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**Customer:**

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Order dated 2017-01-23

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mas-project No.: 17 0130

**Testing:** Analysis of two plastic material samples for selected Polycyclic Aromatic Hydrocarbons (**18 GS-PAHs according to AfPS GS 2014:01 PAH specification**)

**Sample designation:**

| Customer's sample designation | Sample matrix | Appearance | mas sample-number |
|---|---|---|---|
| **PRO-gran sample A** | plastic material | 3 pieces of green plastic material | 17 0130 001 |
| **PRO-gran sample B** | plastic material | 1 piece of green plastic material | 17 0130 002 |

**Date of order:** January 23rd, 2017

**Sample arrival:** January 26th, 2017

**Sampling:** The samples were sent to mas gmbh by the client via a commercial carrier.

**Start of testing** January 27th, 2017 **End of testing:** January 31st, 2017

**Test method:** Test method according to the GS-Mark specification AfPS GS 2014:01 PAK (former ZEK 01.4-08). The basic steps of the analysis can be summarized as follows:

- cutting of the sample material into small pieces
- addition of 3 deuterated PAHs as internal standards to an aliquot of the cut sample material
- ultrasonic extraction of the aliquot with Toluene for 1 h at 60°C
- clean-up of the extract

- addition of a further deuterated PAH as recovery standard
- HRGC/LRMS analysis
- quantification via the three internal deuterated PAH standards (isotope dilution and internal standard method)

**Remarks:** The PAH-results can be seen from the Tables 01 and 02. All data refer to the original sample material as delivered.

**Comments:** An assessment of the analysis results is not matter of this report but is reserved to the customer.

Münster, January 31st, 2017

Dr. Stephan Hamm
(Chemist / Head of Project)

Dr. Armin Maulshagen
(Chemist / Head of R & D)

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**Tab. 01: Results of the analysis of a plastic material sample for the 18 GS-PAHs according to AfPS GS 2014:01 PAH specification;**
Results refer to the original sample material as delivered

| **Customer's sample designation** | | **PRO-gran sample A** | | |
|---|---|---|---|---|
| Sample matrix | | plastic material | | |
| mas sample-number | | 17 0130 001 | | |
| **PAH compound** | **Unit** | **Concentration** | **LOQ** | **Test method** |
| Naphthalene | mg/kg | **nd** | 0,30 | AfPS GS 2014:01 |
| Acenaphthylene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Acenaphthene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Fluorene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Phenanthrene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Anthracene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Fluoranthene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Pyrene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(a)anthracene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Chrysene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(b)fluoranthene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(j)fluoranthene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(k)fluoranthene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(e)pyrene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| **Benzo(a)pyrene**** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Dibenzo(a,h/a,c)anthracene[a,**] | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(ghi)perylene | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Indeno(1,2,3-cd)pyrene | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| **Subtotal of 7 PAHs*,[b]** | mg/kg | **nc** | 0,70 | AfPS GS 2014:01 |
| **Total of the 18 GS-PAHs[b]** | mg/kg | **nc** | 2,00 | AfPS GS 2014:01 |

| | |
|---|---|
| ** | 8 PAH compounds specified by Commission Regulation (EU) No 1272/2013, amending Annex XVII to regulation (EC) No 1907/2006 on REACH |
| nd | PAH compound not detected at levels above the indicated limit of quantification (LOQ) |
| nc | Subtotal or total not calculated since none of the PAH compounds specified was detected at levels above the LOQ |
| a | co-eluting PAHs |
| b | not detected GS-PAHs were not included in the calculation of the total |

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**Tab. 02: Results of the analysis of a plastic material sample for the 18 GS-PAHs according to AfPS GS 2014:01 PAH specification;**
Results refer to the original sample material as delivered

| **Customer's sample designation** | | **PRO-gran sample B** | | |
|---|---|---|---|---|
| Sample matrix | | plastic material | | |
| mas sample-number | | 17 0130 002 | | |
| **PAH compound** | **Unit** | **Concentration** | **LOQ** | **Test method** |
| Naphthalene | mg/kg | **nd** | 0,30 | AfPS GS 2014:01 |
| Acenaphthylene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Acenaphthene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Fluorene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Phenanthrene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Anthracene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Fluoranthene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Pyrene* | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(a)anthracene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Chrysene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(b)fluoranthene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(j)fluoranthene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(k)fluoranthene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(e)pyrene** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| **Benzo(a)pyrene**** | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Dibenzo(a,h/a,c)anthracene[a,**] | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Benzo(ghi)perylene | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| Indeno(1,2,3-cd)pyrene | mg/kg | **nd** | 0,10 | AfPS GS 2014:01 |
| **Subtotal of 7 PAHs*,[b]** | mg/kg | **nc** | 0,70 | AfPS GS 2014:01 |
| **Total of the 18 GS-PAHs[b]** | mg/kg | **nc** | 2,00 | AfPS GS 2014:01 |

** 8 PAH compounds specified by Commission Regulation (EU) No 1272/2013, amending Annex XVII to regulation (EC) No 1907/2006 on REACH

nd PAH compound not detected at levels above the indicated limit of quantification (LOQ)

nc Subtotal or total not calculated since none of the PAH compounds specified was detected at levels above the LOQ

a co-eluting PAHs

b not detected GS-PAHs were not included in the calculation of the total