Produktprüfung
Zertifizierung
Qualitätssicherung

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TESTED PRODUCT
ID 0610 - 11427 - 003

Latex Core

PT RubberFoam Indonesia

Test Report No. 21930-1

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Test Report No. 21930-1

Client:	**PT RubberFoam Indonesia, Kawasan Industri Sentul, Jl. Olymoic Raya Blok B5, Kel. Sentul, Kec. Babakan Madang, Kab. Bogor 16810 Jawa – Barat**
Sample description by client:	**Latex Core**
Sample no.:	21930-1
Type of sample:	Latex core
Sampled by:	client
Date of sampling:	not documented
Location of sampling:	not documented
Date of production:	not documented
Date of arrival of sample:	23 April 2010
Condition of sample:	without objection
Date of report:	17 June 2010
Number of pages of report:	22
Test parameter:	see table of contents
Testing laboratory:	eco-INSTITUT GmbH, Cologne * external laboratory

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Test report

Latex core

1 Emission test

1.1 Volatile organic compounds (VOC)

Definition of terms:

VOC (volatile organic compounds)	All individual materials with a concentration ≥ 0,001 mg/m³ in retention range C_6 (n-Hexane) to C_{16} (n-Hexadecane) Substances refer to LCI lists / AgBB (DIBt)
TVOC (Total volatile organic compounds)	Sum of all individual substances in retention range C_6 to C_{16}.
CMR-VOC (carcinogenic, mutagenic, reproduction-toxic VOC)	All individual substances with the following categories: Regulation (EC) No. 1272/2008: Category Cat.1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B TRGS 905: K1 and K2, M1 and M2, R1 and R2 IARC: Group 1 and 2A DFG (MAK lists): Category III1and III2
VVOC (very volatile organic compounds)	All individual substances wit concentration ≥ 0,001 mg/m³ in retention range < C_6
SVOC (semi volatile organic compounds)	All individual materials ≥ 0,001 mg/m³ in retention range > C_{16} (n-Hexadecane) to C_{22} (Docosane)
Total SVOC (Total semi volatile organic compounds)	Sum of all SVOC in retention range > C_{16} to C_{22}.
Identified and calibrated substances ($c_{id\ sub}$), substance specific calculated	Spectrum and retention time are concordant with the calibrated comparison substance
Not identified substances calculated as toluene equivalent ($c_{ni\ tol}$)	Suggestion from the spectrum library with high probability and/or allocation to a group of substances
SER	Specific emission rate (see appendix)
LCI value	Lowest Concentration of Interest; calculated value for the evaluation of VOC, established by the Committee for Health-related Evaluation of Building Products (Ausschuss zur gesundheitlichen Bewertung von Bauprodukten - AgBB)
R value	The quotient of the concentration and the LCI value is generated for every substance which is detected in the test chamber air. The sum of the calculated quotients results in the R value.

List of the analysed VOCs:

Aromatic hydrocarbons
Toluene
Ethylbenzene
p-Xylene
m-Xylene
o-Xylene
Isopropylbenzene
n-Propylbenzene
1,3,5-Trimethylbenzene
1,2,4-Trimethylbenzene
1,2,3-Trimethylbenzene
2-Ethyltoluene
1-Isopropyl-4-methylbenzene
1,2,4,5-Tetramethylbenzene
n-Butylbenzene
1,3-Diisopropylbenzene
1.4-Diisopropylbenzene
Phenyl octane
1-Phenyl decane[2]
1-Phenyl undecane[2]
4-Phenylcyclohexene
Styrene
Phenyl acetylene
2-Phenyl propene
Vinyl toluene
Naphthalene
Indene
Benzene

Saturated aliphatic substances
Hydrocarbons
2-Methyl pentane[1]
3-Methyl pentane[1]
n-Hexane
Cyclohexane
Methylcyclohexane
1,4-Dimethylcyclohexane

n-Heptane
n-Octane
n-Nonane
n-Decane
n-Undecane
n-Dodecane
n-Tridecane
n-Tetradecane
n-Pentadecane
n-Hexadecane
Methylcyclopentane

Terpenes
δ-3-Caren
α-Pinene
β-Pinene
Limonene
Longifolene
Caryophyllene
Isolongifolene
alpha-Phellandrene
Myrcene
Camphene
alpha-Terpinend
Longipinene
beta-Caryophyllene
beta-Farnesen
alpha-Bisabolen

Aliphatic alcohols and ether
1-Propanol[1]
2-Propanol[1]
tert-Butanol
2-Methyl-1-propanol
1-Butanol
1-Pentanol
1-Hexanol
Cyclohexanol
2-Ethyl-1-hexanol
1-Octanol
4-Hydroxy-4-methyl-pentan-2-one
1-Heptanol
1-Nonanol
1-Decanol

Aromatic alcohols (phenols)
Phenol
BHT (2,6-di-tert-butyl-4-methylphenol)
Benzylalcohol

Glycols, Glycol ether, Glycol ester
Propylenglycol (1,2-Dihydroxypropane)
Ethylene glycol (Ethandiol)
Ethylene glycol monobutyl ether
Diethylene glycol
Diethylene glycol-monobutyl ether
2-Phenoxyethanol
Ethylene carbonate
1-Methoxy-2-propanol
Glycolic acid butyl ester
Texanol
Butyldiglycol acetate
Dipropylenglycol mono-methyl ether
2-Methoxyethanol
2-Ethoxyethanol
2-Propoxyethanol
2-Methylethoxyethanol
2-Hexoxyethanol
1,2-Dimethoxyethane
1,2-Diethoxyethane
2-Methoxyethyl acetate
2-Ethoxyethyl acetate
2-Butoxyethyl acetate
2-(2-Hexoxyethoxy)-ethanol
1-Methoxy-2-(2-methoxy-ethoxy)-ethane
Propylene glycol di-acetate
Dipropylene glycol
Dipropylene glycol monomethylether acetate
Dipropylene glycol mono-n-propylether
Dipropylene glycol mono-t-butylether
1,4-Butanediol
Tripropyleneglycolmonomethyl ether
Triethylene glycol dimethyl ether
1,2-Propylene glycol dimethyl ether
TXIB
Ethyldiglycol
Dipropylene glycol-dimethyl ether

Aldehydes
Butanal[1,3]
Pentanal[3]
Hexanal
Heptanal
2-Ethylhexanal
Octanal
Nonanal
Decanal
2-Butenal[3]
2-Pentenal[3]
2-Hexenal
2-Heptenal
2-Octenal
2-Nonenal
2-Decenal
2-Undecenal
Furfural
Glutaraldehyde
Benzaldehyde
Acetaldehyde[1,3]
Propanal[1,3]
Propenal[1,3]
Isobutenal

Ketones
Ethylmethylketone[3]
3-Methyl-2-propanol
Methylisobutylketone
Cyclopentanone
Cyclohexanone
Acetone[1,3]
2-Methylcyclopentanone
2-Methylcyclohexanone
Acetophenone
1-Hydroxyacetone

Acids
Acetic acid
Propionic acid
Isobutyric acid
Butyric acid
Pivalic acid
n-Valeric acid
n-hexanoic acid
n-Heptanoic acid
n-Octanoic acid
2-Ethylhexanoic acid

Esters and Lactones
Methylacetate[1]
Ethyl acetate[1]
Vinyl acetate[1]
Isopropyl acetate
Propyl acetate
2-Methoxy-1-methylethyl acetate
n-Butyl formate
Methylmethacrylate
Isobutylacetate
1-Butyl acetate
2-Ethylhexyl acetate
Methyl acrylate
Ethyl acrylate
n-Butyl acrylate
2-Ethylhexyl acrylate
Adipic acid dimethyl ester
Fumaric acid dibutyl ester
Succinic acid dimethyl ester

Glutaric acid dimethyl ester
Hexandioldiacrylate
Maleic acid dibutyl ester
Butyrolactone
Dimethylphthalate
Texanol

Chlorinated hydrocarbons
Tetrachlorethene
1,1,1-Trichlorethane
Trichlorethene
1,4-Dichlorbenzene

Others
1,4-Dioxane
Caprolactam
N-Methyl-2-pyrrolidone
Octamethylcyclotetrasiloxane
Methenamine
2-Butanonoxime
Tributyl phosphate
Triethyl phosphate
5-Chlor-2-methyl-4-isothiazolin-3-one
2-Methyl-4-isothiazolin-3-one (MIT)
Triethylamine
Tetrahydrofuran (THF)
1-Decene
1-Octene
2-Pentylfuran
Tetramethyl succinonitrile
Propylencarbonate
Isophorone
Dimethylformamide (DMF)

[1] VVOC
[2] SVOC
[3] Analysis according to DIN ISO 16000-3

Test method:

Preparation of test sample:	following DIN EN ISO 16000-11	
	Pre-treatment:	n/a
	Masking of backside:	no
	Masking of edges:	no
	Relationship of open edges to the surface:	n/a
	Loading:	related to the surface
	Dimensions:	18.9 cm x 18.9 cm x 12 cm
Test chamber conditions:	DIN EN ISO 16000-9	
	Chamber volume:	0.125 m³
	Temperature:	23°C
	Relative humidity:	50 %
	Air pressure:	normal
	Air:	cleaned
	Air exchange rate:	0.5 h^{-1}
	Upstream air velocity:	0.3 m/s
	Loading:	1.3 m²/m³
	Specific air flow rate:	0.77 m³/m²*h
	Air sampling:	2 days (CMT VOC) or 7 days after test chamber loading
Analytics:	DIN ISO 16000-6	
	Detection limit:	2 µg/m³

Measurement time 2 days after test chamber loading

1.1.1 CMT VOC_{2d}

Test parameter:

Carcinogenic, mutagenic and teratogenic volatile organic compounds (CMT VOC), test chamber, air sampling 2 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m³]	CMR classification*)
VOC_{3d}: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)				
-	-	-	-	
VOC_{3d}: Further identified and calibrated substances in addition to LCI list/AgBB, substance specific calculated($c_{id\ sub}$)				
-	-	-	-	
VOC_{3d}: Not identified substances calculated as toluene equivalent ($c_{ni\ tol}$)				
-	-	-	-	

1.1.2 VOC / $TVOC_{2d}$

Test parameter:

Volatile organic compounds (VOC), test chamber, air sampling 2 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m³]
VOC_{2d}: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
1	**Aromatic hydrocarbons**		
1-16	1-Isopropyl-4-methylbenzene	99-87-6	6
3	**Terpene**		
3-4	Limonene	138-86-3	7
9	**Acids**		
9-1	Acetic acid	64-19-7	3
VOC_{2d}: Further identified and calibrated substances in addition to LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
VOC_{2d}: Not identified substances calculated as toluene equivalent ($c_{ni\ tol}$)			
-	Aniline or methylpyridine	-	18
-	Isoalkane, C10 – C11	-	3
-	Terpene	-	2

Total volatile organic compounds	Concentration (Test chamber air) [µg/m³]	SER_a [µg/m³h]
$TVOC_{2d}$	**39**	**30**

1.1.3 $VVOC_{2d}$

Test parameter:

Very volatile organic compounds (VVOC), test chamber, air sampling 2 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m³]
$VVOC_{2d}$: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
$VVOC_{2d}$: Further identified and calibrated substances addition to with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
$VVOC_{2d}$: Not identified substances calculated as toluene equivalent ($c_{ni\ tol}$)			
-	N,N-Diethylamine	-	54

1.1.4 $SVOC_{2d}$

Test parameter:

Semi- volatile organic compounds (SVOC), test chamber, air sampling 2 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m³]
$SVOC_{2d}$: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
$SVOC_{2d}$: Further identified and calibrated substances addition to with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
$SVOC_{2d}$: Not identified substances calculated as toluene equivalent ($c_{ni\ tol}$)			
-	-	-	-

Total semi-volatile organic compounds	Concentration (Test chamber air) [µg/m³]	SER_a [µg/m³h]
Σ $SVOC_{2d}$	**-**	**-**

Measurement time 7 days after test chamber loading

1.1.5 VOC_{7d} / $TVOC_{7d}$

Test parameter:

Volatile organic compounds (VOC), test chamber, air sampling 7 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m³]
VOC_{7d}: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
3	**Terpene**		
3-4	Limonene	138-86-3	2
VOC_{7d}: Further identified and calibrated substances addition to with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
VOC_{7d}: Not identified substances calculated as toluene equivalent ($c_{ni\ tol}$)			
-	Aniline or methylpyridine	-	10

Total volatile organic compounds	Concentration (Test chamber air) [µg/m³]	SER_a [µg/m³h]
$TVOC_{7d}$	**12**	**9**

1.1.6 $VVOC_{7d}$

Test parameter:

Very volatile organic compounds (VVOC), test chamber, air sampling 7 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m³]
$VVOC_{7d}$: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
$VVOC_{7d}$: Further identified and calibrated substances addition to with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
$VVOC_{7d}$: Not identified substances calculated as toluene equivalent ($c_{ni\ tol}$)			
-	N,N-Diethylamine	-	50

1.1.7 $SVOC_{7d}$

Test parameter:

Semi- volatile organic compounds (SVOC), test chamber, air sampling 7 days after test chamber loading

Test result:

No.	Substance	CAS No.	Concentration (Test chamber air) [µg/m³]
$SVOC_{7d}$: Identified and calibrated substances in accordance with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
$SVOC_{7d}$: Further identified and calibrated substances addition to with LCI list/AgBB, substance specific calculated ($c_{id\ sub}$)			
-	-	-	-
$SVOC_{7d}$: Not identified substances calculated as toluene equivalent ($c_{ni\ tol}$)			
-	-	-	-

Total semi-volatile organic compounds	Concentration (Test chamber air) [µg/m³]	SER_a [µg/m³h]
Σ $SVOC_{7d}$	**-**	**-**

1.2 Carbon Disulfide CS_2

Test parameter:

Emissions of carbon disulfide CS_2 in the test chamber, air sampling 2 days after test chamber loading

Test method:

Preparation of test sample:	DIN EN ISO 16000-11	
	see No. 1.1 VOCs	
Test chamber conditions:	DIN ISO 16000-9 and according to DIN V ENV 717-1	
	see No. 1.1 VOCs	
	Air sampling:	2 days after test chamber loading
Analytics:	DIN EN 16000-6	
	Detection limit:	1 µg/m³

Test result:

Substance	**Concentration (Test chamber air) [µg/m³]**
Carbon Disulfide CS_2	< 2

1.3 Nitrosamines *

Test parameter:

Emission of nitrosamines in the test chamber, air sampling 2 days after test chamber loading

Test method:

Preparation of test sample:	DIN EN ISO 16000-11	
	see No. 1.1 VOCs	
Test chamber conditions:	DIN ISO 16000-9 and according to DIN V ENV 717-1	
	see No. 1.1 VOCs	
	Air sampling:	2 days after test chamber loading
Analytics:	BGI 505-23 determination of nitrosamines	
	Detection limit:	100 ng/m³

Test result:

Substance	**Concentration** (Test chamber air) **[ng/m³]**
N-Nitrosodimethylamine (NDMA)	< 100
N-Nitrosomethylethylamine (NMEA)	< 100
N-Nitrosodiethylamine (NDEA)	110
N-Nitrosodiisopropylamine (NDIPA)	< 100
N-Nitrosodipropylamine (NDPA)	< 100
N-Nitrosodibutylamine (NDBA)	< 100
N-Nitrosopyrrolidine (NPYR)	< 100
N-Nitrosopiperidine (NPIP)	< 100
N-Nitrosomorpholine (NMOR)	< 100

1.4 Formaldehyde$_{2d}$

Test parameter:

Formaldehyde, test chamber, air sampling 2 days after test chamber loading

Test method:

Preparation of test sample:	according to DIN EN 717-1	
	see No. 1.1 VOCs	
Test chamber conditions:	DIN EN 717-1 with the following deviations:	
	– No determination of the equilibrium concentration; the formaldehyde emission is indicated at a measuring point as determined above.	
	– For test chamber volume see No. 1.1 VOCs	
	– Relative humidity: 50%	
	Test chamber parameter: see No. 1.1 VOCs	
	Air sampling:	2 days after test chamber loading
Analytics:	DIN EN 16000-3	
	Detection limit:	3 µg/m³ ≈ 0.003 ppm

Test result:

Substance	**Concentration** (Test chamber air) **[µg/m³]**	**Concentration** (Test chamber air) **[ppm]**
Formaldehyde	< 3	< 0.003

1.5 Odour testing

Test parameter:

Odour, test collective, odour test 24 hours after desiccator loading

Test method:

Analytics:	VDA recommendation 270 at 50 % humidity
Rating scale:	1 not perceivable
	2 not disturbing
	3 clearly discernable, not objectionable
	4 objectionable
	5 strongly discernable
	6 intolerable

Test result:

Temperature [°C]	Intensity [Note]	Odour characterisation
40	2	Product typical

Bolster / wadding materials

2 Content analysis

2.1 Polymers and filler percentage

Test parameter:
Polymers and filler percentage

Test method:

Analytics:	Ash/filler percentage: Thermogravimetry; Polymer percentage : IR/ATR

Test result:

Filler percentage	**[weight/%]**
Related to the total sample the polymer portion amounts to.	95,4
Related to the total sample the ash portion (including zinc oxide) amounts to.	4,6
Related to the total sample the filler portion amounts to [1)]	< 5
Polymer percentage	**[weight/%]**
Related to the polymer content the natural latex portion amounts to [2)]	100
Related to the polymer content the synthetic latex portion amounts to [2)]	0

[1)] The filler portion is calculated by the difference of ash portion and zinc oxide on the assumption that maximally 5% zinc oxide is contained related to the total weight of the expanded latex core.

[2)] With findings < 5 % for natural latex the result is represented as 100 % synthetic latex. Usually no natural latex portion under 5 % is used.

Cologne, dated 17 June 2010

Dr. rer.-nat. Hans-Ulrich Krieg
(Technical Manager)

Appraisal

The product Latex Core was submitted to laboratory tests on behalf of PT RubberFoam Indonesia for an ecological product examination according to the eco-INSTITUT-Label test criteria "Mattresses" (Status: February 2010).
The results documented in the test report were evaluated as follows.

Latex core			
Test parameter	**Result / Emission**	**Limit value**	**Within limits [yes/no]**
Emission test			
TVOC (total volatile organic compounds) (2 days after test chamber loading)	39 µg/m³	≤ 400 µg/m³	yes
TVOC (total volatile organic compounds) (7 days after test chamber loading)	12 µg/m²	≤ 200 µg/m³	yes
VOC classified in: K1, K2; M1, M2; R1, R2 (as per TRGS 905, RL 67/548 EC); IARC group 1 & 2A; MAK III1, III2 (2 days after test chamber loading)	< 2 µg/m³	≤ 2 µg/m³	yes
VOC (sum) without LCI (7 days after test chamber loading)	10 µg/m³	≤ 100 µg/m³	yes
VOC (individual sums):			
Sum of sensitising materials with the following categorisations: DFG (MAK list): Category IV, German Federal Institute for Risk Assessment list: Cat A, TRGS 907 (7 days after test chamber loading)	2 µg/m³	≤ 100 µg/m³	yes
Sum of VOC with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 2, Muta. 2, Repr. 2, TRGS 905: K3, M3, R3, IARC: Group 2B, DFG (MAK list): Category III3 (7 days after test chamber loading)	< 2 µg/m³	≤ 50 µg/m³	yes
Sum C_9 - C_{14}: Alkanes / Isoalkanes (7 days after test chamber loading)	< 2 µg/m³	≤ 100 µg/m³	yes
VOC (individual substances):			
Styrol (7 days after test chamber loading)	< 2 µg/m³	≤ 10 µg/m³	yes
Disulfide (2 days after test chamber loading)	< 2 µg/m³	≤ 50 µg/m³	yes
Nitrosamines (2 days after test chamber loading)	0.11 µg/m³	≤ 0.3 µg/m³	yes
R value (7 days after test chamber loading)	< 1.0	≤ 1.0	yes
Formaldehyde (2 days after test chamber loading)	< 0,003 ppm	≤ 0.02 ppm	yes
Odour (24 hours after loading of desiccator)	Grade 2	≤ Grade 3	yes

Bolster / wadding materials			
Test parameter	**Content/ Result**	**Limit value**	**Threshold reached [yes/no]**
Content analysis			
Polymer percentage	100 % NR	Declaration in %	---
Filler portion (ash content)	< 5 %	≤ 5%	yes

Summary evaluation

The product Latex Core was submitted to an ecological product examination on behalf of PT RubberFoam Indonesia for the acquisition of the eco-INSTITUT-Label.

The eco-INSTITUT-Label criteria were successfully fulfilled.

The criteria of the Qualitätsverband Umweltverträgliche Latexmatratzen e.V. (QUL e.V.) were successfully fulfilled.

As a result of the successful ecological product examination the

eco-INSTITUT-Label

eco INSTITUT
TESTED PRODUCT
ID 0610 - 11427 - 003

is awarded for the product/s:
Latex Core
for a period of two years.

Certification number	ID 0610 - 11427 - 003
Test report Number	21930-1
Validity	06 / 2012

After expiration of two years it is the possible to acquire the eco-INSTITUT-Label for another two year period. For this a laboratory test would be accomplished according to the latest eco-INSTITUT-Label test criteria.

Cologne, dated 17 June 2010

Sarah Fritschen
(Project Manager)

Appendix

Explanation of the Specific Emission Rate SER

Emission measurements are accomplished in test chambers under defined physical conditions (temperature, relative humidity, room loading, Air exchange rate etc.).

Test chamber measurement results are directly comparable only if the investigations were accomplished under the same basic conditions.

If the differences of the physical conditions refer only to the change of air rate and/or the loading, the "SER" or "specific emission rate" can be used for comparability of the measurement results. The SER indicates how many volatile organic compounds (VOC) are released by the sample for each material unit and hour (h).

The SER can be calculated using the formula below for each proven individual component of the VOC from the data in the test report.

As material units the following are applicable:

l = unit of length (m)	refers the emission to the length
a = unit area (m²)	refers the emission to the surface
v = unit volume (m³)	refers the emission to the volume
u = piece unit (unit = piece)	refers the emission to the complete unit

From this the different dimensions for SER result:

length-specific	SER_l	in µg/m h
surface-specific	SER_a	in µg/m² h
volume-specific	SER_v	in µg/m³ h
unit specific	SER_u	in µg/u h

SER thus represents a product specific rate, which describes the mass of the volatile organic compound, which is emitted by the product per time unit at a certain time after beginning of the examination.

$$SER = q \cdot C$$

q specific air flow rate (quotient from change of air rate and loading)
C Concentration of the measured substance(s)

The result can be indicated in milligrams (mg) in place of micro grams (µg), whereby 1 mg = 1000 µg.