

## Analysis report for the residue analysis AESUB blue

### Samples

The following samples were obtained for analysis:

Scanningspray "AESUB blue" / batch no. : 1126583

Spray can with riser, valve and spray head

### Examination survey

Detection and identification of possible residues from a given scanningspray recipe, which can remain on a surface as a residue.

### Procedure

#### **Solvent**

The solvents used in the formulation were analyzed directly by gas chromatography using mass spectrometric detection.

The Following devices and device parameter were used:

1. Gas chromatograph Agilent 7890

Injection: 1µl Splitless

KAS: 50°C to 320°C with 12°/sec, 3min 320°

Pillar: VF-5 MS, 30m x 0,25mm x 0,5µm, flow 0,8 ml/min Helium

Temperature: 50°C, 3min, to 150°C with 30°/min, to 320°C with 10°/in, 3min 324°

2. Mass spectrometer Agilent 5975 Inert MSD

Solventdelay: 5min

Scan Area 35-350 r with 2,33 Scans/sec

SEV: 2250 V

Prof. Dr. Martin Jäger, Professor für Instrumentelle Analytik  
Dipl.-Ing. Joachim Horst  
Frankenring 20, 47798 Krefeld, T: 02151 822 4188, [www.hs-niederrhein.de/chemie/forschung](http://www.hs-niederrhein.de/chemie/forschung)

The evaluation of the chromatograms was carried out only for compounds with a boiling point > 200 °C, which are considered semi-volatile.

### **Product mixture**

The fillable mixture of active ingredient and solvent was freed from the solvent in a rotary evaporator at 750 mbar and 60°C. In order to remove the material by sublimation, the solids content was subsequently dried at 105°C. for 15 hours in a circulating air drying cabinet. The remaining residue was then taken up without residue in 1ml of chloroform.

Subsequent GC-MS analysis was performed by the method described above.

The quantification of the detected individual substances was carried out by means of methyl stearate standard as a reference. All used solvents and equipment were tested in advance for blank values.

### **Product-leading plastic components of spraycan**

All product-leading plastic parts of the spraycan were extracted for 6 hours at room temperature with the solvent mixture used in the spray on a laboratory shaker. The extract was then analyzed as described above.

This extraction was designed for maximum extraction, i. lower values are expected in practice as lower extraction rates will occur. In particular, the spray head incl. Jets and the valve in the technical execution have no extraction corresponding intensive and permanent contact with the solvent used.

### **Spray test to determine the applied amount of active ingredient**

A 10x10 cm glass plate covered with aluminum foil was sprayed over the surface as instructed. By weighing the plate before the spraying, after spraying and after sublimation, the quantity of the substance and the residue were determined. The plate was also examined visually for remaining traces.

The weight accuracy was 0.1 mg.

## **Results**

### **Solvents**

In the tested solvents no relevant semi-volatile compounds could be detected, which could leave residues on sprayed surfaces.

Prof. Dr. Martin Jäger, Professor für Instrumentelle Analytik  
Dipl.-Ing. Joachim Horst  
Frankenring 20, 47798 Krefeld, T: 02151 822 4188, [www.hs-niederrhein.de/chemie/forschung](http://www.hs-niederrhein.de/chemie/forschung)

In particular, no plasticizers and silicone compounds could be detected as typical residue-forming species.

### Active agent solution

In the drug solution, a total of 3.6 mg/kg semifluid compounds with a boiling point > 200°C were detected.

### Plastic components

In the solvent extract, 6.1 mg/kg was determined as the sum of all extracted semi-volatile compounds.

In total, 9.7 mg/kg semifluid compounds were detected in the scanningspray "AESUB blue".

### Spray test

In the spray test, an occupancy of 150mg of product was determined for the 100 sq.cm plate. The applied amount sublimated with no apparent optical residuals, as shown in Figure 1 and Figure 2. The weighing of the plate confirmed the visual impression, no weight difference could be determined.

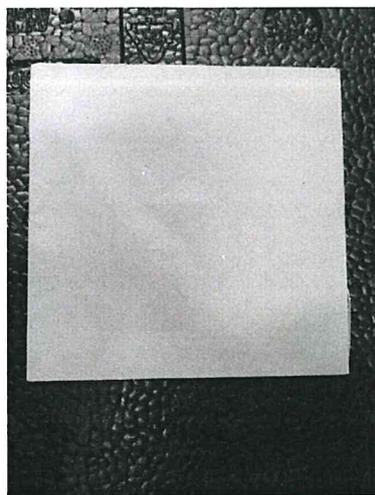


Figure 1: Product sprayed onto a glass plate coated with aluminum foil



Figure: Coated glass plate from Figure 1 after sublimation of the product

Prof. Dr. Martin Jäger, Professor für Instrumentelle Analytik  
Dipl.-Ing. Joachim Horst

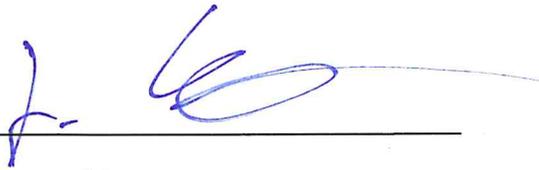
Frankenring 20, 47798 Krefeld, T: 02151 822 4188, [www.hs-niederrhein.de/chemie/forschung](http://www.hs-niederrhein.de/chemie/forschung)

## **Summary**

The proven and quantified sum of all semi-volatile compounds and the identity of the individual compounds were within the expected range. Based on the application of 1 - 2mg/sq.cm when applied according to the printed description, approximately 10ng substance/sq.cm remain on the sprayed object.

Such a residue is neither optically recognizable, nor can it be detected with surface metrology. Therefore, the investigated scanning spray "AESUB blue" can be characterized as residue-free in the sense of the used analytical methods.

Krefeld, den 07.06.2019



Dipl.-Ing. Joachim Horst



Prof. Dr. Martin Jäger