EU-Plastikstrategie / Recycling

Deutscher Bundestag

Parlamentarischer Beirat
f. nachhaltige Entwicklung

Ausschussdrucksache
19(26)18-1

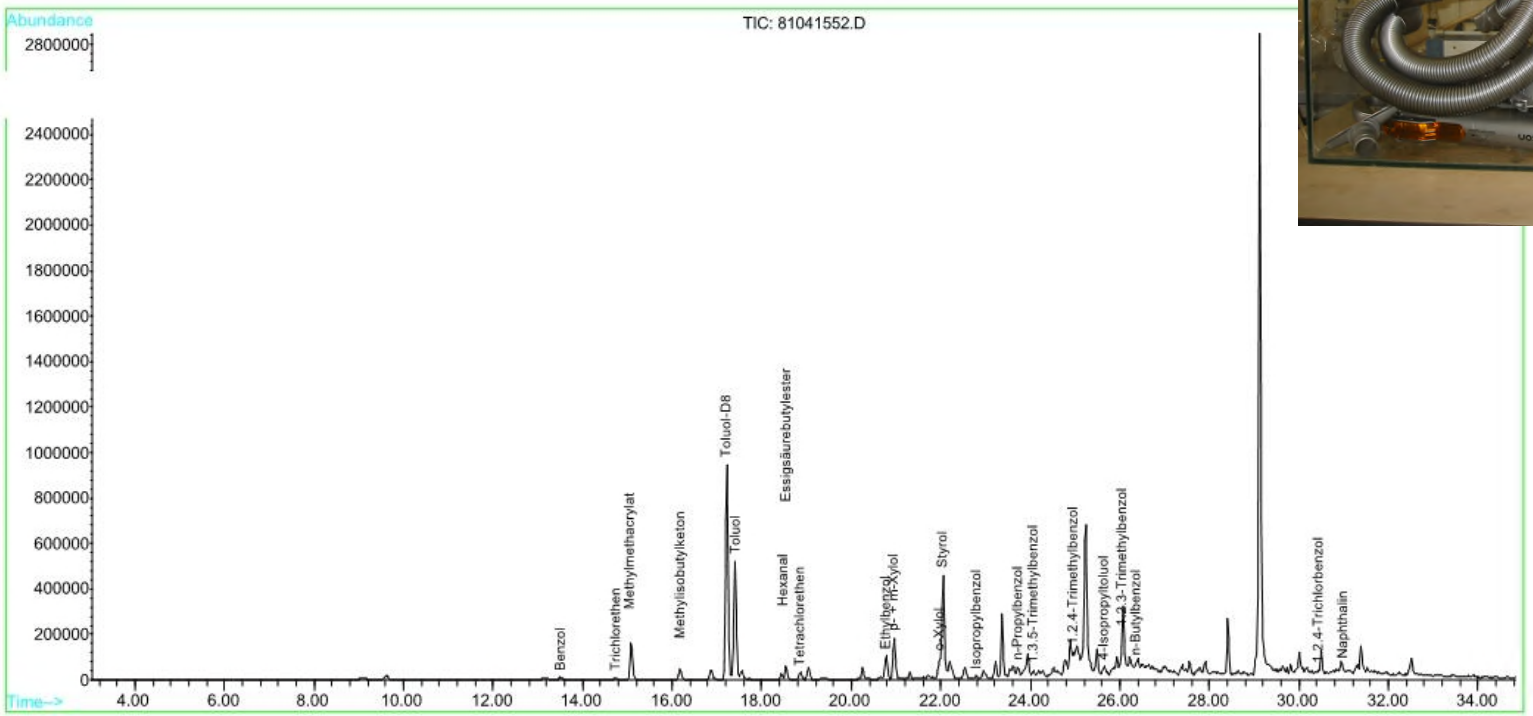
LEUPHANA
UNIVERSITÄT LÜNEBURG

cradle to cradle

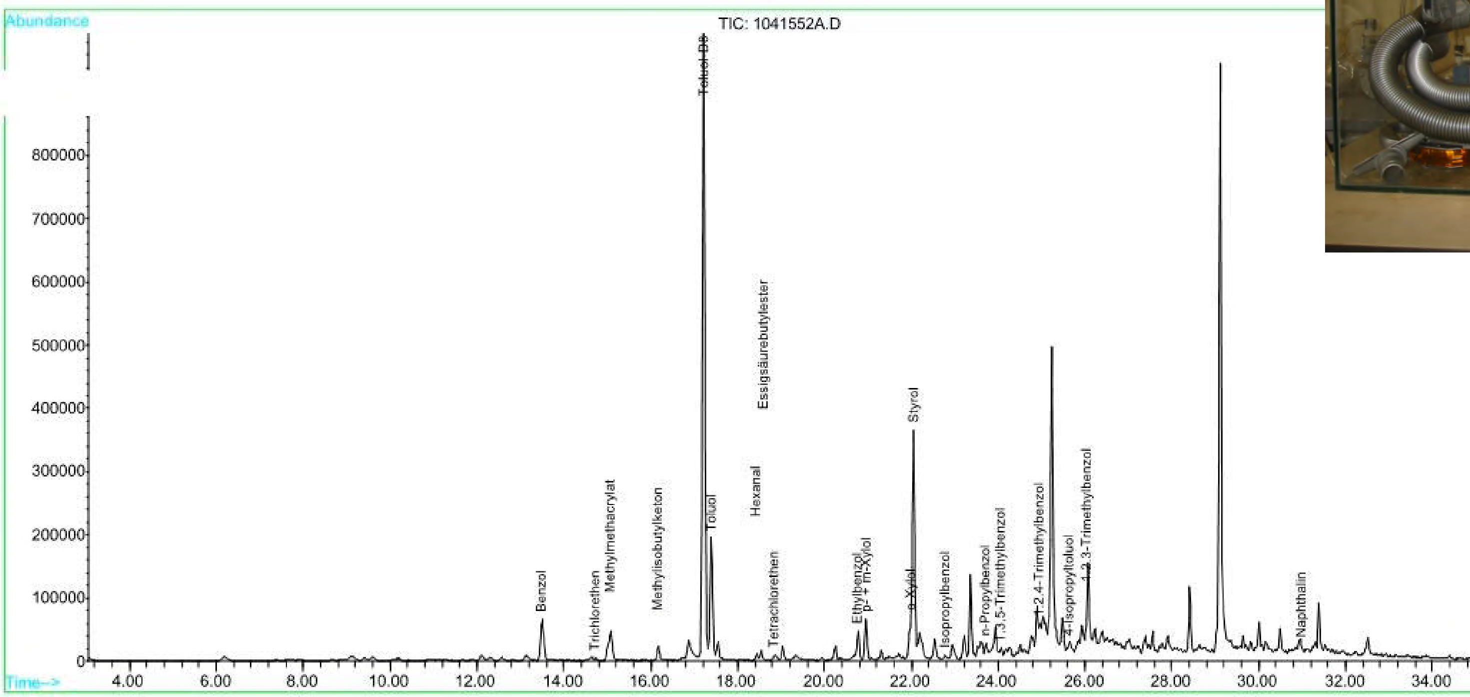
Prof. Dr. Michael Braungart

Sitzung des Parlamentarischen Beirates für nachhaltige Entwicklung
Deutscher Bundestag, Berlin
28.11.2018

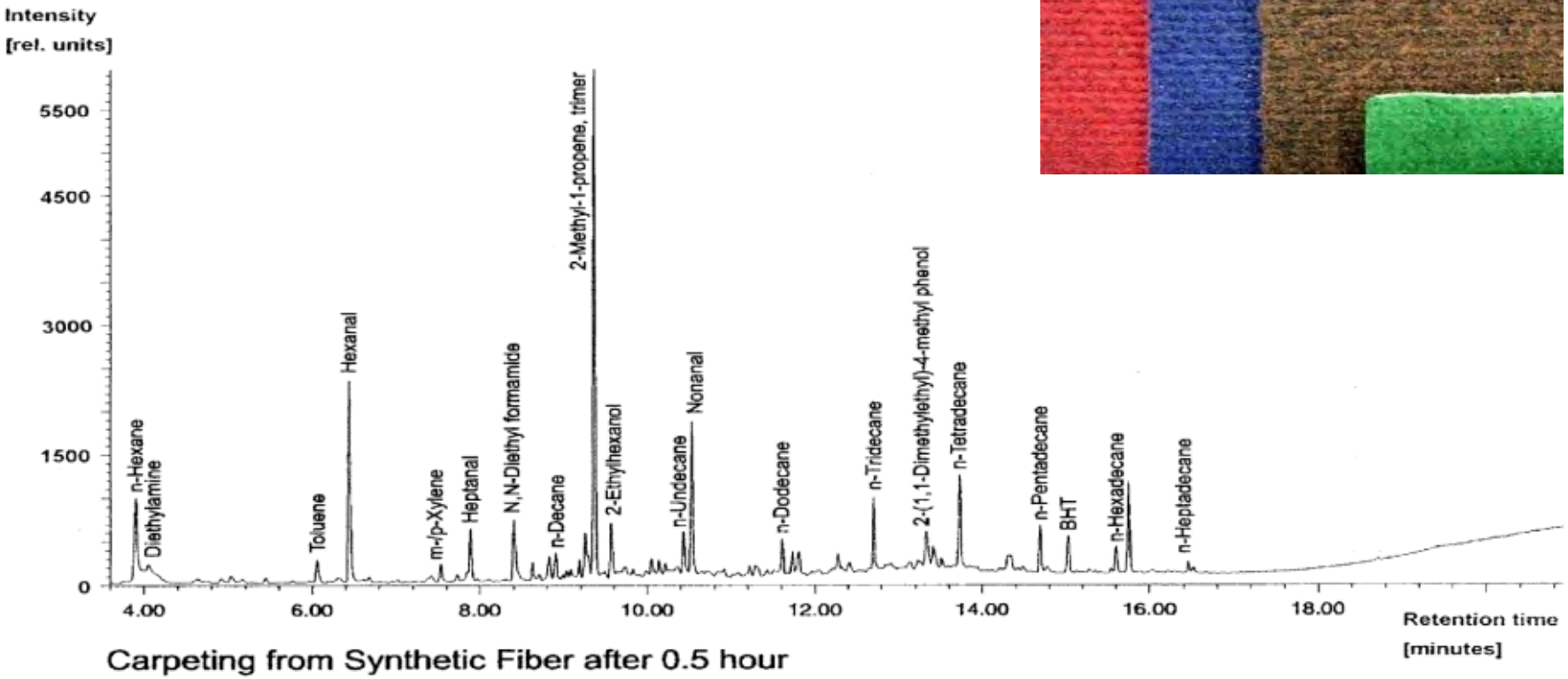
STAUBSAUGER (**AUS**GESCHALTET)



STAUBSAUGER (EINGESCHALTET)



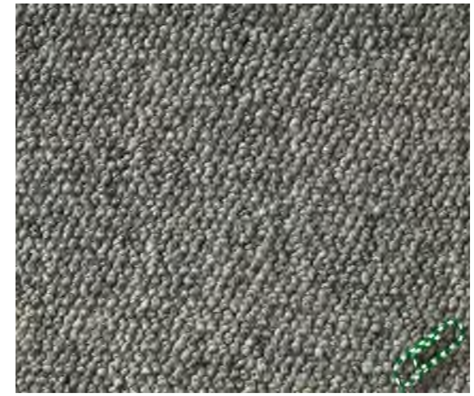
AUSGASUNG - TEPPICH (SYNTHETISCHE FASER)

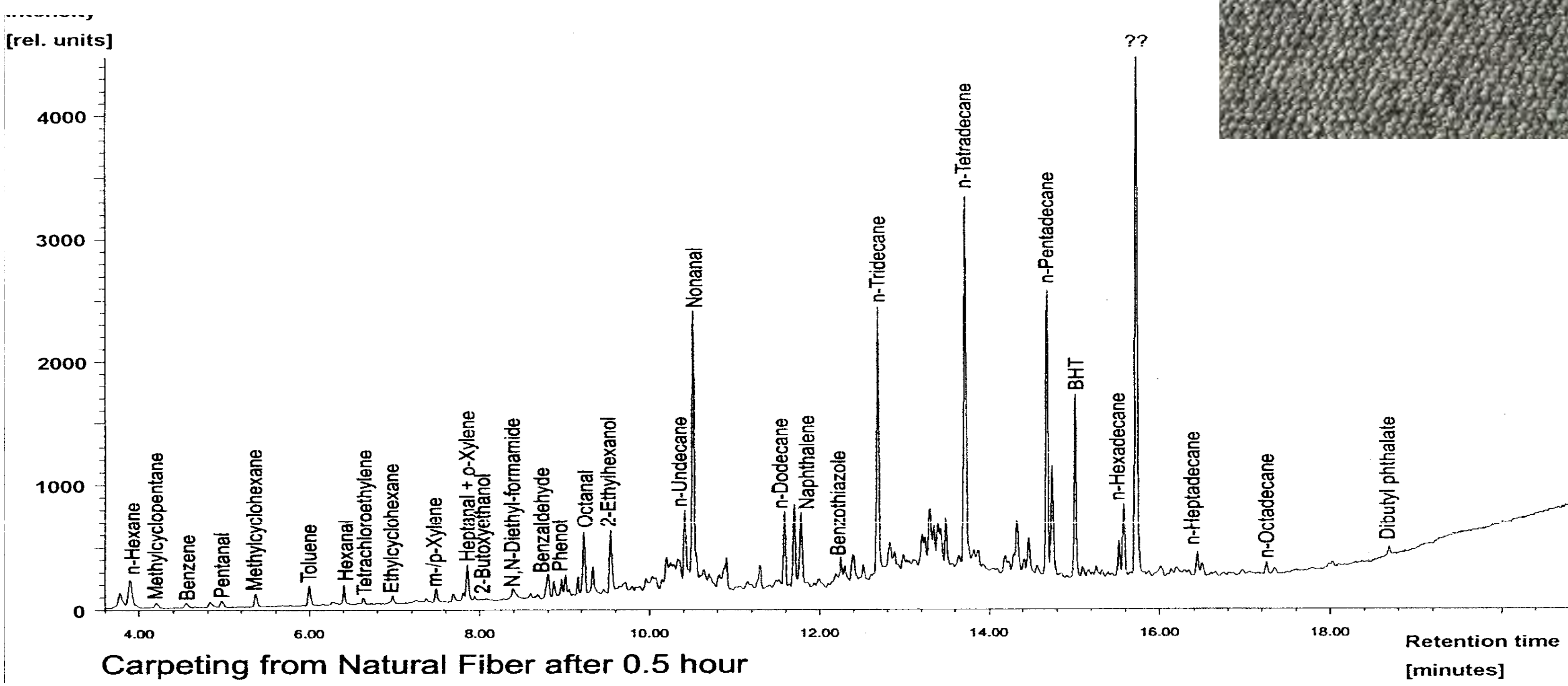


Carpeting from Synthetic Fiber after 0.5 hour

cradletocradle EPEA

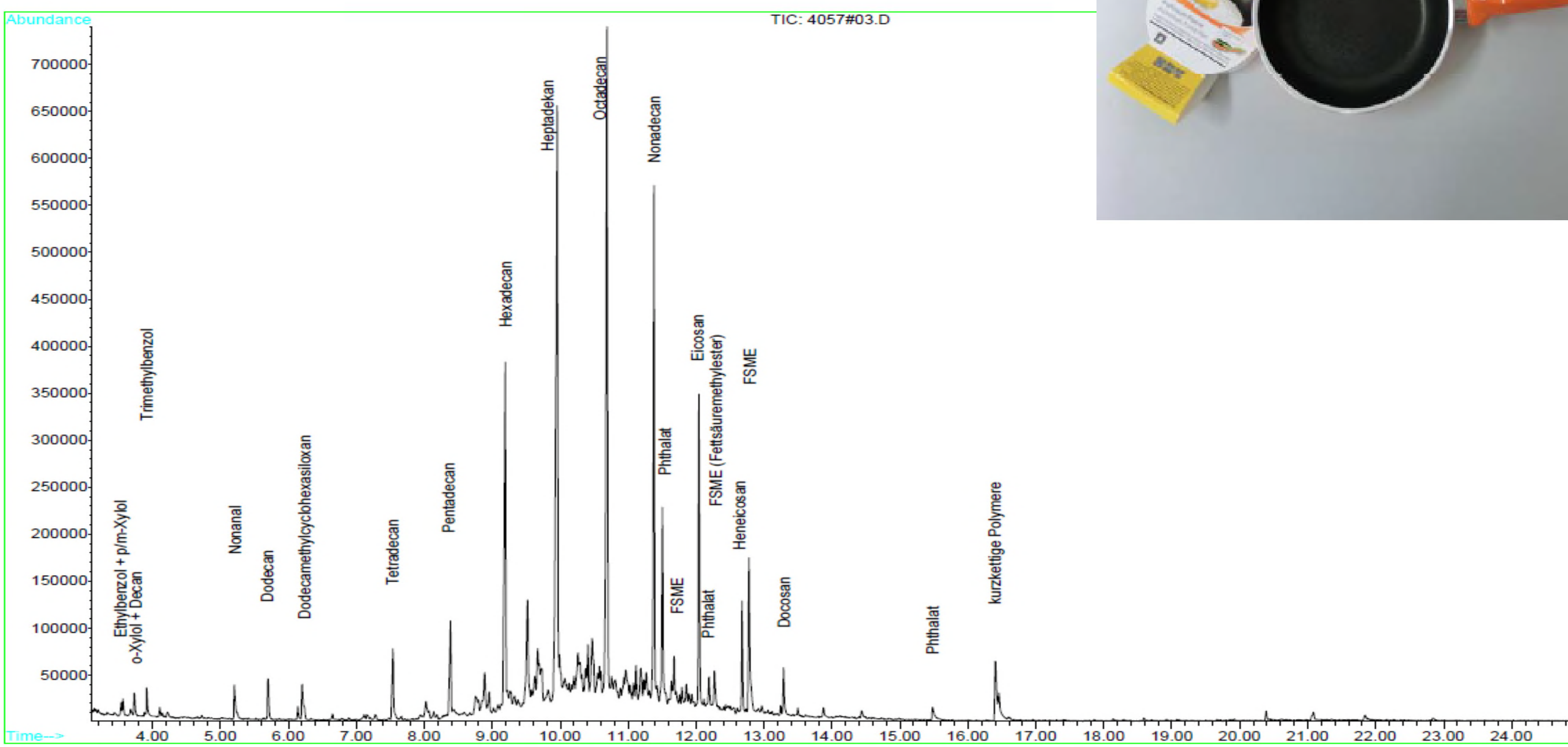
Ausgasung - Teppich (Naturfaser)



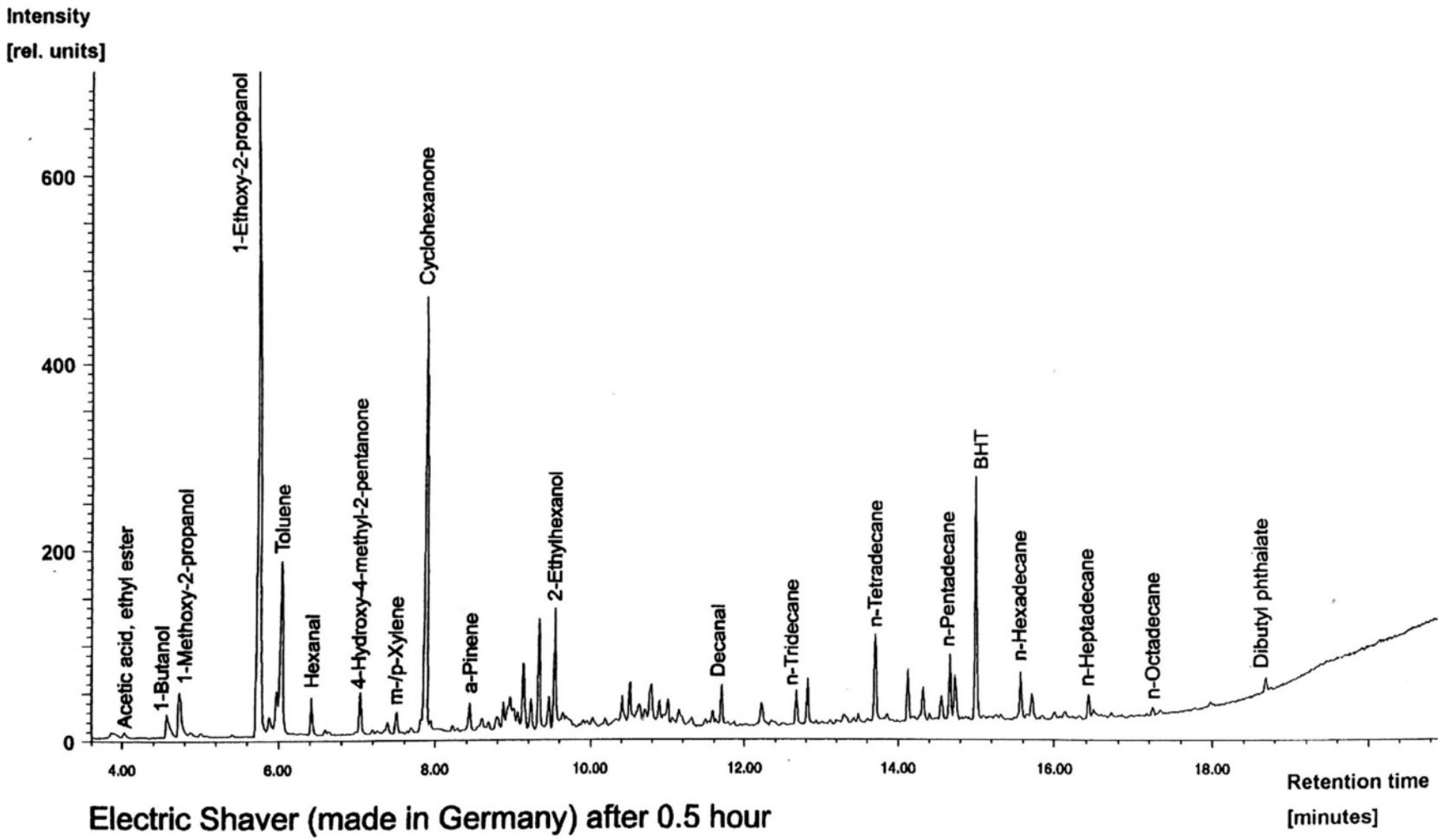


KONTAMINATION - BRATPFANNE

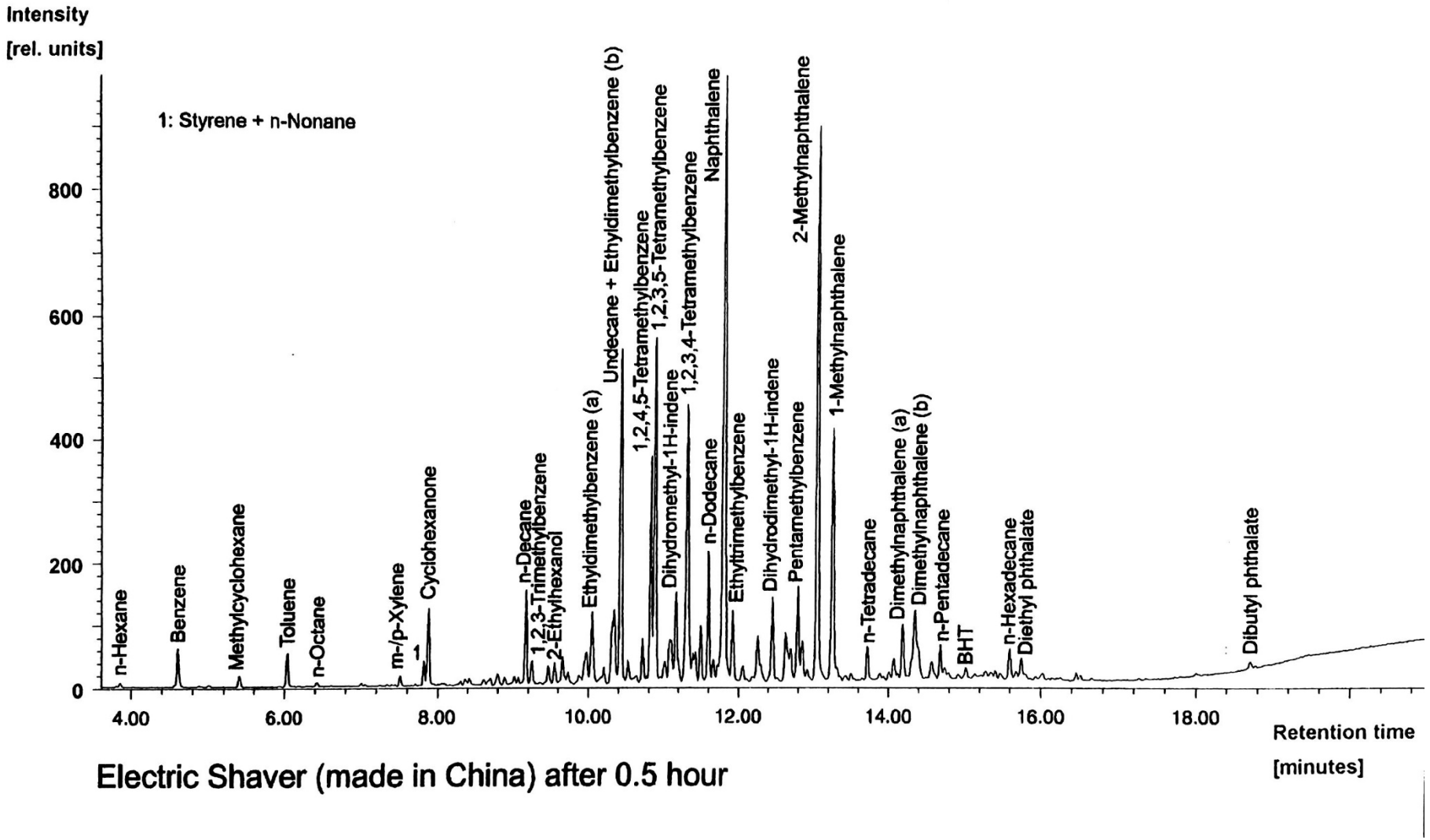
```
File        : C:\DATEN\EPEA\120912\4057#03.D
Operator    : Ostrop
Acquired    : 12 Sep 2012    8:52      using AcqMethod SCREEN
Instrument  :    Instrumen
Sample Name: 12204057-003
Misc Info   :
Vial Number: 47
```



ELEKTRISCHER RASIERAPPARAT (D)



ELEKTRISCHER RASIERAPPARAT (CHINA)

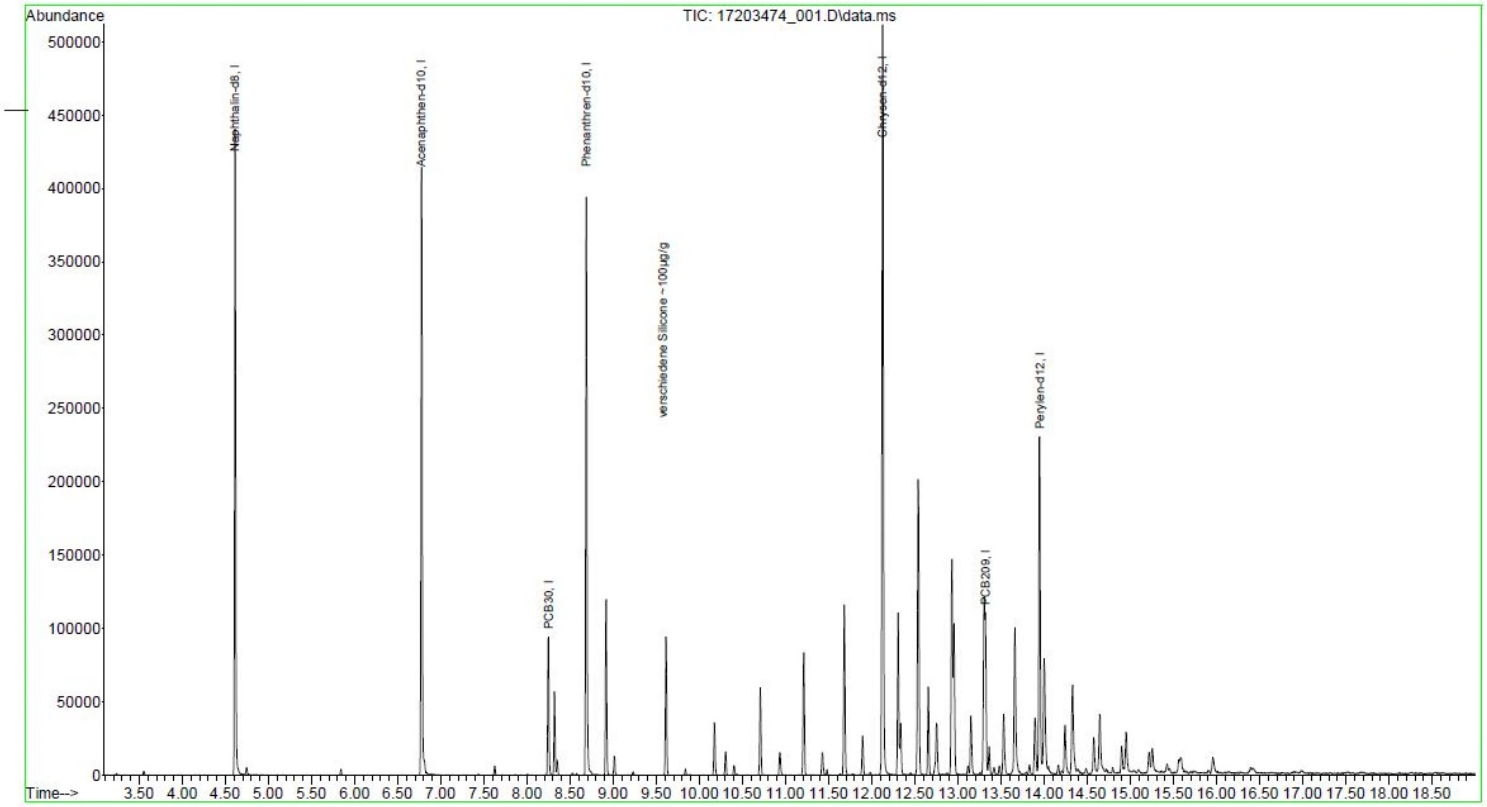


SILIKON-BRUSTIMPLANTAT

GBA

LABOR
UMWE

File :R:\2017\HPGCMSD_1\Screen\170512\17203474_001.D
Acquired : 12 May 2017 11:07 using AcqMethod SCREEN.M
Instrument : Instrument #1
Sample Name: 17203474-001
Misc Info : Screen
Vial Number: 99

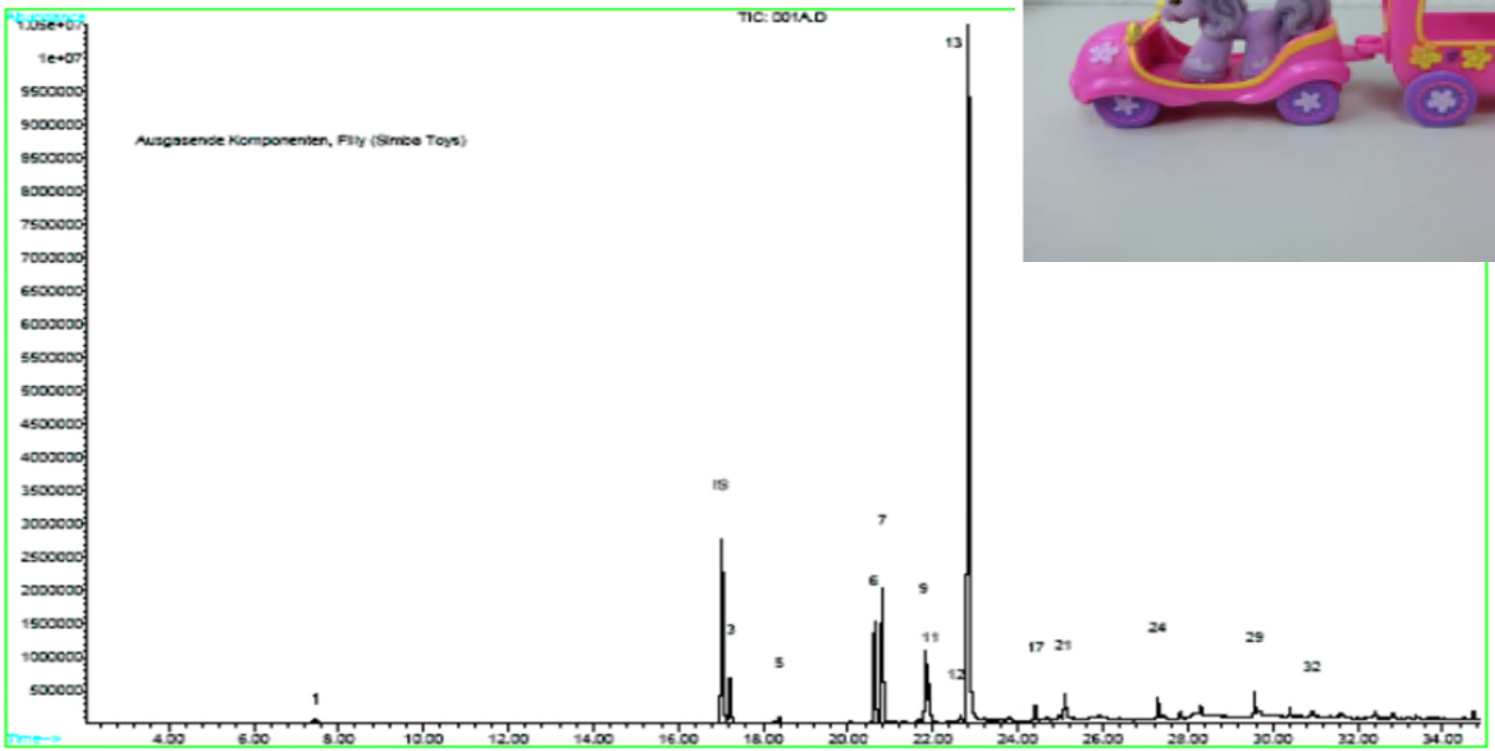


cradle to cradle EPEA

Ausgasung - Spielzeug

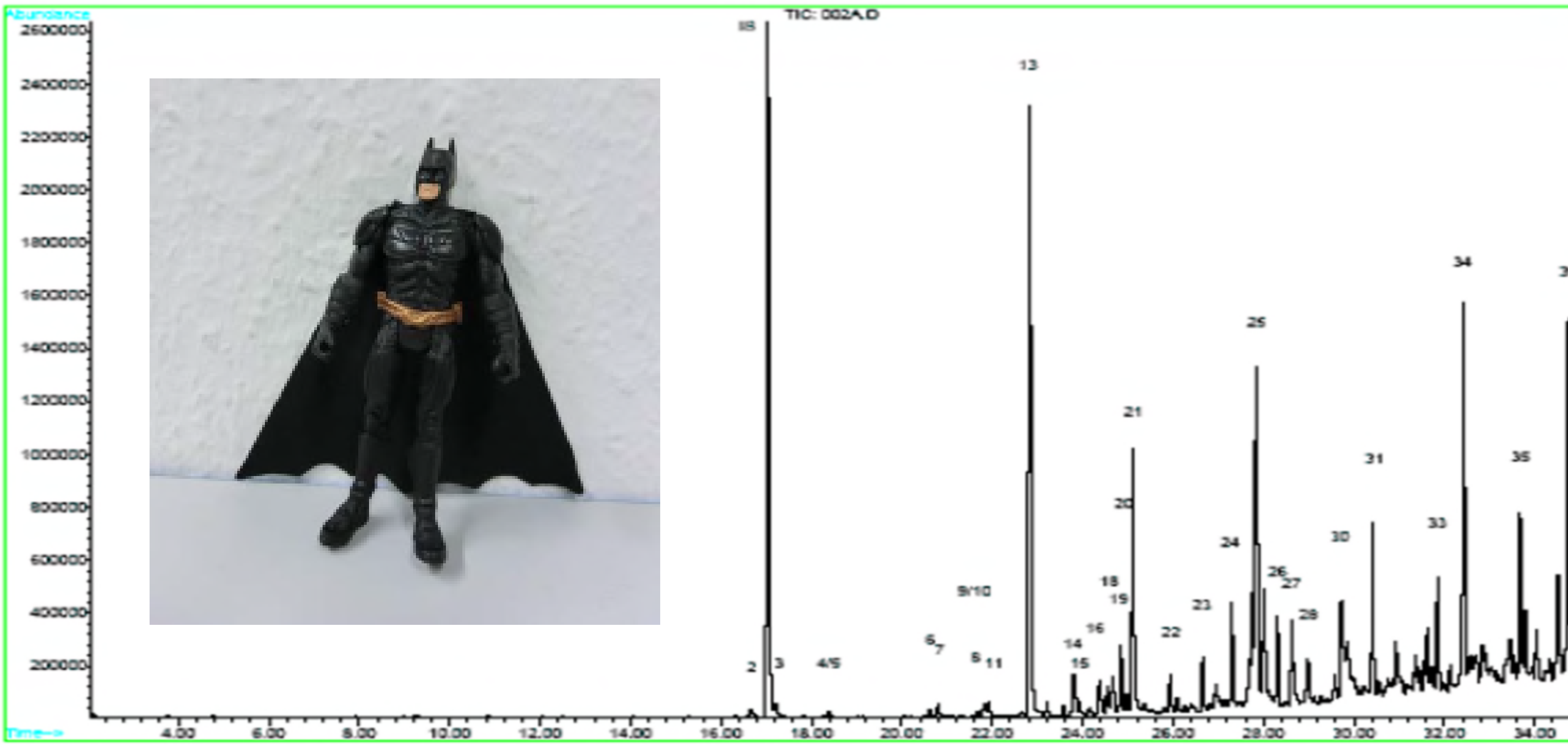
Filly Pferd

```
File        : C:\DATEN\EPEA\12204057\001A.D
Operator    : Ostrop
Acquired    :  4 Oct 2012  15:17      using AcqMethod SCREEN40
Instrument  :   ALGE GCD
Sample Name: 12204057-001
Misc Info   : 34 L, 30 min, 60 Grd.
Vial Number: 6
```



AUSGASUNG - SPIELZEUG
BATMAN

```
File        : C:\DATEN\EPEA\12204057\002A.D
Operator    : Ostrop
Acquired    :  4 Oct 2012   14:00      using AcqMethod SCREEN40
Instrument  :   ALGE GCD
Sample Name: 12204057-002
Misc Info   : 34 L, 30 min, 60 Grd.
Vial Number: 6
```

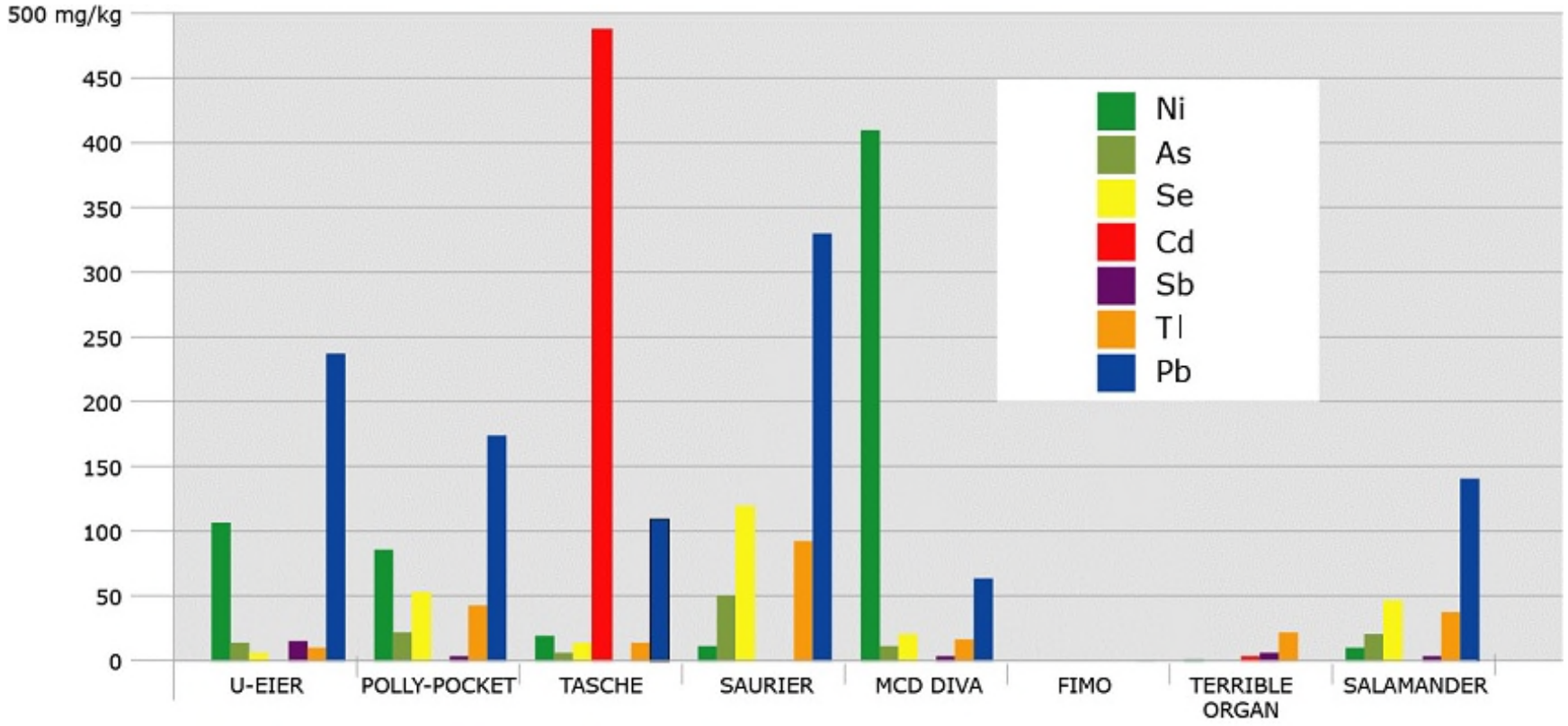


cradletocradle EPEA

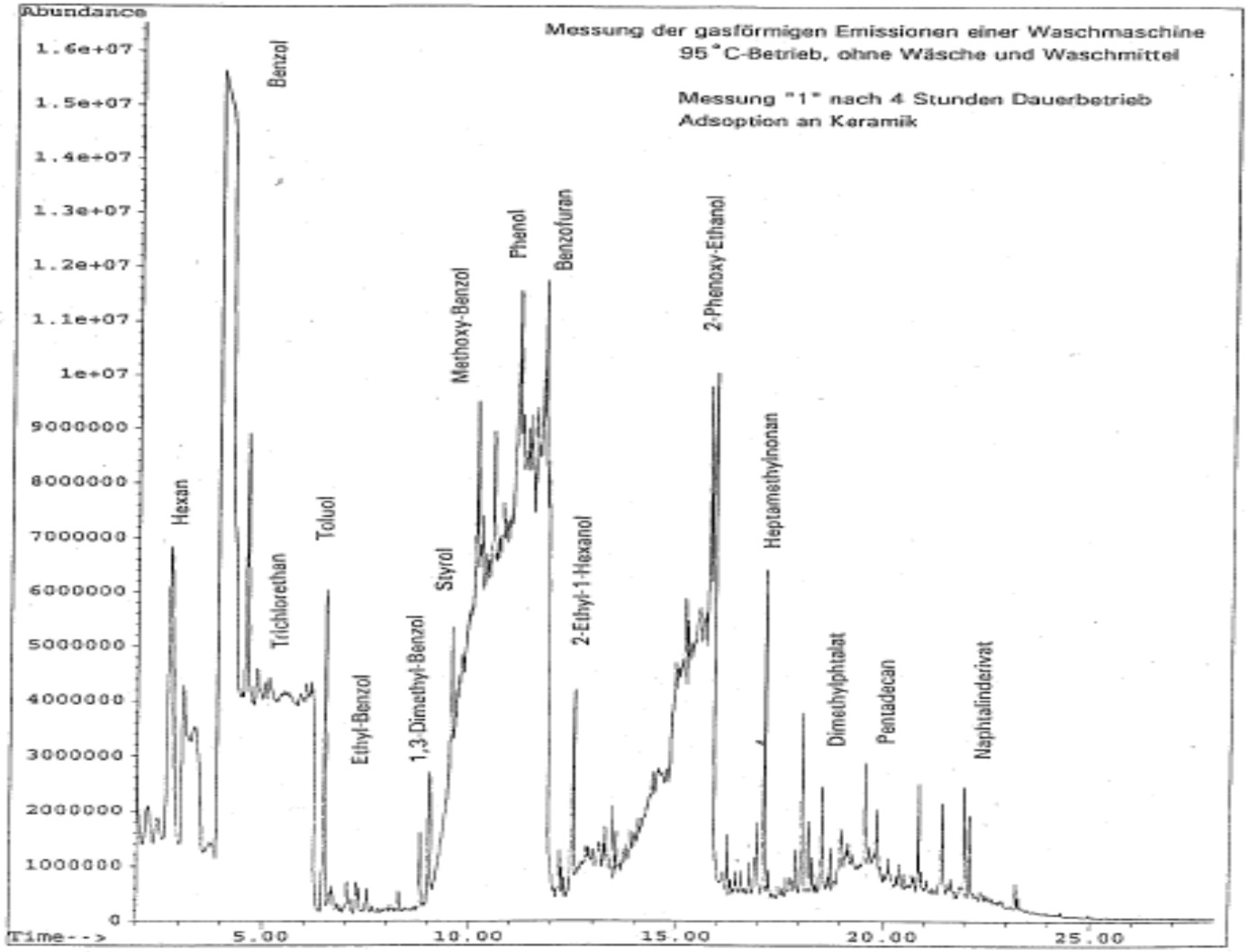
INHALTSSTOFFE - SPIELZEUG

Peak-Nr.	Komponente (in Elutionsreihenfolge)	12204057-001	12204057-002	
		(Filly)	(Batman)	
1	Aceton	0.21		µg/Probe·h
2	Hexamethylcyclotrisiloxan		0.06	µg/Probe·h
3	Toluol	0.88	0.06	µg/Probe·h
4	Hexanal		0.01	µg/Probe·h
5	Butylacetat	0.04	0.03	µg/Probe·h
6	Ethylbenzol	1.90	0.03	µg/Probe·h
7	p/m-Xylol	2.40	0.06	µg/Probe·h
8	Heptanal		0.03	µg/Probe·h
9	o-Xylol	1.28	0.05	µg/Probe·h
10	Octamethylcyclotetrasiloxan		0.03	µg/Probe·h
11	Styrol	1.28	0.08	µg/Probe·h
12	Cumol	0.14	0.02	µg/Probe·h
13	Cyclohexanon	16.40	3.51	µg/Probe·h
14	3/4-Ethyltoluol		0.26	µg/Probe·h
15	1.3.5-Trimethylbenzol	0.01	0.06	µg/Probe·h
16	Ethylcyanoacetat		0.27	µg/Probe·h
17	6-Methyl-5-hepten-2-on	0.29		µg/Probe·h
18	alpha-Methylstyrol		0.26	µg/Probe·h
19	1.2.4-Trimethylbenzol	0.03	0.30	µg/Probe·h
20	Benzaldehyd		0.11	µg/Probe·h
21	2-Ethyl-1-hexanol	0.48	1.22	µg/Probe·h
22	1.2.3-Trimethylbenzol		0.07	µg/Probe·h
23	Indan		0.27	µg/Probe·h
24	Nonanal	0.39	0.49	µg/Probe·h
25	Acetophenon		2.20	µg/Probe·h
26	Cycloaliphat		0.38	µg/Probe·h
27	Dodecan		0.49	µg/Probe·h
28	Pentandisäuredimethylester		0.32	µg/Probe·h
29	Decanal	0.52		µg/Probe·h
30	Aliphat		0.65	µg/Probe·h
31	Tridecan		0.69	µg/Probe·h
32	Naphthalin	0.08	0.22	µg/Probe·h
33	Aliphat		0.57	µg/Probe·h
34	Tetradecan		1.84	µg/Probe·h
35	Aliphat		0.82	µg/Probe·h
36	Pentadekan		2.04	µg/Probe·h

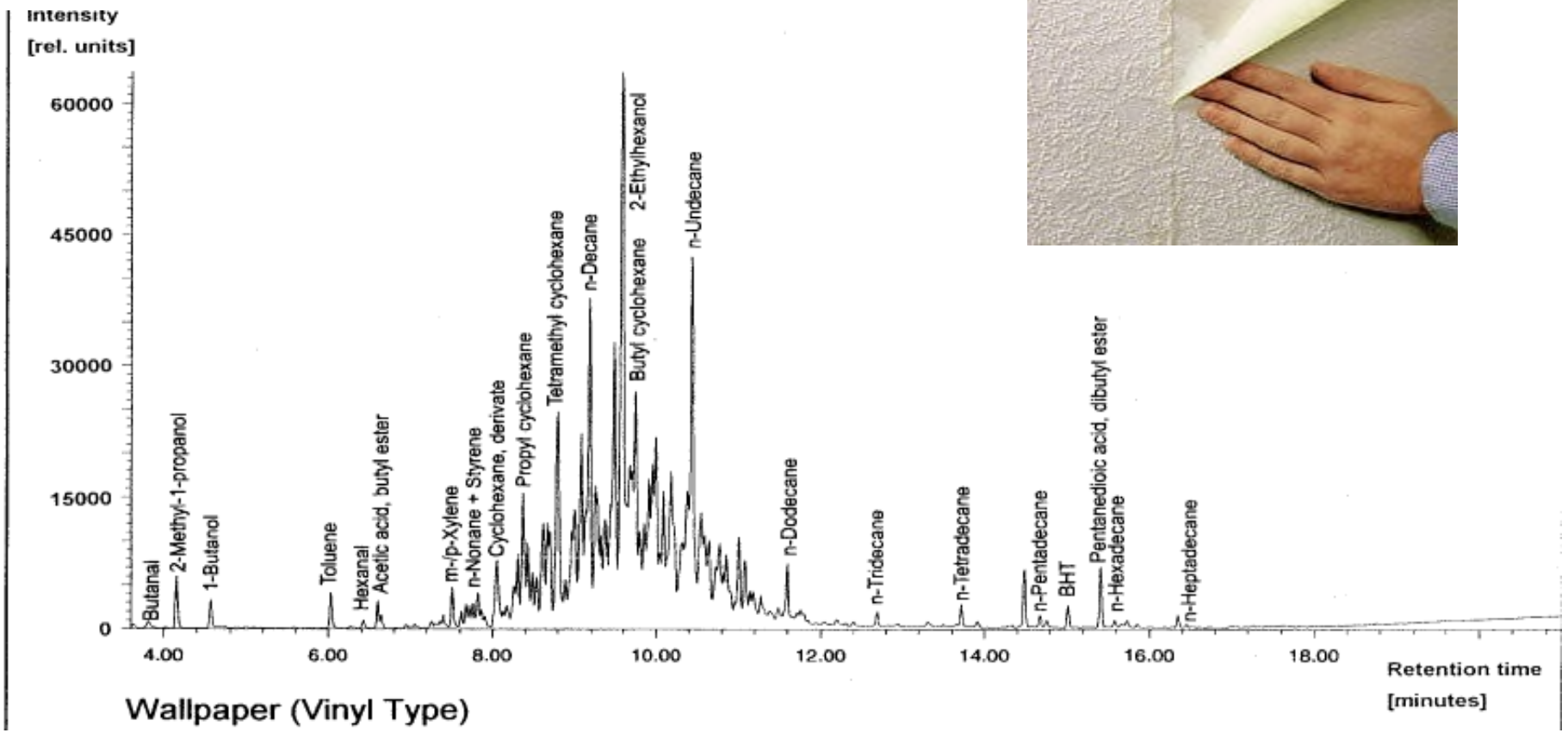
SCHWERMETALLE IN SPIELZEUG



AUSGASUNG WASCHMASCHINE



AUSGASUNG - TAPETE

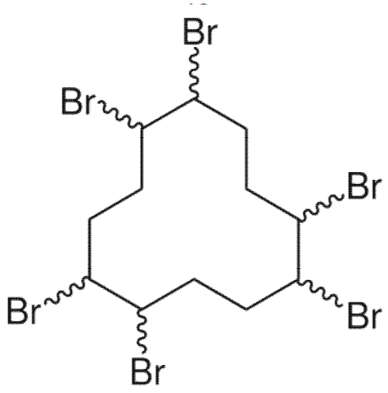


cradletocradle EPEA

ANALYSE - STYROFOAM

Parameter	Messwert	Einheit
Aufschluss mit Königswasser	aus gemahlener Probe	
Aluminium	190	mg/kg TM
Antimon	<1,0	mg/kg TM
Arsen	<1,0	mg/kg TM
Barium	15	mg/kg TM
Beryllium	<1,0	mg/kg TM
Bismut	<1,0	mg/kg TM
Blei	9,9	mg/kg TM
Bor	26	mg/kg TM
Cadmium	0,17	mg/kg TM
Calcium	4200	mg/kg TM
Chrom ges.	13	mg/kg TM
Cobalt	<1,0	mg/kg TM
Eisen, ges.	230	mg/kg TM
Kalium	77	mg/kg TM
Kupfer	7,8	mg/kg TM
Lithium	<1,0	mg/kg TM
Magnesium	1400	mg/kg TM
Mangan	7,7	mg/kg TM
Molybdän	<1,0	mg/kg TM
Natrium	520	mg/kg TM
Nickel	1,5	mg/kg TM
Phosphor ges.	28	mg/kg TM
Quecksilber	<0,10	mg/kg TM
Schwefel ges.	230	mg/kg TM
Selen	<5,0	mg/kg TM
Silber	<1,0	mg/kg TM
Silicium	310	mg/kg TM
Strontium	8,7	mg/kg TM
Tellur	<5,0	mg/kg TM
Thallium	<0,30	mg/kg TM
Titan	4,5	mg/kg TM
Vanadium	<1,0	mg/kg TM
Zink	989	mg/kg TM
Zinn	11	mg/kg TM

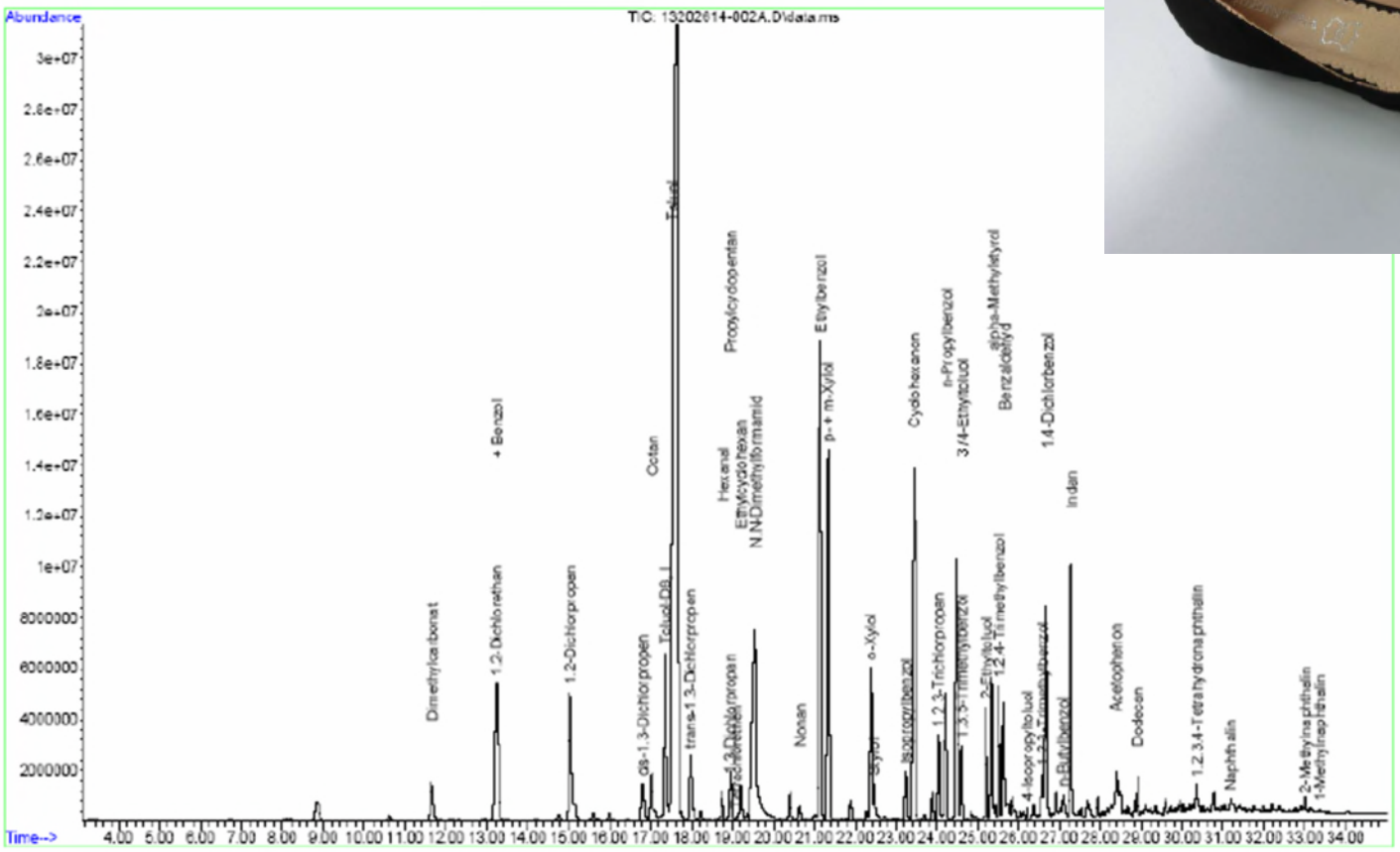
Bromierte Flammschutzmittel	
TeBDE	mg/kg
PBDE 47	mg/kg
PeBDE	mg/kg
PBDE 99	mg/kg
PBDE 100	mg/kg
HxBDE	mg/kg
HpBDE	mg/kg
OBDE	mg/kg
NBDE	mg/kg
DeBDE	mg/kg
TBBPA	mg/kg
DeBB	mg/kg
HBCD	mg/kg



cradletocradle EPEA

AUSGASUNG - SCHUH

```
File       :D:\EPEA\13202614\002\13202614-002A.D
Operator   : Ostrop
Acquired   : 24 Jun 2013    9:01      using AcqMethod SCREEN40.M
Instrument :    GCMSD
Sample Name: 13202614-002
Misc Info  : 10 min, 12,5 L
Vial Number: 0
```



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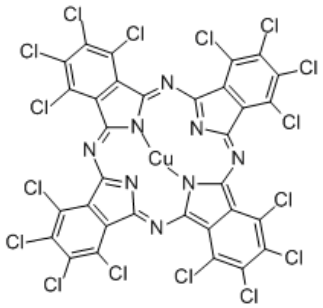
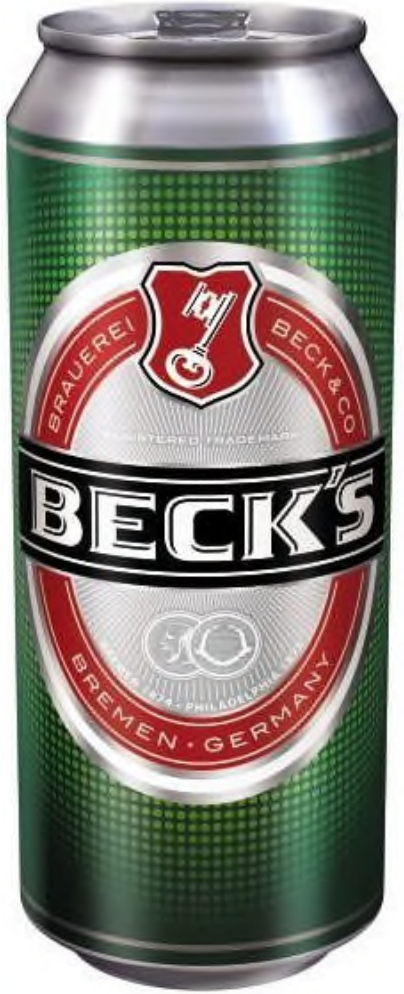
PIGMENT GREEN 7, CAS 1328-53-6

- Stark halogeniert
- Enthält Kupfer





http://www.buddelbreef.de/pl/review/product/list/id/1223/

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Beschichtungen, Pigmente & PVC

Deckel
Aluminum
Druckfarben
Deckschichten
Siegelwachs
Bindemittel
Pigmente
Photoinitiatoren
Zusätze

Becher
Kunststoffe
Zusätze
Pigmente
Verschlüsse
Aufdrucke
Druckfarben

Über 600 Chemikalien in einem Becher!

„KREISLAUFWIRTSCHAFT“

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PLASTIKPROBLEM = PAPIERPROBLEM

SCHADSTOFFE - TOILETTENPAPIER ICE

In Toilettenpapier nachgewiesen*	In mg/kg
Organisches Chlor	700
Organisches Fluor	70
Zink	35
Titan	31
Kupfer	27
Chrom	5.9
Blei	4.0
Nickel	1.4
Antimon	1.2

„Holy shit!“

(Strand von Sansibar, Tansania 2018)

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Baby-Verpackungen

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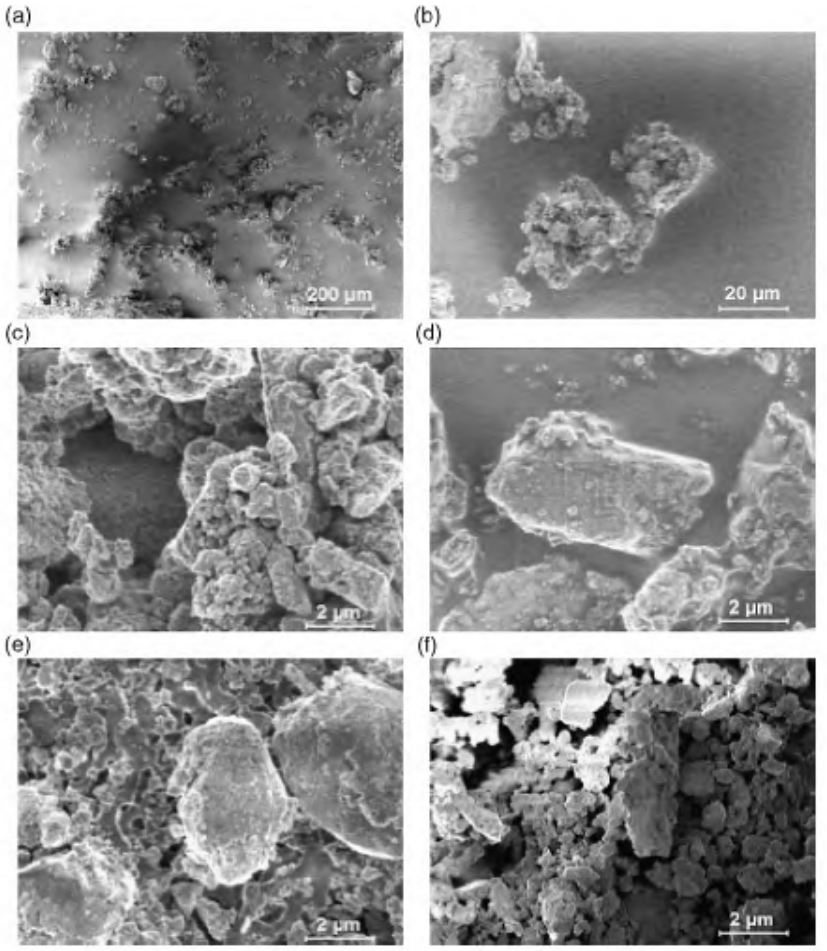
ASBESTFREI?



Elektronenmikroskopische Bilder von Bremstaub
O. von Uexküll and Michael Braungart et al. /
Journal of Cleaner Production 13 (2005) 19–31

REIFENABRIEB

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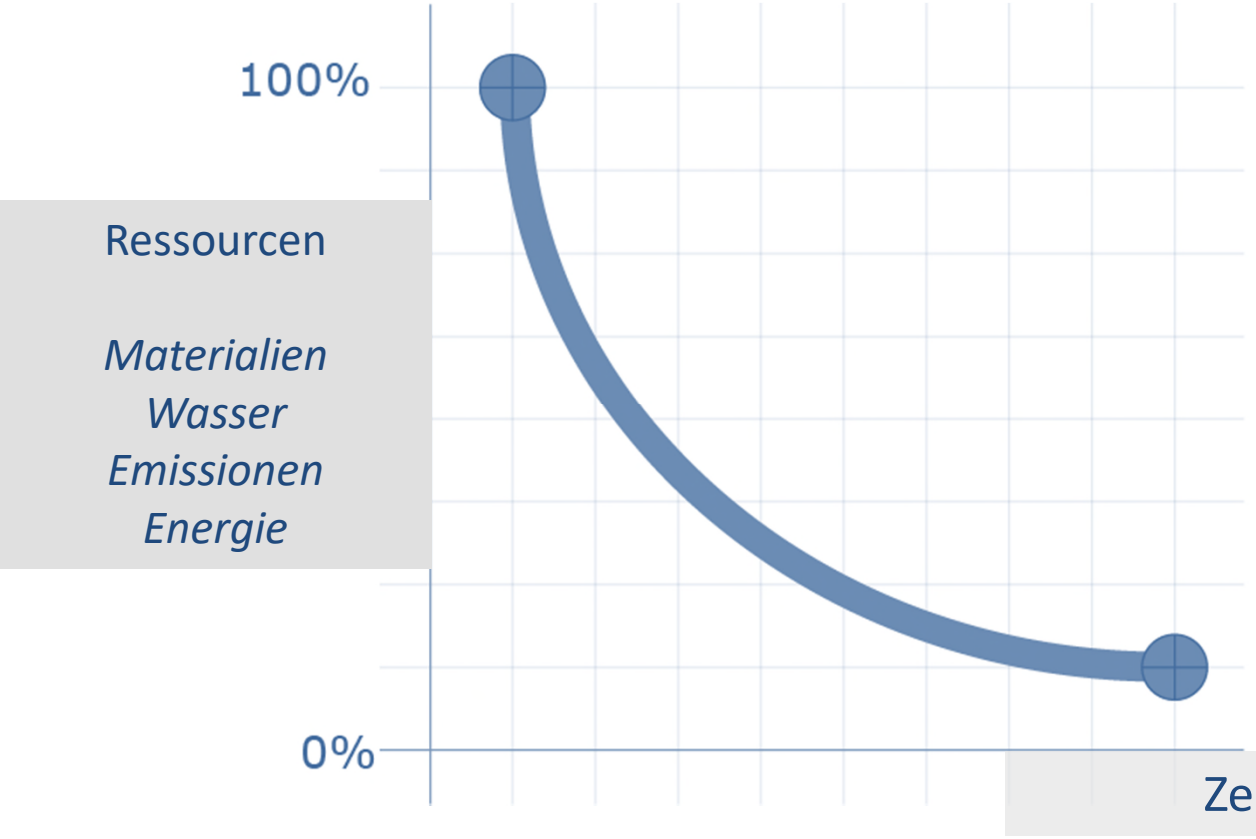
NACHHALTIGKEIT

DEN KUNDEN ZUM FEIND MACHEN?

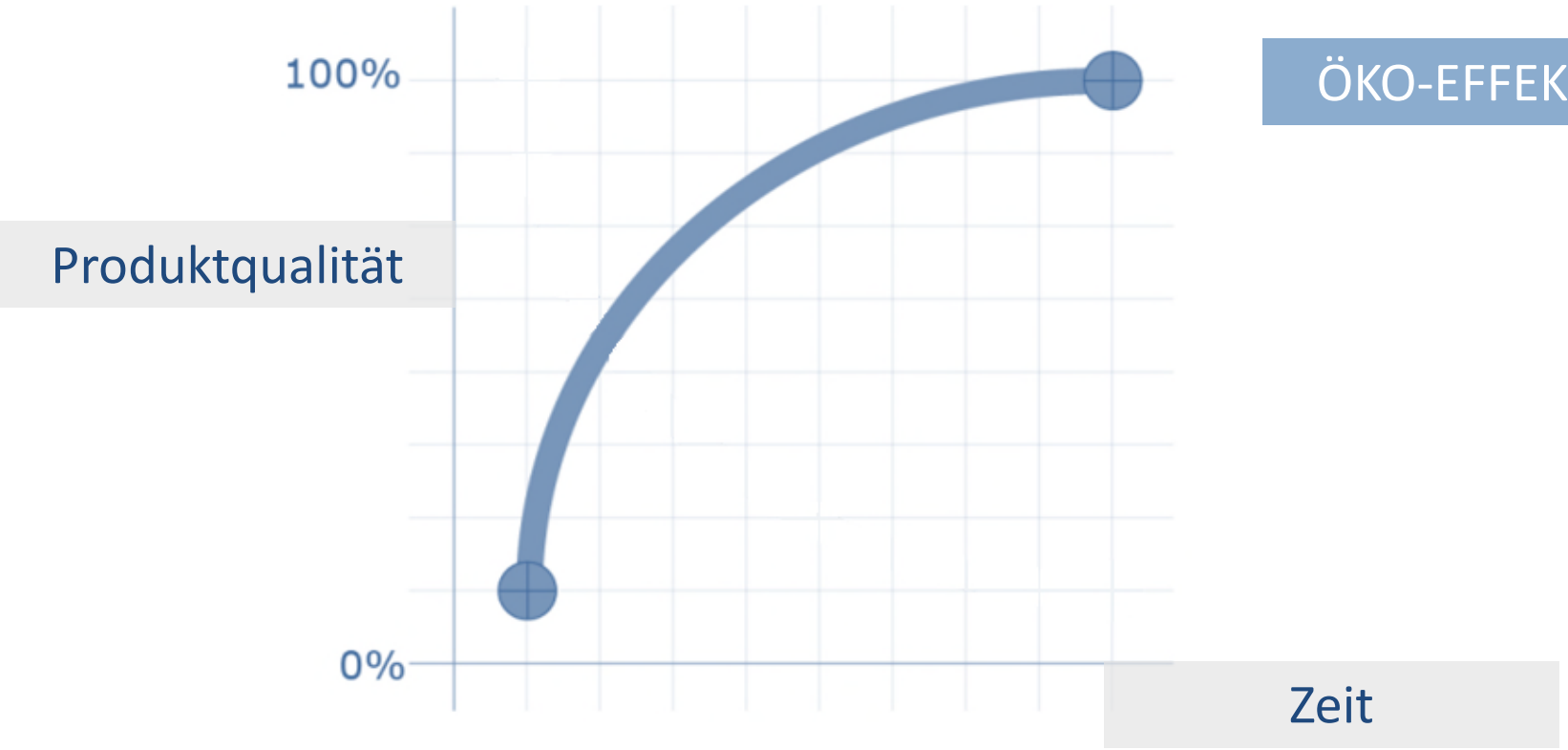


Reduzierung
Vermeidung
Minimierung
Prävention

ÖKO-EFFIZIENZ

Von der Wiege zur Wiege

Ziel ist umfassende Qualität & Nützlichkeit



Cradle to Cradle® Paradigma

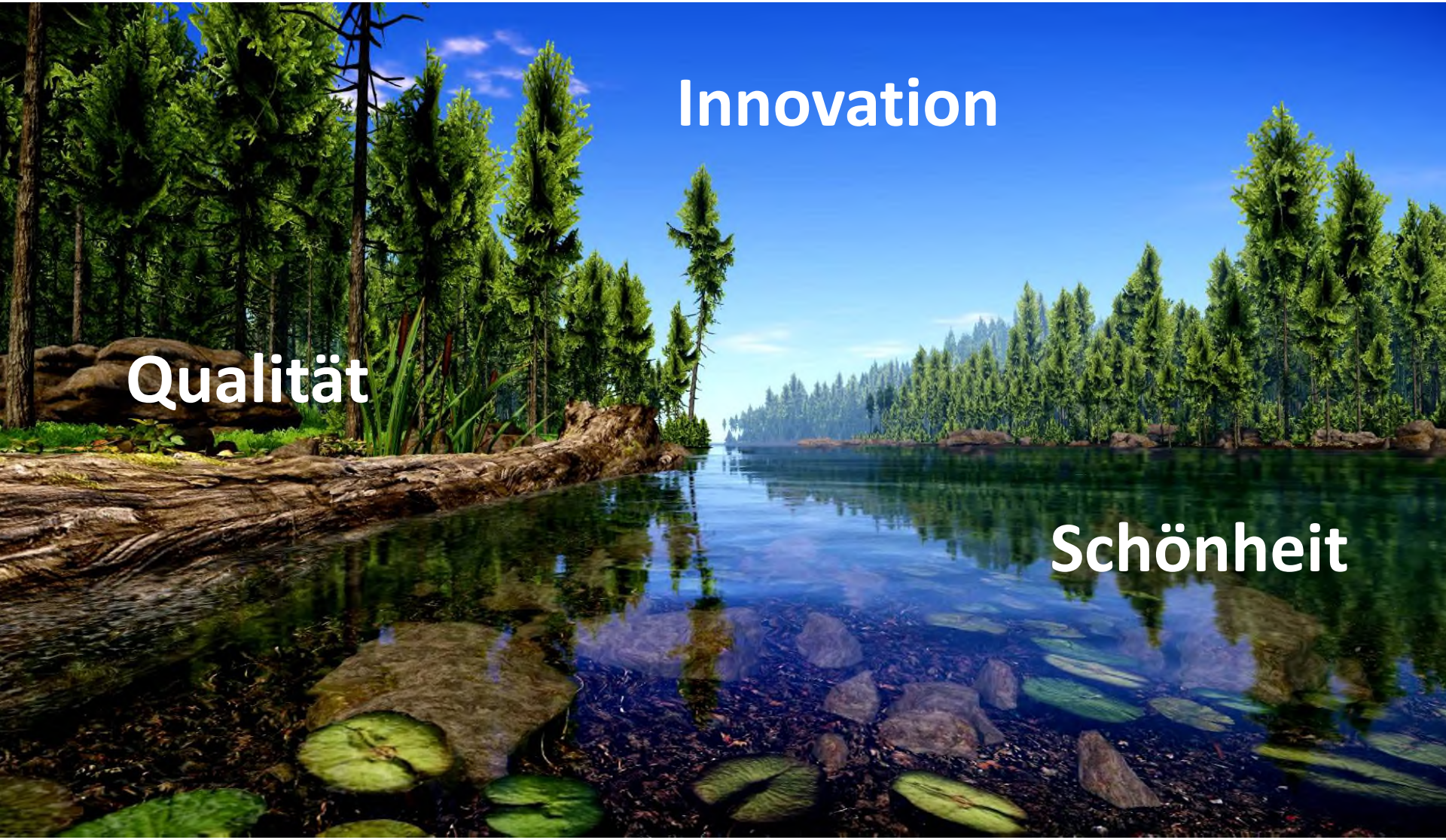
Nährstoffe sind Nährstoffe

Nutzung erneuerbarer Energien

Aktive Unterstützung von Vielfalt

cradletocradle® EPEA

Öko-Effektivität & Öko-Effizienz



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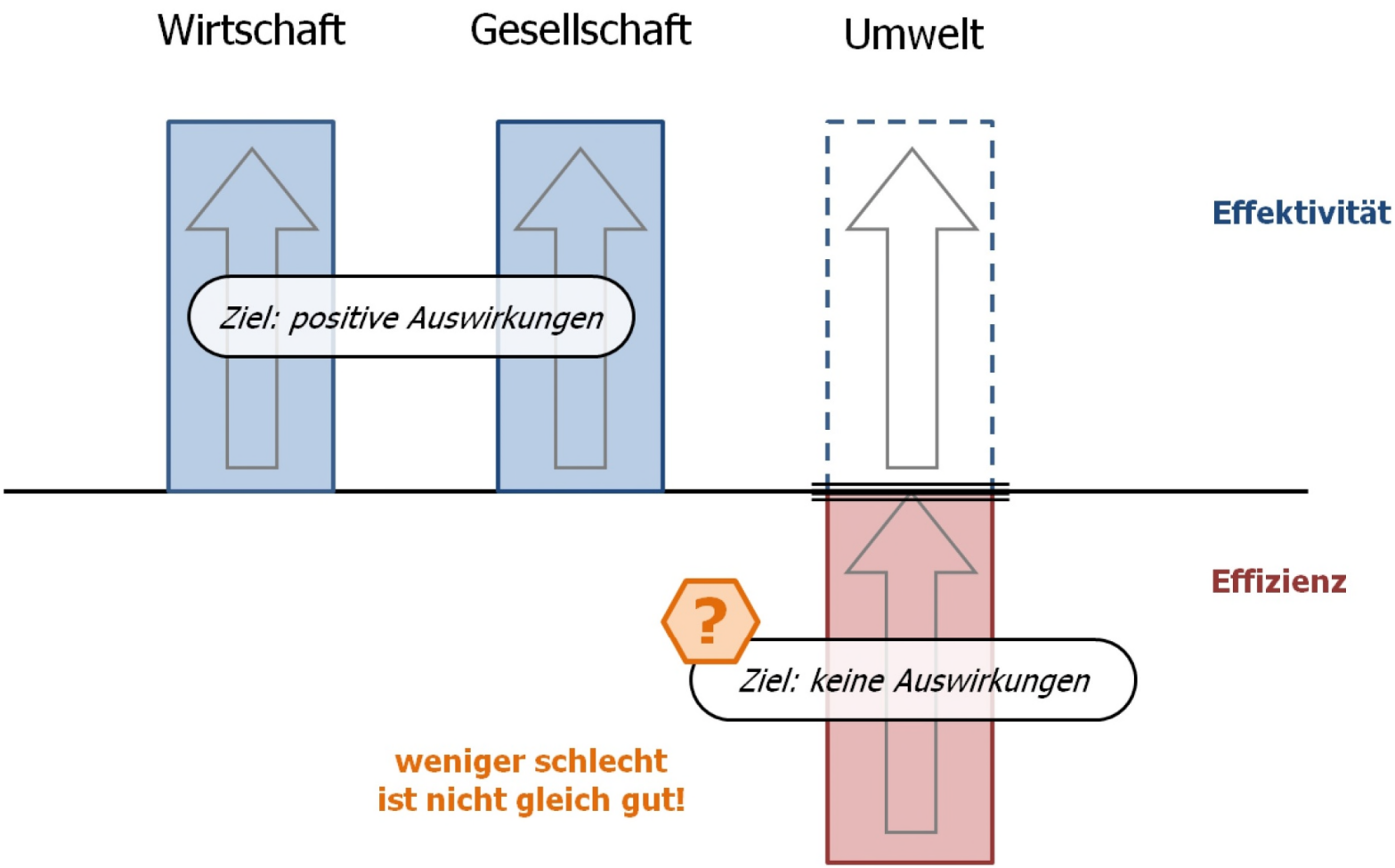
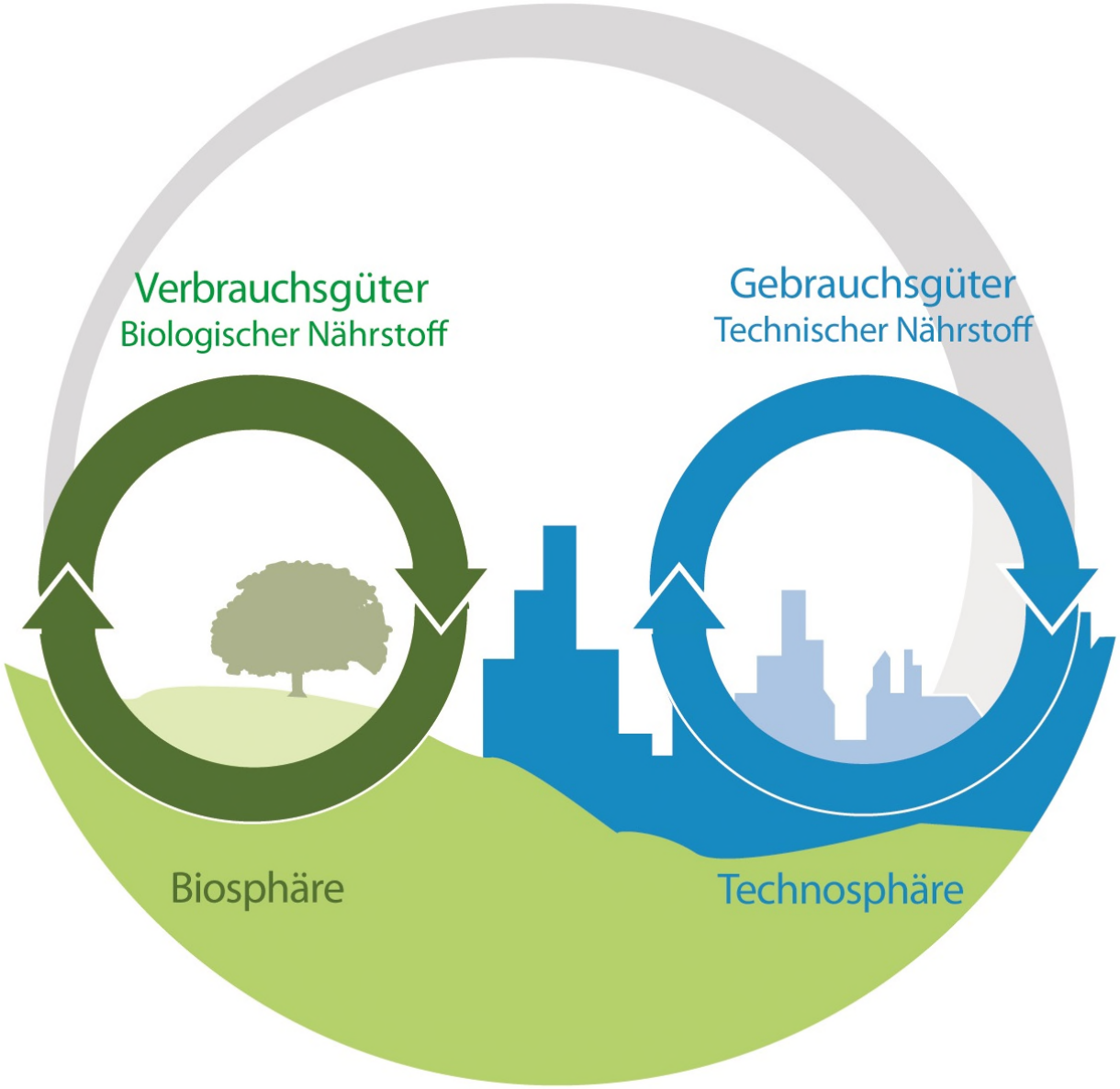
TRIPLE TOP LINE




Verbrauchsgüter
Biologischer Nährstoff
Gebrauchsgüter
Technischer Nährstoff
Biosphäre
Technosphäre

PUMA InCycle Sneaker "Basket"

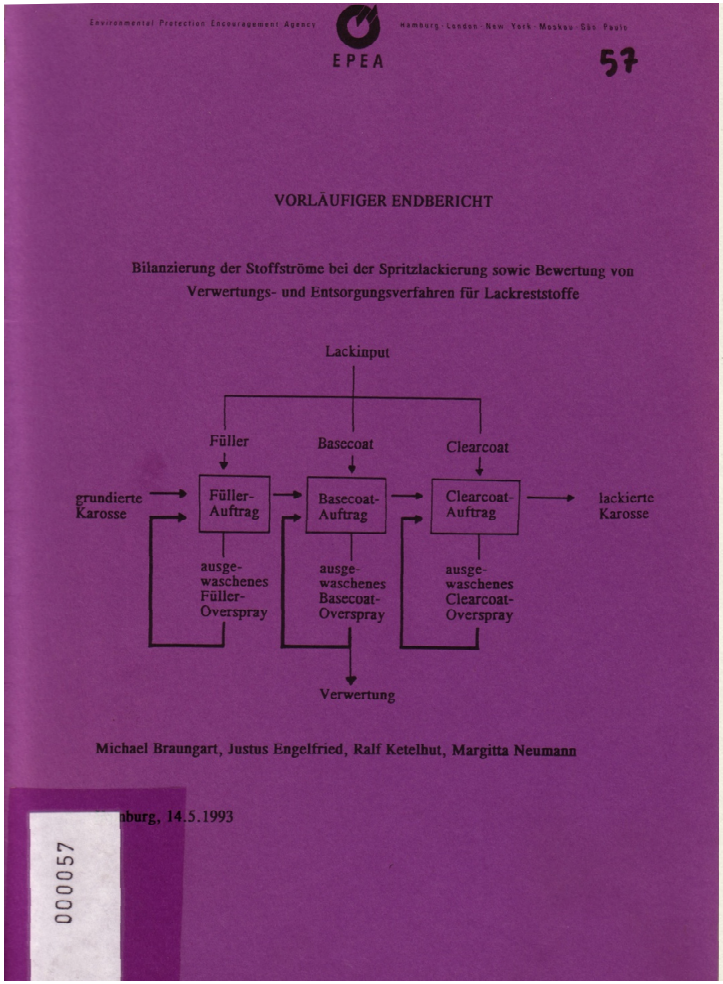
http://about.puma.com/puma-introduces-biodegradable-and-recyclable-products/2012

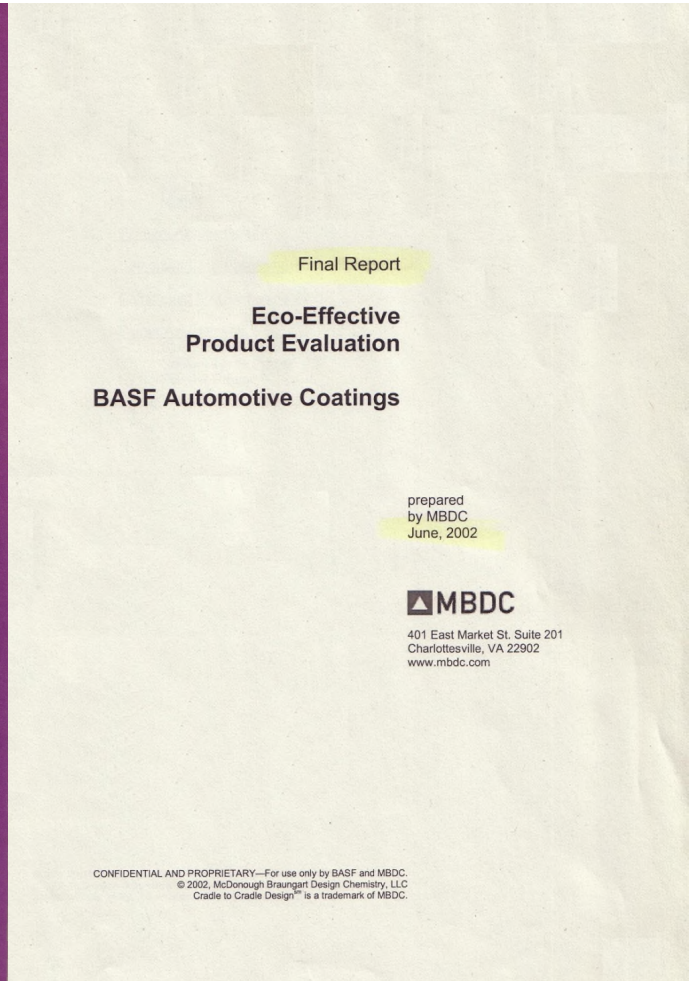
GOODBABY, KINDERWAGEN UND -MÖBEL

Ein Auto wie ein Büffel

Ford Model U

BASF Automotive Coatings





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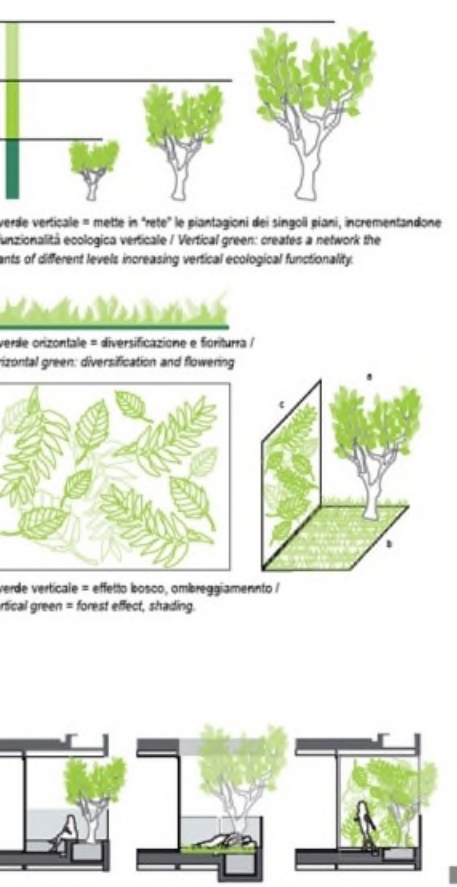
HÄUSER WIE BÄUME, STÄDTE WIE WÄLDER



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BUILDINGS AS MATERIAL BANKS (BAMB)

Get involved in the stakeholder network for special interest groups and visit:

www.bamb2020.eu

1. Materials Passports

2. Reversible Building Design

3. Data management (including BIM)

4. Business Models

5. Policies and Standards

6. Case Studies and Pilots

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BUILDINGS AS MATERIAL BANKS (BAMB)

A Building...

...THAT **CLEANS THE AIR** JUST...

...THAT **CREATES A HEALTHY CLIMATE** JUST ...

...THAT **CHANGES COLOURS WITH THE SEASONS** JUST ...

...THAT **CELEBRATES HEALTHY ABUNDANCE AND BEAUTY** JUST ...

...THAT **CAPTURES LIGHT & CO2 TO MANUFACTURE RENEWABLE MATERIALS** JUST...

...THAT **USES MATERIALS LOCALLY IN A GLOBALLY BENEFICIAL WAY** JUST...

...THAT **RESISTS FIRES, STORMS, FLOODS, DROUGHTS, AND EARTHQUAKES** JUST...

...THAT **PROVIDES MATERIALS FOR CIRCULAR SYSTEMS** JUST...

...THAT **EXCHANGES INFORMATION WITH ITS ENVIRONMENT** JUST...

...THAT **OFFERS SHADE TO PROTECT SPECIES FROM THE SUN** JUST...

...THAT **SYNTHESISES COMPLEX SUBSTANCES** JUST...

...THAT **IS A HABITAT FOR HUNDREDS OF SPECIES** JUST...

...THAT **OPERATES WITH RENEWABLE ENERGY** JUST...

...THAT **GENERATES SOIL AND NUTRIENTS** JUST...

...THAT **SUPPORTS DIVERSE WAYS OF LIFE** JUST...

...THAT **PROMOTES AND CELEBRATES BIODIVERSITY** JUST...

...THAT **CREATES SYMBIOTIC COMMUNITIES** JUST...

...THAT **FEEDS ANIMALS AND PLANTS** JUST...

...THAT **IS SAFE FOR THE BIOSPHERE** JUST...

...THAT **MAKES OXYGEN** JUST...

...THAT **GROWS OVER TIME** JUST ...

...THAT **PURIFIES WATER** JUST ...

...THAT **MAKES GERMANS, TREE HUGGERS AND OTHER EMOTIONAL PEOPLE SING** JUST...

...THAT **ADAPTS OVER TIME, IS SELF-RENEWING, RESTORATIVE AND SELF-REPLICATING** JUST...

...like a Tree.

cradle to cradle® EPEA

CRADLE TO CRADLE® – BILDUNG & FORSCHUNG

TU Delft

LEUPHANA
Universität Lüneburg

UNIVERSITEIT TWENTE.

RSM Erasmus University

TECHNISCHE UNIVERSITÄT MÜNCHEN

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EPEA