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Gewerbegebiet Freiberg Ost - D-09627 - Bobritzsch-Hilbersdorf

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Title : **Test report for order 11931692**
Test report number : **AR-19-FR-031138-01**

Project name : **Analyses of biochar according to EBC**

Number of samples : **1**
Sample type : **biochar**
Date of sample taking : **2019-10-07**
Sample Taker: **Client**

Sample reception date : **2019-10-14**
Sample processing time : **2019-10-14 - 2019-11-08**

The test results refer solely to the analysed test specimen. Unless the sampling was done by our laboratory or in our sub-order the responsibility for the correctness of the sampling is disclaimed. This test report is only valid with signature and may only be further published completely and unchanged. Extracts or changes require the authorisation of the EUROFINS UMWELT in each individual case.

Our General Terms & Conditions of Sale (GTCS) are applicable, as far as no specific agreements do exist. The GTCS are available on <http://www.eurofins.de/umwelt/avb.aspx>.

Accredited test laboratory according to DIN EN ISO/IEC 17025:2005 notification under the DAkkS German Accreditation System for Testing. The laboratory is according (D-PL-14081-01-00) accredited.

Attachments

119128590-1
119128590-2
PNP_11931692_119128590

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Digitally signed 11/8/2019
Sabine Bandemer
Prüfleitung



Parameter	Lab	Accr.	Method	Limit values				Description		Biochar 1/2019	
				GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	Date and time of sample taking		2019-10-07	
								Sample number		119128590	
				LOQ	Unit	ar	db				
Biochar properties											
Bulk density	FR	JE02	DIN 51705: 2001-06						kg/m ³	132	-
specific surface (BET)	SUIB/o		DIN 66137/DIN ISO 9277						m ² /g	-	252 *
true density	SUIB/o		DIN 66137/DIN ISO 9277						g/cm ³	-	1.55
Moisture	FR	JE02	DIN 51718: 2002-06					0.1	% (w/w)	9.8	-
Ash content (550°C)	FR	JE02	DIN 51719: 1997-07					0.1	% (w/w)	5.5	6.1
Hydrogen	FR	JE02	DIN 51732: 2014-07					0.1	% (w/w)	1.9	2.1
Carbon	FR	JE02	DIN 51732: 2014-07		> 50		> 50	0.2	% (w/w)	77.8	86.2
Total nitrogen	FR	JE02	DIN 51732: 2014-07					0.05	% (w/w)	0.40	0.44
Oxygen	FR	JE02	DIN 51733: 2016-04						% (w/w)	6.4	7.1
Total inorganic carbon (TIC)	FR	JE02	DIN 51726: 2004-06					0.1	% (w/w)	0.7	0.7
carbonate-CO2	FR	JE02	DIN 51726: 2004-06					0.4	% (w/w)	2.4	2.7
carbon (organic)	FR	JE02	berechnet						% (w/w)	77.1	85.5
H/C ratio (molar)	FR	JE02	berechnet		< 0.6		< 0.6			0.29	0.29
H/Corg ratio (molar)	FR	JE02	berechnet		< 0.7		< 0.7			0.30	0.30
O/C ratio (molar)	FR	JE02	berechnet		< 0.4		< 0.4			0.062	0.062
Sulphur (S), total	FR	JE02	DIN 51724-3: 2012-07					0.03	% (w/w)	< 0.03	< 0.03
pH in CaCl2	FR		DIN ISO 10390: 2005-12	10		10				7.1	-
Conductivity	FR		BGK III. C2: 2006-09					5	µS/cm	157	-
salt content	FR		BGK III. C2: 2006-09					0.005	g/kg	0.211	0.234
salt content	FR		BGK III. C2: 2006-09					0.005	g/l	0.028	0.031
thermogravimetry TGA 950°C by N-Atm.	FR		TGA 701 D4C							see attachment	-

Parameter	Lab	Accr.	Method	Limit values				Description		Biochar 1/2019	
				GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	Date and time of sample taking	Sample number	ar	db
								LOQ	Unit		
										2019-10-07	119128590

Elements from the micro wave pressure digestion acc. to DIN 22022-1: 2014-07

Arsenic (As)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 13		< 13	0.8	mg/kg	-	< 0.8
Lead (Pb)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 150		< 120	2	mg/kg	-	< 2
Cadmium (Cd)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 1.5		< 1	0.2	mg/kg	-	< 0.2
Copper (Cu)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 100		< 100	1	mg/kg	-	5
Nickel (Ni)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 50		< 30	1	mg/kg	-	4
Mercury (Hg)	FR	JE02	DIN 22022-4: 2001-02		< 1		< 1	0.07	mg/kg	-	< 0.07
Zinc (Zn)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 400		< 400	1	mg/kg	-	15
Chromium (Cr)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 90		< 80	1	mg/kg	-	1
Boron (B)	FR	JE02	DIN EN ISO 17294-2: 2005-02					1	mg/kg	-	15
Manganese (Mn)	FR	JE02	DIN EN ISO 17294-2: 2005-02					1	mg/kg	-	328

Elements fr. the borate digestion of ash 550 °C acc. to DIN 51729-11: 1998-11

Phosphorus as P2O5	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0.1	% (w/w)	-	1.5
Magnesium as MgO	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0.1	% (w/w)	-	3.3
Calcium as Calciumoxid	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0.1	% (w/w)	-	37.0
Potassium as K2O	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0.1	% (w/w)	-	8.8
Sodium as Na2O	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0.1	% (w/w)	-	1.3
Iron as Fe2O3	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0.1	% (w/w)	-	0.5
Silicon as SiO2	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0.1	% (w/w)	-	6.8
sulphur as SO3	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0.1	% (w/w)	-	16.2

Parameter	Lab	Accr.	Method	Limit values				Description		Biochar 1/2019	
				GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit	ar	db
Elements fr. the borate digestion of ash 550°C acc. to DIN 51729-11:1998-11 (OS)								Date and time of sample taking	2019-10-07		
								Sample number	119128590		
Calcium (Ca)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					% (w/w)	-	1.6	
Iron (Fe)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					% (w/w)	-	0.0	
Potassium (K)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					% (w/w)	-	0.4	
Magnesium (Mg)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					% (w/w)	-	0.1	
Sodium (Na)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					% (w/w)	-	0.1	
Phosphorus	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					% (w/w)	-	0.0	
Sulphur (S)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					% (w/w)	-	0.4	
Silicon (Si)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					% (w/w)	-	0.2	

Parameter	Lab	Accr.	Method	Limit values				Description		Biochar 1/2019	
				GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	Date and time of sample taking		2019-10-07	
				LOQ	Unit	Sample number		119128590		ar	db
Elements from toluene extraction											
Naphthalene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	12
Acenaphthylene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	< 0.1
Acenaphthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	< 0.1
Fluorene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	0.3
Phenanthrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	2.3
Anthracene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	0.4
Fluoranthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	0.4
Pyrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	0.4
Benz(a)anthracene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	0.2
Chrysene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	0.1
Benzo(b)fluoranthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	< 0.1
Benzo(k)fluoranthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	< 0.1
Benzo(a)pyrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	< 0.1
Indeno(1,2,3-cd)pyrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	< 0.1
Dibenz(a,h)anthracene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	< 0.1
Benzo(g,h,i)perylene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	< 0.1
Total 16 EPA-PAH excl. LOQ	FR	JE02	DIN EN 16181:2019-08		< 12		< 4		mg/kg	-	16.1

Explanations

LOQ - Limit of quantification

ar - as received

db - dry basis

Lab - Abbreviation of the performing laboratory

Accr. - Abbreviation of the accreditation of the performing laboratory

* Comment on parameter 'specific surface (BET)': negative C-values, BET too low

The C-value is a qualitative measure for the pore volume distribution. A negative C-value is an indication for a high portion of micropores, whose surface can only be measured insufficiently with the method chosen.

The parameters identified by FR have been performed by the laboratory Eurofins Umwelt Ost GmbH (Bobritzsch-Hilbersdorf). The accreditation code JE02 identifies the parameters accredited according to DIN EN ISO/IEC 17025:2005 D-PL-14081-01-00 .

The parameters identified by SUIB have been performed by the laboratory TU Bergakademie Freiberg (IEC) (Freiberg).

/o - The analysis has been outsourced.

Explanations regarding Limits

Analysis performed according to guidelines for sustainable production of biochar of the european biochar certificate.

GW 1: basic quality grade (referred to dry basis)

GW 2: premium quality grade (referred to dry basis)

Ho,V / Hu,p: complies calorific value at constant volume or pressure

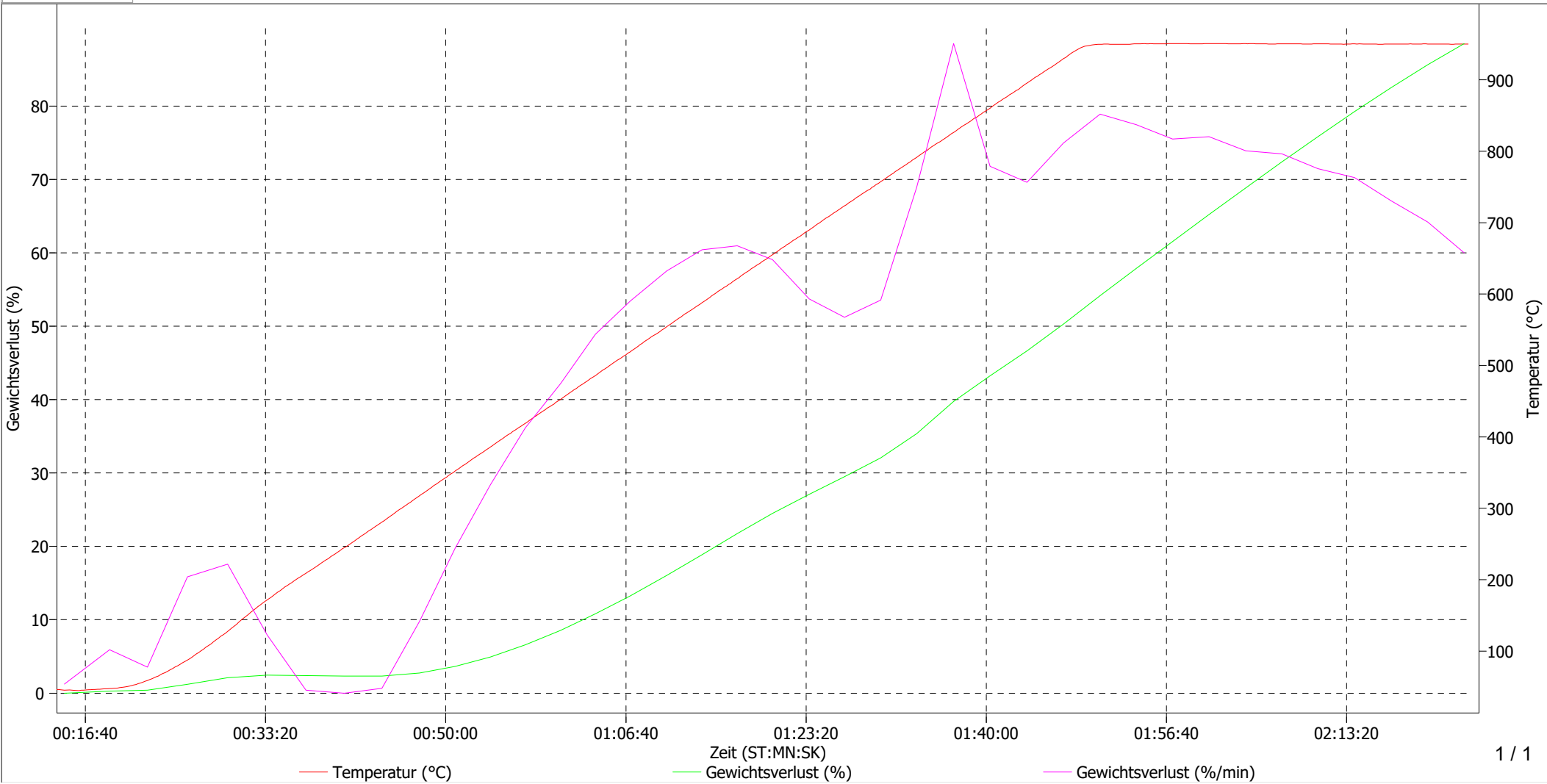
EUROFINS UMWELT assumes no responsibility for the legal liability of the cited limits.

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Name	Position	Kommentar	Ausgangsgewicht	Methode	Wasser	Wasser 135e	Asche 500e	Asche 550e	Asche 775e	Asche 815e	Asche 950	TGA 950	Feuchte	W 110	Datum der Analyse	Asche 975	GV 550	(wf) GV 550	GV 950	Asche 810
14	17	a5fw	0.6016	TGA 950 N (Pflanz								88.54			10/25/11:52:AM					

TGA 950
88.54



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Name	Position	Kommentar	Ausgangsgewicht	Methode	Wasser	Wasser 135e	Asche 500e	Asche 550e	Asche 775e	Asche 815e	Asche 950	TGA 950	Feuchte	W 110	Datum der Analyse	Asche 975	GV 550 (wf)	GV 950	Asche 810	
16	19	a5fw	0.5252	TGA 950 N (Pflanz								89.28			10/25/11:52:AM					

TGA 950
89.28

