Explanation of application of carpet fibres as Equestrian bottom/ground stabilizer Sortas Recycling

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1 Introduction

Sortas Recycling is a collection point and processor of various residual flows from the industrial sector. One of the residual flows that it collects is carpet fibres (see figure 1). A processing line is being developed at the location at 9 Griend in Urk to make new products from these carpet fibres. Sortas is working on carpet recycling together with Van Dijk Recycling Genemuiden.

1.1 Process description

Van Dijk BV annually collects 2,500 tons of carpet residues that arise during the production of carpets (post-industrial waste), including the cutting process. Van Dijk transfers the carpet remnants to Sortas. After ingestion, the residues are at the desired brought quality through mechanical machining processes. First of all, the carpet residues are in size reduced (to max. 100 mm) by means of a shredder. The coarsely reduced carpet residues are then stripped of chalk residues and fine dust by means of a sieving process. Finally, the carpet residues are further reduced to the desired 'fibre' dimensions (40 mm). Such processing steps are of common industrial practice, where nothing is added and no change takes place in the nature and composition of the material. Below figure shows the carpet fibre production process.

Figure 1-2 Production process of carpet fibre from carpet residues

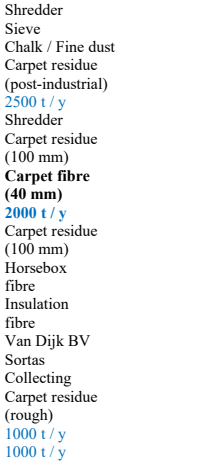

Figure 1-1 Carpet fibre (baled)

1.2 Scope

Sortas Recycling can produce carpet fibres to specification, and thus sell them as a component for the stabilization of horse box bottoms. The fibres are brought to specification by sorting them by size and color. For the application as a stabilizer for horse box floors, the carpet fibre is then mixed with sand to specification, which is usually used as the main ingredient in horse box floor, in order to improve the structure of the to create a horse box. Carpet fibre is already widely used for such applications [1] . The softening effect of the carpet fibre provides more resilience and a higher shock absorption of the floor. Next the improved riding experience for the horse, the carpet fibre also retains more moisture, resulting in more cohesion with the sand and less dust will be formed. Sortas has come to an end of waste status for this application of the carpet fibres requested. The document used as a pad for this has document number 1958600-RAP-0001-01.

1.3 Purpose

The purpose of this document is to provide an explanation of the results from analyzes of the carpet fibres, in order to provide an answer
to be able to indicate whether these can be used without endangering humans and the environment as
horse bucket stabilizer. This is further explained in the next chapter.

[1] There are already several parties that sell this material, see for example:
https://tapijtvezels.nl/
https://www.polyvlokken.com/tapijtvezels/
https://www.zandcompleet.nl/paardenbak/tapijtvezels/
https://www.horseequipment.nl/c-1667430/manegebodem/

2 Assessment framework

2.1 Definitions

In order to properly explain the analysis results, it is necessary to first establish a number of definitions, te
start with the definition of a building material. In the Soil Quality Decree, a building material is defined as follows:
" *Material in which the total contents of silicon, calcium or aluminium together exceed 10% by weight of that material, with the exception of flat glass, metallic aluminium, earth or dredged material, which is intended to be applied "*
Carpet fibres are made of synthetic material. This mainly consists of plastic and does not contain silicon, calcium
or aluminium. The carpet fibres themselves are therefore not regarded as building materials and therefore the soil quality decision is not in principle
applicable. However, in the case of the use as a stabilizer for horse box bottoms, the fibres are met
sand mixed, which may well be a building material. There are two options for this sand: This is either a building material,
either ground. For this it is necessary to first establish the definition of land, which reads as follows:
"Soil is a solid material that consists of mineral parts with a maximum grain size of 2 mm and organic matter in it a ratio and with a structure such as are naturally found in the soil, as well as naturally in the shells and gravel occurring at the bottom with a grain size of 2 to 63 millimetres, with the exception of dredged material. "
Sand from sand extraction thus falls underground. However, sand that has been brought to specification differs from
the natural composition as it occurs in the soil and is therefore a building material. For the top layer of
horse pit bottoms (in which carpet fibres are added as stabilization) sand is usually used
has been brought to specification for this, and therefore falls under the building materials.
Although there is no unambiguous assessment framework for the application of carpet fibres as a horsebox stabilizer, it is true that the application of the carpet fibres is very similar to that of broadcast rubber and / or rubber used in sports technology
low on synthetic turf pitches. For these applications, a duty of care document [2] has been drawn up by the Sport Association
and Cultural Engineering (BSNC). It describes the following:
"There are specific requirements for soil protection for the application of stony building materials on or in the soil and surface water elaborated in the Soil Quality Decree (Bbk). In addition, the general duty of care provisions apply (Article 1.1 Environmental Management Act, Article 13 Wbb and Article 7 Bbk), which are intended as a safety net for situations in which the Decree
soil quality does not apply. In this context, the duty of care means that everyone knows or reasonably could have suspected that by performing actions on or in the soil, the soil, soil and / or surface water can be polluted or affected, it is obliged to take all measures he can are required. "
Although the assessment framework is not unambiguous, there is a duty of care to protect the soil and the soil.
and / or surface water. It is therefore assumed that the mixture of sand and carpet fibres is considered a building material, since the sand used does count as a building material and only a small percentage of carpet fibres are mixed in.

[2] Duty of care document for the environment of synthetic turf pitches, drawn up by the Sport and Cultuurtechniek sector association, January 2020, ISDN: 9789087850135

2.2 Type of building material

Within the Soil Quality [3] Regulation , a distinction is made between three types of building materials:
- Shaped building materials
- Unframed building materials without IBC measures
- Non-moulded building materials with IBC measures, the IBC building materials [4]

A horse box floor is made up of two layers: a draining bottom layer and a stabilizing top layer. This is
schematically shown in Figure 2-1. If this system is compared with infill rubber on synthetic turf pitches, applies
the draining bottom layer as an IBC measure (this is described in the duty of care document). This means that the
top layer, which consists of a mixture of sand and carpet fibres, so can be regarded as IBC building material. This is important for comparing the maximum permitted emission values, since the requirements for IBC building materials are more flexible
are then those of non-moulded building materials. To be sure, we also looked at the maximum allowed
values for non-moulded building materials, to check whether these requirements could also be met,

in the event that the bottom layer would not be sufficient to qualify the top layer as an IBC building material. For both types of building materials, the maximum permitted values are included in Appendix A of the Soil Quality Regulation. The Tables with maximum permitted values of various constituents from this Annex are included in ANNEX A .

Figure 2-1 Construction of the horse box floor

[3] Regulation of 13 December 2007, no. DJZ2007124397, taken from: https://wetten.overheid.nl/BWBR0023085/2020-06-09

[4] IBC building materials are non-moulded building materials that may only be used with insulation, management and control (IBC) measures, because applying without these measures would otherwise lead to too many emissions to the environment.

3 Analysis results for carpet fibres

The carpet fibres have been analysed in an ISO 17025 accredited laboratory for all components for which a maximum value applies in the soil quality regulation, except for asbestos. The carpet fibres come from post-industrial cutting waste from new carpets. This means that the fibres come entirely from new cutting waste produced carpets and therefore have not previously been used by consumers. Since asbestos has not been since 1993 may be used in new products, this will not be present in the carpet fibres. The analysis results such as they are obtained from the laboratory can be found in APPENDIX B.

3.1 Comparison with maximum permitted emission values

A leaching test was carried out by the laboratory to determine the emission values of the carpet fibres. This means that the carpet fibres are exposed to water for a certain period of time (for example, to the influence of rainwater), after which the used water (also called eluate) is analysed for a large quantity number of substances. This can be used to determine whether, for example, heavy metals leach (wash out) from the carpet fibres and themselves can spread in the soil. The analysis values for the emission of the carpet fibres have been compared with the maximum permitted values for both IBC building materials and non-moulded building materials from appendix A of the regulation soil quality. The values from the soil quality regulation have a different unit from the analysis values determined by the laboratory. In order to properly compare these units, the analysis values must be extracted from the laboratory must therefore be converted to the correct unit. For this purpose, the data from the laboratory of the weight used for leaching (100 g) and the determined dry matter content (99.8 mass%). The conversion of the values in mg / litre of eluate to mg / kg of dry matter was done by first calculating back to mg / gram dry matter and then to mg / kg dry matter.

This comparison of the determined values and the maximum allowed values is shown in Table 3-1. It can be seen in this that the leaching of all analysed components into the carpet fibre is very low and always well below the maximum the permitted value lies from the soil quality regulation, for both IBC building materials and non-moulded building materials.

Table 3-1 Comparison of analysis results with maximum permitted values for IBC building materials from appendix A regulation soil quality

3.2 Comparison with maximum permitted values of organic parameters

Besides the fact that there are maximum permitted values for the emissions of building materials, there are also maximum permitted values values for the composition of building materials in the field of organic substances. These are the same for all building materials. These substances have therefore also been analysed. It must be kept in mind that the carpet fibres are not in themselves a building material, but the mixture of carpet fibres and sand is. In Table 3-2 are therefore suitable for each parameter always contains three values:

- The analysis value, as determined by the laboratory (of the carpet fibres only);
- A calculated value, which takes into account the total top layer of carpet fibres and sand;
- The maximum permitted value from Appendix A of the Soil Quality Regulation.

The analysis value has been determined on the carpet fibre without sand. For this, it is first determined in the laboratory what the dry matter content (the weight of the sample without water), and then the content of all different parameters, expressed in mg per kg dry matter. These analysis values therefore only apply to the carpet fibres itself and not on the top layer as a whole. Only part of the top layer consists of carpet fibres. This applies to this a maximum of 7 kg of carpet fibres per square meter of horse box is added. These are mixed with a layer from 7 to 10 cm of sand. In the most conservative case, 7 kg of carpet fibres will be mixed in a top layer of 7 cm of sand turn into. The density of dry sand is about 1500 kg / m^3 . The top layer of sand (7 cm) then weighs 100 kg / m^2 and contains 7 kg / m^2 carpet fibres. The percentage of carpet fibres in this top layer of soil is therefore 7%. The calculated value therefore assumes 7% carpet fibres. In addition, clean sand has been assumed, so sand without organic contaminants.

Chlorine
8.6 mg / l
86 mg / kg ds
8,800 mg / kg ds

616 mg / kg ds
Fluorine
0.33 mg / l
3.3 mg / kg ds
1,500 mg / kg ds
55 mg / kg ds
Bromine
0.25 mg / l
2.5 mg / kg ds
34 mg / kg ds
20 mg / kg ds
Sulphate
3 mg / l
30 mg / kg ds
20,000 mg / kg ds
2,430 mg / kg ds
Lead (Pb)
0.014 mg / l
0.14 mg / kg ds
8.30 mg / kg ds
2.30 mg / kg ds
Arsenic (As)
0.0015 mg / l
0.015 mg / kg ds
0.90 mg / kg ds
0.90 mg / kg ds
Cadmium (Cd)
<0.0003 mg / l
<0.003 mg / kg ds
0.06 mg / kg ds
0.04 mg / kg ds
Chrome (Cr)
<
0.001 mg / l
<
0.01 mg / kg ds
7 mg / kg ds
1 mg / kg ds
Copper (Cu)
0.012 mg / l
0.12 mg / kg ds
10 mg / kg ds
1 mg / kg ds
Nickel (Ni)
0.004 mg / l
0.04 mg / kg ds
2.10 mg / kg ds
0.44 mg / kg ds
Mercury (Hg)
<
0.002 mg / l
<
0.02 mg / kg ds
0.08 mg / kg ds
0.02 mg / kg ds
Antimony (Sb)
0.015 mg / l
0.15 mg / kg ds
0.70 mg / kg ds
0.32 mg / kg ds
Cobalt (Co)
0.0015 mg / l
0.015 mg / kg ds
2.40 mg / kg ds
0.54 mg / kg ds
Vanadium (V)
0.0016 mg / l
0.016 mg / kg ds
20 mg / kg ds
2 mg / kg ds
Barium (Ba)
0.0081 mg / l
0.081 mg / kg ds
100 mg / kg ds
22 mg / kg ds
Molybdenum (Mo)
<
0.001 mg / l
<
0.01 mg / kg ds
15 mg / kg ds
1 mg / kg ds
Selenium (Se)
<
0.002 mg / l
<

0.02 mg / kg ds
3 mg / kg ds
1 mg / kg ds
Zinc (Zn)
0.11 mg / l
1.1 mg / kg ds
14 mg / kg ds
5 mg / kg ds
Parameter
Maximum permitted values Appendix A
Analysis values
Calculated value
IBC building materials
Unshaped

For almost all values, the analysis value is already below the maximum permitted value from appendix A of the soil quality regulation. Since the calculated value is lower than this, it is also well below the maximum allowed value. The analysis value is only slightly above the maximum permissible value for the mineral oil share value. This is not illogical, because the maximum permissible values assume a stony building material, while the carpet fibres consist of synthetic material. However, if one looks at the top layer as a whole (and therefore starts from the calculated value) the maximum permitted value can be easily met.

Table 3-2 Comparison of analysis results with maximum permitted values for non-moulded building materials from the appendix A soil quality regulation

Sum PCBs
<0.007 mg / kg DM
<0.0005 mg / kg DM
0.50 mg / kg DM
Naphthalene
<0.050 mg / kg DM
<0.0035 mg / kg DM
5 mg / kg DM
Acenaphthylene
<0.050 mg / kg DM
<0.0035 mg / kg DM
-
Acenaphthene
<0.050 mg / kg DM
<0.0035 mg / kg DM
-
Fluorene
<0.050 mg / kg DM
<0.0035 mg / kg DM
-
Phenanthrene
<0.050 mg / kg DM
<0.0035 mg / kg DM
20 mg / kg DM
Anthracene
<0.050 mg / kg DM
<0.0035 mg / kg DM
10 mg / kg DM
Fluoranthene
<0.050 mg / kg DM
<0.0035 mg / kg DM
35 mg / kg DM
Pyrene
<0.050 mg / kg DM
<0.0035 mg / kg DM
-
Benzo (a) anthracene
<0.050 mg / kg DM
<0.0035 mg / kg DM
40 mg / kg DM
Chrysene
<0.050 mg / kg DM
<0.0035 mg / kg DM
10 mg / kg DM
Benzo (b) + (k) fluoranthene
<0.050 mg / kg DM
<0.0035 mg / kg DM
40 mg / kg DM
Benzo (a) pyrene
<0.050 mg / kg DM
<0.0035 mg / kg DM
10 mg / kg DM
Dibenz (ah) anthracene
<0.050 mg / kg DM
<0.0035 mg / kg DM

-
Indeno (1,2,3-cd) pyrene
<0.050 mg / kg DM
<0.0035 mg / kg DM
40 mg / kg DM
Benzo (g, h, i) perylene
<0.050 mg / kg DM
<0.0035 mg / kg DM
40 mg / kg DM
Mineral oil (C10-C40)
760 mg / kg DM
53.20 mg / kg DM
500 mg / kg DM
Sum of PAHs
mg / kg DM
mg / kg DM
50 mg / kg DM
Benzene
<0.050 mg / kg DM
<0.0035 mg / kg DM
1 mg / kg DM
Toluene
<0.050 mg / kg DM
<0.0035 mg / kg DM
1.25 mg / kg DM
Ethylbenzene
<0.050 mg / kg DM
<0.0035 mg / kg DM
1.25 mg / kg DM
m- / p-Xylene
<0.050 mg / kg DM
<0.0035 mg / kg DM
-
o-Xylene
<0.050 mg / kg DM
<0.0035 mg / kg DM
-
Sum xylenes
<0.100 mg / kg DM
<0.0070 mg / kg DM
1.25 mg / kg DM
not measurable*
not measurable*
* All PAHs are not demonstrably present in the sample. This means that they are not in it, or very minimally
(so that they are below the detection limit). The sum of the PAHs cannot be determined with this, but is certainly below the maximum
allowed value.
Parameter
Calculated value
Max. permitted values Appendix A
Analysis values
Carpet fibres
Carpet fibres + sand
Assessment framework

4 Conclusion and recommendations

4.1 Conclusion

For the application of carpet fibres as stabilization in horse box floors, it applies that they can be used safely without dangers for humans and the environment. However, when the horse box loses its function, the top layer is true the mixture of sand and carpet fibres is contained in it, cannot simply be used elsewhere. In the decision soil quality, it is stated that the quality of each batch of building materials must be determined and the batch provided must be of an environmental hygiene declaration on which the quality is indicated. Even if it were to be reused as a top layer in another horse box, this is no exception for the environmental hygiene statement. For every operation (eg removing the carpet fibres from the sand) is also no exception for the environmental protection statement. This is also included in the duty of care document for synthetic turf pitches.

4.2 Recommendation

Although the composition of the carpet fibres does not cause any problems, there is a duty of care to prevent this the fibres spread in the environment. Ingenia recommends that additional processing (how should the carpet fibres are safely processed during the construction of the tray) and application requirements (how can the fibres spread in the environment), in the case of use in a horse box. These would can be comparable with the regulations to prevent the spread of broadcast rubber, as included in section 4.4 of the duty of care document on synthetic turf pitches.

Attachments

APPENDIX A Tables from Appendix A Soil Quality Regulation

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APPENDIX B Analysis results from laboratory (GBA)

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Test Report No .: 2020P225392 / 1

Date of Arrival	27.07.2020
Taking of samples	durch den Auftraggeber
Sample Name	001
Start / End of analyses	27.07.2020 - 18.08.2020
Order / Sample-No.	20208580
/	Carpet Fibres Sortas
Material	Feststoff

Appearance		
appeared		
Fabric		
Color		
mehrfarbig		
Sample amount		
4.78		
kg		
Sample preparation		

manuell,
Reißmühle
DIN ISO 11464: 2006-12ª Ç
Dry weight
99.8
W.-%
DIN EN 15414-3: 2011-05ª Ç
Digestion (Calorimetry)
von TR, director
Bodensatz /
clear
DIN EN 15408: 2011-05ª ÇÇ
Chlorine, total
<1000
mg / kg DW
DIN EN 15408: 2011-05 / DIN EN ISO 10304-1: 2009-07ª ÇÇ
Fluorine, total
11
mg / kg DW
DIN EN 15408: 2011-05 / DIN EN ISO 10304-1: 2009-07ª ÇÇ
Bromine, total
<10
mg / kg DW
DIN EN 15408: 2011-05 / DIN EN ISO 10304-1: 2009-07ª ÇÇ
Sulfur, total
401
mg / kg DW
DIN EN 15408: 2011-05 / DIN EN ISO 10304-1: 2009-07ª ÇÇ
Digestion with HNOÈ
DIN EN ISO 15587-2: 2002-07ª Ê
Lead (Pb)
12
mg / kg DW DIN EN 16171: 2017-01ª Ê
Arsenic (As)
<1.0
mg / kg DW DIN EN 16171: 2017-01ª Ê
Cadmium (Cd)
0.12
mg / kg DW DIN EN 16171: 2017-01ª Ê
Chromium, total (Cr)
8.3
mg / kg DW DIN EN 16171: 2017-01ª Ê
Copper (Cu)
11
mg / kg DW DIN EN 16171: 2017-01ª Ê
Nickel (Ni)
3.9
mg / kg DW DIN EN 16171: 2017-01ª Ê
Mercury (Hg)
<0.10
mg / kg DW DIN EN 16171: 2017-01ª Ê
Antimony (Sb)
28
mg / kg DW DIN EN 16171: 2017-01ª Ê
Parameter
Result
Unit
Methods

Mercury (Hg)

<0.10
mg / kg DW DIN EN 16171: 2017-01ª Ê
Antimony (Sb)
28
mg / kg DW DIN EN 16171: 2017-01ª Ê
Cobalt (Co)
<1.0
mg / kg DW DIN EN 16171: 2017-01ª Ê
Vanadium (V)
<1.0
mg / kg DW DIN EN 16171: 2017-01ª Ê
Barium (Ba)
14
mg / kg DW DIN EN 16171: 2017-01ª Ê
Molybdenum (Mo)
<1.0
mg / kg DW DIN EN 16171: 2017-01ª Ê
Selenium (Se)
<2.0
mg / kg DW DIN EN 16171: 2017-01ª Ê
Zinc (Zn)
26
mg / kg DW DIN EN 16171: 2017-01ª Ê
PCB 28
<0.0010
mg / kg DW DIN EN 15308: 2016-12ª Ç
PCB 52
<0.0010
mg / kg DW DIN EN 15308: 2016-12ª Ç
PCB 101
<0.0010
mg / kg DW DIN EN 15308: 2016-12ª Ç
PCB 118
<0.0010
mg / kg DW DIN EN 15308: 2016-12ª Ç
PCB 138
<0.0010
mg / kg DW DIN EN 15308: 2016-12ª Ç
PCB 153
<0.0010
mg / kg DW DIN EN 15308: 2016-12ª Ç
PCB 180
<0.0010
mg / kg DW DIN EN 15308: 2016-12ª Ç
PCB Sum 7 Congeners
nn
mg / kg DW DIN EN 15308: 2016-12ª Ç
Dry weight
99.8
W.-%
DIN ISO 11465: 1996-12ª Ç
Naphthalene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Acenaphthylene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Acenaphthene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Fluorene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Phenanthrene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Anthracene

<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Fluoranthene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Pyrene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Benz (a) anthracene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Chrysene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Benzo (b) + (k) fluoranthene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Benzo (a) pyrene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Dibenz (ah) anthracene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Indeno (1,2,3-cd) pyrene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Benzo (g, h, i) perylene
<0.050
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Sum PAH (EPA)
nn
mg / kg DW DIN ISO 18287: 2006-05ª Ç
Mineraloil hydrocarbons (C10-C40)
760
mg / kg DW
DIN EN 14039: 2005-01 iVm LAGA
KW / 04: 2009-12ª Ç
mobile part up to C22
86
mg / kg DW DIN EN ISO 16703: 2011-09ª Ç
Dry weight
99.8
W.-%
DIN ISO 11465: 1996-12ª Ç
Dry weight
99.8
W.-%
DIN EN 14346: 2007-03ª Ç
Benzene
<0.050
mg / kg DW DIN EN ISO 22155: 2016-07ª Ç
Toluene
<0.050
mg / kg DW DIN EN ISO 22155: 2016-07ª Ç
Ethylbenzene
<0.050
mg / kg DW DIN EN ISO 22155: 2016-07ª Ç
m- / p-Xylene
<0.050
mg / kg DW DIN EN ISO 22155: 2016-07ª Ç
o-Xylene
<0.050
mg / kg DW DIN EN ISO 22155: 2016-07ª Ç
Sum BTEX
nn
mg / kg DW calculated Ç
Styrene

<0.050
mg / kg DW DIN EN ISO 22155: 2016-07ª Ç
Cumene
<0.050
mg / kg DW DIN EN ISO 22155: 2016-07ª Ç
Benzene
0.14
µg / L
DIN 38407-9 (F9): 1991-05ª
Appearance
appeared
Parameter
Result
Unit
Methods

Cumene
<0.050
mg / kg DW DIN EN ISO 22155: 2016-07ª Ç
Benzene
0.14
µg / L
DIN 38407-9 (F9): 1991-05ª
Toluene
6.6
µg / L
DIN 38407-9 (F9): 1991-05ª
Ethylbenzene
<0.10
µg / L
DIN 38407-9 (F9): 1991-05ª
m- / p-Xylene
<0.10
µg / L
DIN 38407-9 (F9): 1991-05ª
o-Xylene
<0.10
µg / L
DIN 38407-9 (F9): 1991-05ª
Sum BTEX
6.74
µg / L
calculated Ç
mass for elution
100
g
DIN EN 12457-4: 2003-01ª Ç
volume for elution
1000
mL
DIN EN 12457-4: 2003-01ª Ç
volume or filtrate
970
mL
DIN EN 12457-4: 2003-01ª Ç
pH
8.1
DIN EN ISO 10523: 2012-04ª Ç
Conductivity
251
µS / cm
DIN EN 27888: 1993-11ª Ç
Naphthalene
0.030

µg / L
DIN 38407-39: 2011-09ª Ç
Acenaphthylene
<0.010
µg / L
DIN 38407-39: 2011-09ª Ç
Acenaphthene
0.018
µg / L
DIN 38407-39: 2011-09ª Ç
Fluorene
0.011
µg / L
DIN 38407-39: 2011-09ª Ç
Phenanthrene
0.085
µg / L
DIN 38407-39: 2011-09ª Ç
Anthracene
0.018
µg / L
DIN 38407-39: 2011-09ª Ç
Fluoranthene
0.093
µg / L
DIN 38407-39: 2011-09ª Ç
Pyrene
0.062
µg / L
DIN 38407-39: 2011-09ª Ç
Benz (a) anthracene
0.014
µg / L
DIN 38407-39: 2011-09ª Ç
Chrysene
0.016
µg / L
DIN 38407-39: 2011-09ª Ç
Benzo (b) + (k) fluoranthene
0.017
µg / L
DIN 38407-39: 2011-09ª Ç
Benzo (a) pyrene
<0.010
µg / L
DIN 38407-39: 2011-09ª Ç
Dibenz (ah) anthracene
0.016
µg / L
DIN 38407-39: 2011-09ª Ç
Indeno (1,2,3-cd) pyrene
<0.010
µg / L
DIN 38407-39: 2011-09ª Ç
Benzo (g, h, i) perylene
<0.010
µg / L
DIN 38407-39: 2011-09ª Ç
Sum PAH (EPA)
0.38
µg / L
calculated Ç
PCB 28
<0.010
µg / L
DIN EN ISO 6468: 1997-02ª Ç
PCB 52

<0.010
µg / L
DIN EN ISO 6468: 1997-02ª Ç
PCB 101
<0.010
µg / L
DIN EN ISO 6468: 1997-02ª Ç
PCB 153
<0.010
µg / L
DIN EN ISO 6468: 1997-02ª Ç
PCB 138
<0.010
µg / L
DIN EN ISO 6468: 1997-02ª Ç
PCB 180
<0.010
µg / L
DIN EN ISO 6468: 1997-02ª Ç
Sum PCB
nn
µg / L
calculated Ç
Mineraloil hydrocarbons (C10-C40)
0.96
mg / L
DIN EN ISO 9377-2 (H53): 2001-07ª Ç
Bromide
0.25
mg / L
DIN EN ISO 10304-1: 2009-07ª ÇÇ
Chloride
8.6
mg / L
DIN EN ISO 10304-1: 2009-07ª ÇÇ
Fluoride
0.33
mg / L
DIN EN ISO 10304-1: 2009-07ª ÇÇ
Sulfate
39
mg / L
DIN EN ISO 10304-1: 2009-07ª ÇÇ
Arsenic (As)
0.0015
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Antimony (Sb)
0.015
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Barium (Ba)
0.0081
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Lead (Pb)
0.014
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Cadmium (Cd)
<0.00030
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Chromium, total (Cr)
<0.0010
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê

Copper (Cu)
0.012
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Appearance
appeared
Parameter
Result
Unit
Methods

Gelsenkirchen, 18.08.2020
i. A. Jan-Niklas Franzen
Projektbearbeitung
Chromium, total (Cr)
<0.0010
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Copper (Cu)
0.012
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Molybdenum (Mo)
<0.0010
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Nickel (Ni)
0.0040
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Mercury (Hg)
<0.00020
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Selenium (Se)
<0.0020
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Zinc (Zn)
0.11
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Cobalt (Co)
0.0015
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
Vanadium (V)
0.0016
mg / L
DIN EN ISO 17294-2: 2017-01ª Ê
appearance
clear
Color
farblos
DIN EN ISO 7887: 2012-04ª Ç
Appearance
appeared
Parameter
Result
Unit
Methods