiO ₄
	Jarosite.11	KFe ₃ (SO ₄) ₂ (OH) ₆
	Orthoclase.11	(K,Na)AlSi ₃ O ₈
12	Nonttronite.12B	(CaO _{0.5} ,Na) _{0.3} Fe ³⁺ ₂ (Si,Al) ₄ O ₁₀ (OH) ₂ ·nH ₂ O
	Quartz.12	SiO ₂
13	Nonttronite.12A	(CaO _{0.5} ,Na) _{0.3} Fe ³⁺ ₂ (Si,Al) ₄ O ₁₀ (OH) ₂ ·nH ₂ O
	Labradorite.13	(Ca,Na)(Al,Si) ₄ O ₈
	Jarosite.13	KFe ₃ (SO ₄) ₂ (OH) ₆
14	Hematite.13	Fe ₂ O ₃
	Montmorillonite.14	(Na,Ca) _{0.33} (Al,Mg) ₂ (Si ₄ O ₁₀)(OH) ₂ ·nH ₂ O
	Orthoclase.14	(K,Na)AlSi ₃ O ₈
15	Kaolinite.14	Al ₂ Si ₂ O ₅ (OH) ₄
	Goethite.15	FeO(OH)
	Labradorite.15	(Ca,Na)(Al,Si) ₄ O ₈
16	Nonttronite.15	(CaO _{0.5} ,Na) _{0.3} Fe ³⁺ ₂ (Si,Al) ₄ O ₁₀ (OH) ₂ ·nH ₂ O
	Quartz.16A	SiO ₂
	Quartz.16B	SiO ₂
	Quartz.16C	SiO ₂

Supplementary Table 2 (Chapter 4). Significance of mineral-specific absence of OTUs.

OTUs Ids, taxa names, p values, minerals in which OTUs were absent, and average abundances (%) over all minerals with standard deviation (SD). False Discovery Rate (FDR) was 5% ($p \leq 0.05$). *non-significant p value.

OTU ID	Taxon	p value	Absent in mineral	Abundance (%)	SD (%)
231	<i>Methylobacter</i>	$7.0 \cdot 10^{-36}$	Kaolinite	3.2	3.2
42	<i>Desulfobacca</i>	$1.4 \cdot 10^{-6}$ $1.3 \cdot 10^{-9}$	Diopside Kaolinite	0.8	1.3
74558	<i>Rikenella</i>	$6.6 \cdot 10^{-13}$	Goethite	0.6	0.8
36239	<i>Meniscus</i>	$2.8 \cdot 10^{-12}$	Goethite	0.6	0.9
338	<i>Bacteroidetes</i>	$3.4 \cdot 10^{-8}$	Goethite	0.4	0.4
40934	<i>Delftia</i>	$2.9 \cdot 10^{-3}$ $1.4 \cdot 10^{-4}$	Diopside Kaolinite	0.3	0.7
87302	<i>Geobacter</i>	$8.7 \cdot 10^{-3}$	Diopside	0.3	0.7
76213	<i>Desulfurivibrio</i>	$1.1 \cdot 10^{-3}$ $1.1 \cdot 10^{-2}$ $5.5 \cdot 10^{-13}$ $1.3 \cdot 10^{-2}$	Kaolinite Diopside Orthoclase Fluorapatite	0.3	0.7
31805	<i>Acidaminobacter</i>	$2.2 \cdot 10^{-3}$	Kaolinite	0.2	0.3
90753	<i>Sedimentibacter</i>	$4.7 \cdot 10^{-8}$ $4.4 \cdot 10^{-3}$ $5.9 \cdot 10^{-17}$	Orthoclase Kaolinite Magnetite	0.2	1.0
93526	<i>Saccharofermentans</i>	$44 \cdot 10^{-3}$	Kaolinite	0.2	0.3
65194	<i>Bacteroidetes</i>	$5.1 \cdot 10^{-3}$	Kaolinite	0.2	0.3
16	<i>Rhodocyclaceae</i>	$5.3 \cdot 10^{-3}$ $1.0 \cdot 10^{-6}$ $3.7 \cdot 10^{10}$	Kaolinite Labradorite Orthoclase	0.2	0.4
250	<i>OD1 incertae sedis</i>	$4.7 \cdot 10^{-5}$	Goethite	0.2	0.6
41059	<i>Undibacterium</i>	$3.8 \cdot 10^{-2}$ $4.3 \cdot 10^{-2}$ $2.2 \cdot 10^{-87}$	Diopside Fluorapatite Quartz	0.2	0.4
56403	<i>Thiobacillus</i>	$1.1 \cdot 10^{-4}$ $1.5 \cdot 10^{-6}$ $8.4 \cdot 10^{-3}$ $5.4 \cdot 10^{-15}$	Goethite Hematite Kaolinite Magnetite	0.2	1.0
77200	<i>Modestobacter</i>	$5.4 \cdot 10^{-2}$ $8.5 \cdot 10^{-8}$ $1.6 \cdot 10^{-4}$ $5.5 \cdot 10^{-6}$ $6.0 \cdot 10^{-88}$	Fluorapatite Forsterite Goethite Labradorite Quartz	0.2	0.5
15214	<i>Coriobacteriaceae</i>	$5.2 \cdot 10^{-2}$ $1.1 \cdot 10^{-2}$	Diopside Kaolinite	0.2	0.4
66493	<i>Geobacter</i>	$5.4 \cdot 10^{-2}$ $1.2 \cdot 10^{-2}$ * $6.0 \cdot 10^{-2}$ $8.4 \cdot 10^{-6}$	Diopside Kaolinite Fluorapatite Labradorite	0.2	0.3
189	<i>Gordonibacter</i>	$6.8 \cdot 10^{-6}$ $1.4 \cdot 10^{-2}$ $2.1 \cdot 10^{-13}$ $2.4 \cdot 10^{-8}$ $1.3 \cdot 10^{-88}$	Hematite Kaolinite Magnetite Orthoclase Quartz	0.2	0.5
25180	<i>Clostridium</i>	$1.4E^{-2}$ * $6.8 \cdot 10^{-2}$	Kaolinite Fluorapatite	0.2	0.6
46685	<i>Ignavibacterium</i>	* $6.9 \cdot 10^{-2}$ $2.3 \cdot 10^{-5}$	Diopside Labradorite	0.2	0.4
243	<i>Leptotrichia</i>	* $7.2 \cdot 10^{-2}$ $2.7 \cdot 10^{-5}$	Diopside Labradorite	0.2	0.3