

Cocolatex Exports (P) Ltd.
Lt. Col. Mohan Andrews (Retd.) Chungom,
Alleppey 688011

Kerala, Indien

TEST REPORT No. 12470-1

Description of sample:	Latex sample A
Kind of sample:	Latex
Client:	Cocolatex Exports (P) Ltd., Kerala
Sampling by:	by client
Date of arrival of sample:	18.11.2004
Date:	10.12.2004
Number of pages:	1
Page:	1
Test parameter:	According to QUL e.V.: <ul style="list-style-type: none">• Filler, polymer content• Nitrosamines (test chamber)• Pentachlorophenol (PCP), Tetrachlorophenol (TeCP)• VOC (Volatile organic compounds, test chamber)• Carbon disulfide (CS₂, test chamber)
Commercial use of this test report:	1 year ⁱ

¹ QUL = Qualitätsverband umweltverträgliche Latexmatratzen e.V.

Filler, polymer content

Filler	[weight/%]
Polymer content, with reference to the sample	91,7
Ash content (incl. zinc oxide), with reference to the sample	5
Filler content, with reference to the sample ¹⁾	< 5
Polymer content	[weight/%]
NR, with reference to the polymer content ²⁾	100
SBR, with reference to the polymer content	0

Remark:

¹⁾ The amount of filler is calculated as difference between the amount of ash and zinkoxide, assuming that the maximum of zinkoxide is 5 % of the total latex foam.

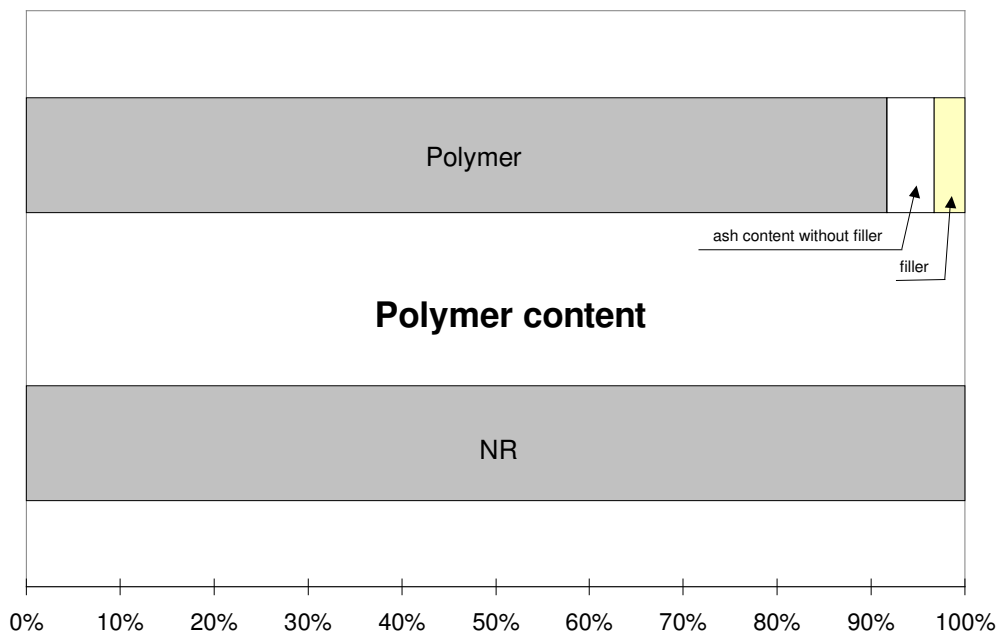
²⁾ If NR-content is below 5 %, the result will be 100 % SBR. Usually there will be no use of NR below 5 % in a mixture of NR and SBR.

Demands by QUL e.V.:

Filler: $\leq 5 \% \pm 1 \%$

Polymer content: NR $\geq 95 \%$

Methods: filler/ash: thermogravimetry; polymer content: IR/ATR.



Nitrosamines (test chamber)

Substance	Concentration [ng/m³]	QUL-Orientation Value [ng/m³]
N-Nitrosodimethylamine	< 100	---
N-Nitrosodiethylamine	< 100	---
N-Nitrosodiisopropylamine	< 100	---
N-Nitrosodipropylamine	< 100	---
N-Nitrosodibutylamine	< 100	---
N-Nitrosopiperidine	< 100	---
N-Nitrosopyrrolidine	< 100	---
N-Nitrosomorpholine	< 100	---
Total:	< 100	300

< = below detection limit

Detection limit: 100 ng/m³

Sample geometry and chamber conditions: see VOC (Volatile organic compounds) test chamber

Test method: according to „Hauptverband der gewerblichen Berufsgenossenschaften - ZH 1/120.23“

Pentachlorophenol (PCP), Tetrachlorophenol (TeCP)

Substance	Content [mg/kg]	QUL-Orientation value [mg/kg]
Pentachlorophenol (PCP)	< 0,01	0,1
Tetrachlorophenol (TeCP)	< 0,01	0,1

< = not detectable, below detection limit

Detection limit: 0,01 mg/kg

Testing method: Extraction, esterification, clean up on silicagel in reference to DFG-method S19, analysis with GC/ECD.

VOC (Volatile organic compounds, test chamber)

<i>Substance/-group</i>	<i>Emission [mg/m³]</i>	<i>SER_d [µg/m²h]</i>
Aromatic Hydrocarbons		
Benzene	< 0,001	< 0,001
Toluene	0,004	0,003
Ethylbenzene	< 0,001	< 0,001
m/p-Xylene	0,001	0,001
o-Xylene	< 0,001	< 0,001
2-Ethyltoluene	< 0,001	< 0,001
3-Ethyltoluene	< 0,001	< 0,001
4-Ethyltoluene	< 0,001	< 0,001
n-Propylbenzene	< 0,001	< 0,001
Iso-Propylbenzene	< 0,001	< 0,001
1,2,4-Trimethylbenzene	0,001	0,001
1,3,5-Trimethylbenzene	< 0,001	< 0,001
1,2,3-Trimethylbenzene	< 0,001	< 0,001
Sum Diethylbenzene	< 0,001	< 0,001
1,2,4,5-Tetramethylbenzene	< 0,001	< 0,001
1,2,3,5-Tetramethylbenzene	< 0,001	< 0,001
1,2,3,4-Tetramethylbenzene	< 0,001	< 0,001
1,3-Diisopropylbenzene	< 0,001	< 0,001
1,4-Diisopropylbenzene	< 0,001	< 0,001
p-Cymene	< 0,001	< 0,001
Butylbenzene	< 0,001	< 0,001
Heptylbenzene	< 0,001	< 0,001
Octylbenzene	< 0,001	< 0,001
Nonylbenzene	< 0,001	< 0,001
Decylbenzene	< 0,001	< 0,001
Undecylbenzene	< 0,001	< 0,001
Naphthalene	< 0,001	< 0,001
1-Methylnaphthalene	< 0,001	< 0,001
2-Methylnaphthalene	< 0,001	< 0,001
Chlornaphthalene	< 0,001	< 0,001
Styrene	< 0,001	< 0,001
Alpha-Methylstyrene	< 0,001	< 0,001
Σ m,o,p-Methylstyrene	< 0,001	< 0,001
4-Phenyl-1-Cyclohexene	< 0,001	< 0,001
Phenylacetylen	< 0,001	< 0,001
Indene	< 0,001	< 0,001

Substance/-group	Emission [mg/m³]	SER_a [µg/m²h]
Aliphatic Hydrocarbons		
n-Hexane	< 0,001	< 0,001
n-Heptane	< 0,001	< 0,001
n-Octane	< 0,001	< 0,001
n-Nonane	< 0,001	< 0,001
n-Decane	< 0,001	< 0,001
n-Undecane	< 0,001	< 0,001
n-Dodecane	< 0,001	< 0,001
n-Tridecane	< 0,001	< 0,001
n-Tetradecane	< 0,001	< 0,001
n-Pentadecane	< 0,001	< 0,001
n-Hexadecane	< 0,001	< 0,001
Methylcyclopentane	< 0,001	< 0,001
Cyclohexane	< 0,001	< 0,001
Methylcyclohexane	< 0,001	< 0,001
1-Hexene	< 0,001	< 0,001
1-Octene	< 0,001	< 0,001
1-Decene	< 0,001	< 0,001
2,4,4-Trimethyl-1-pentene	< 0,001	< 0,001
4-Vinylcyclohexene	< 0,001	< 0,001
Dimethylcyclohexane	< 0,001	< 0,001
Tert.-Butylcyclohexane	< 0,001	< 0,001
Terpenes		
α-Pinene	< 0,001	< 0,001
β-Pinene	< 0,001	< 0,001
δ-3-Carene	< 0,001	< 0,001
Limonene	0,002	0,002
α-Terpinene	< 0,001	< 0,001
Borneol	< 0,001	< 0,001
Tr.-Caryophyllene	< 0,001	< 0,001
Terpineol	< 0,001	< 0,001
Alcohol's		
1-Butanol	< 0,001	< 0,001
2-Ethyl-1-hexanol	< 0,001	< 0,001
Furfuryl alcohol	< 0,001	< 0,001

Substance/-group	Emission [mg/m³]	SER_a [µg/m²h]
Glycol's		
Ethylene glycol	< 0,001	< 0,001
Diethylene glycol	< 0,001	< 0,001
1,2-Propandiol	< 0,001	< 0,001
1,3-Propandiol	< 0,001	< 0,001
2-Methoxyethanol	< 0,001	< 0,001
2-Ethoxyethanol	< 0,001	< 0,001
2-Butoxyethanol	< 0,001	< 0,001
1-Methoxy-2-propanol	< 0,001	< 0,001
2-Butoxyethoxyethanol	< 0,001	< 0,001
2-Phenoxyethanol	< 0,001	< 0,001
1-Butoxy-2-propanol	< 0,001	< 0,001
2-Ethoxyethylacetate	< 0,001	< 0,001
2-Ethoxyethoxyethanol	< 0,001	< 0,001
2-Methyl-2,4-pentandiol	< 0,001	< 0,001
Isopropoxyethanol	< 0,001	< 0,001
2-Ethoxyethylether	< 0,001	< 0,001
2-(2-Methoxy-ethoxy)ethanol	< 0,001	< 0,001
3-Ethoxy-1-propanol	< 0,001	< 0,001
Diethylenglykolhexylether	< 0,001	< 0,001
Dipropylenglykolmethylether	< 0,001	< 0,001
2-Methoxyethylacetate	< 0,001	< 0,001
2-Ethoxyethylacetate	< 0,001	< 0,001
2-Butoxyethylacetate	< 0,001	< 0,001
1-Methoxy-2-propanolacetate	< 0,001	< 0,001
2-Butoxyethoxyethyl-acetate	< 0,001	< 0,001
Aldehydes		
n-Butanal	< 0,001	< 0,001
n-Pentanal	< 0,001	< 0,001
n-Hexanal	0,001	0,001
n-Heptanal	< 0,001	< 0,001
n-Oktanal	< 0,001	< 0,001
n-Nonanal	< 0,001	< 0,001
n-Dekanal	< 0,001	< 0,001
2-Butenal	< 0,001	< 0,001
2-Pentenal	< 0,001	< 0,001
2-Hexenal	< 0,001	< 0,001
2-Heptenal	< 0,001	< 0,001
2-Octenal	< 0,001	< 0,001
2-Nonenal	< 0,001	< 0,001
2-Decenal	< 0,001	< 0,001
2-Undecenal	< 0,001	< 0,001
Benzaldehyde	< 0,001	< 0,001
2,5-Dimethylbenzaldehyde	< 0,001	< 0,001
Glutardialdehyde	< 0,001	< 0,001
Furfurol	< 0,001	< 0,001
5-Methylfurfural	< 0,001	< 0,001

Substance/-group	Emission [mg/m³]	SER_a [µg/m²h]
Ketones		
Methylethylketone	< 0,001	< 0,001
Methylisobutylketone	< 0,001	< 0,001
2-Pentanone	< 0,001	< 0,001
Cyclohexanone	< 0,001	< 0,001
4-Methylcyclohexanone	< 0,001	< 0,001
Diisopropylketone	< 0,001	< 0,001
Acetophenone	< 0,001	< 0,001
Benzophenone	< 0,001	< 0,001
Acids		
Hexanoic acid	< 0,001	< 0,001
2-Ethylhexanoic acid	< 0,001	< 0,001
Esters		
Methylacetate	< 0,001	< 0,001
Ethylacetate	< 0,001	< 0,001
Butylacetate	0,001	0,001
Isobutylacetate	< 0,001	< 0,001
Isopropylacetate	< 0,001	< 0,001
3-Methylbutylacetate	< 0,001	< 0,001
Vinylacetate	< 0,001	< 0,001
Methyldecanoat	< 0,001	< 0,001
Succinicaciddimethylester	< 0,001	< 0,001
Glutaricaciddimethylester	< 0,001	< 0,001
Adipicaciddimethylester	< 0,001	< 0,001
Phenols		
Phenol	< 0,001	< 0,001
4-Chloro-3-methyl-phenol	< 0,001	< 0,001
o-Cresole	< 0,001	< 0,001
m,p-Cresole	< 0,001	< 0,001
Halocarbons		
cis-1,2-Dichlorethene	< 0,001	< 0,001
trans-1,2-Dichlorethene	< 0,001	< 0,001
Trichlorethene	< 0,001	< 0,001
Tetrachlorethene	< 0,001	< 0,001
1,1,1-Trichlorethane	< 0,001	< 0,001
1,4-Dichlorbenzene	< 0,001	< 0,001
Trichlormethane	< 0,001	< 0,001
Tetrachlormethane	< 0,001	< 0,001
1,2-Dichlorbenzene	< 0,001	< 0,001
1,3-Dichlorbenzene	< 0,001	< 0,001
1,2,3-Trichlorbenzene	< 0,001	< 0,001
1,2,4-Trichlorbenzene	< 0,001	< 0,001
1,3,5-Trichlorbenzene	< 0,001	< 0,001
1,2,3,5-Tetrachlorbenzene	< 0,001	< 0,001
1,2,4,5-Tetrachlorbenzene	< 0,001	< 0,001

Substance/-group	Emission [mg/m³]	SER_a [µg/m²h]
Phthalates		
DMP	< 0,001	< 0,001
DEP	0,002	0,002
DPP	< 0,001	< 0,001
DnBP	< 0,001	< 0,001
DiBP	< 0,001	< 0,001
Acrylates		
Ethylacrylate	< 0,001	< 0,001
Methylacrylate	< 0,001	< 0,001
n-Butylacrylate	< 0,001	< 0,001
Isobutyl-methacrylate	< 0,001	< 0,001
t-Butylacrylate	< 0,001	< 0,001
Methyl-methacrylate	< 0,001	< 0,001
Butyl-methacrylate	< 0,001	< 0,001
2-Ethylhexylacrylate	< 0,001	< 0,001
Glycid-methacrylate	< 0,001	< 0,001
1,6-Hexandioldiacrylate	< 0,001	< 0,001
Siloxane		
Hexamethylcyclotrisiloxane	< 0,001	< 0,001
Octamethylcyclotrisiloxane	< 0,001	< 0,001
Decamethylcyclotrisiloxane	< 0,001	< 0,001
Other calibrated VOC		
TXIB® ¹	< 0,001	< 0,001
Texanol®	< 0,001	< 0,001
2-Pentylfuran	< 0,001	< 0,001
THF	< 0,001	< 0,001
Aniline	< 0,001	< 0,001
DMF	< 0,001	< 0,001
1-Me-2-pyrrolidone	< 0,001	< 0,001
Benzothiazene	0,009	0,007
BHT	< 0,001	< 0,001
Others non-calibrated VOC, quantified as toluene-equivalent		
Diethylamine	0,024	0,018
N,N-Diethylformamid	0,002	0,002
Keton, possibly with 7 or 8 carbon atoms	0,002	0,002
Sesquiterpen	0,001	0,001
Total:	0,050	0,039
QUL-orientation value without isoaliphates:	0,5	0,39

< = below detection limit

Detection limit: 0,001 mg/m³

Orientation value for the single substance: 0,15 mg/m³

¹ TXIB® = 2,2,4-trimethyl-1,3-pentandiol diisobutyrat

Substance/-group	Emission [mg/m³]	SER_a [µg/m²h]
Isoaliphates		
2-Methylpentane	< 0,001	< 0,001
3-Methylpentane	< 0,001	< 0,001
Iso-Octane	< 0,001	< 0,001
Total isoaliphate:	< 0,001	< 0,001
QUL-orientation value isoaliphate:	0,5	0,39

< = below detection limit

Detection limit: 0,001 mg/m³

Orientation value for the single substance: 0,15 mg/m³

Sample geometry: sealed edges: No
Loading related to: area
Sample volume: 27,7 x 27,7 x 15,5 cm

Chamber conditions: according to the standards DIN EN 13419 and DIN V ENV 717-1 i. A.
Volume: 0,25 m³
Temperature: 23 °C
Rel. Humidity: 45 %
Pressure: Normal
Air: Clean
Air change rate: 1,0 h⁻¹
Air velocity: 0,3 m/s
Loading: 1,3 m²/m³
Specific air flow rate: 0,77 m³/m²*h
Sampling after: 48 h after loading of test chamber

Method: DIN ISO 16000-6

Carbon disulfide (CS₂, test chamber)

Substance	Concentration [µg/m³]	QUL-orientation value [µg/m³]
Carbon disulfide CS ₂	< 1	50

< = below detection limit

Detection limit: 1 µg/m³

Sample geometry: see VOC (Volatile organic compounds) test chamber

Chamber conditions: see VOC (Volatile organic compounds) test chamber

Method: DIN ISO 16000-6

Cologne, 10.12.2004

Dr. H.-U. Krieg
(Laboratory Manager)

Assessment

The tested sample "Latex sample A", manufactured by Cocolatex Exports (P) Ltd., fulfils the criteria of the "Qualitätsverband umweltverträgliche Latexmatratzen e.V." (QUL) to the above-mentioned range.

Cologne, 10.12.2004

Dr. Frank Kuebart
(Project Manager)

ⁱ For the interest of product safety we set a time limit of 1 year for commercial use of this report. Products with changing raw materials need a regular check for an effective quality control.