Exposure to toluene and other neurotoxic substances in Danish children's bedrooms

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Purpose

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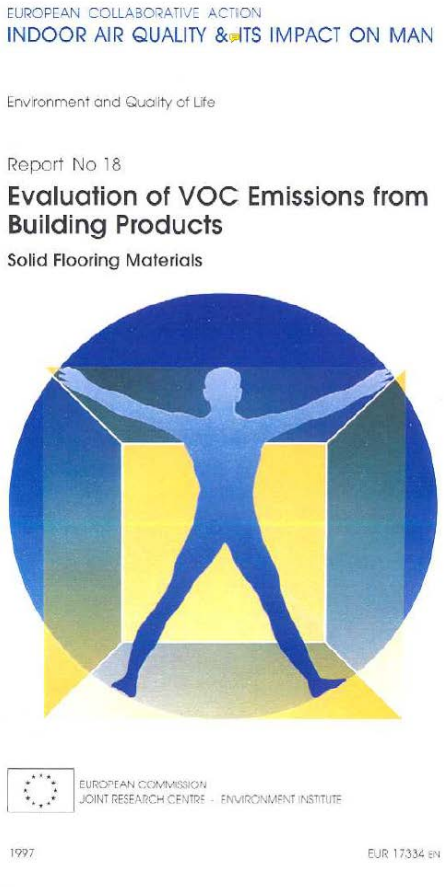
Children are particularly sensitive to substances that may affect their developing central nervous system. It is essential to know the exposure of children to toluene and similar neurotoxic substances in order to assess whether such exposures could pose a risk for adverse effects on the developing central nervous system.

The purpose of the project is to investigate whether exposure to toluene and other substances with similar mode of action in children's bedrooms can be problematic for children's health.

Background

Year 1997



LCI: The lowest concentration of a pollutant which, according to best professional judgement, might have an effect on people in the indoor environment.

Table 4.2 "Lowest Concentrations of Interest" (LCIs) of VOCs detected in emissions from flooring materials. Letters in the column "Reference" refer to explanations in table 4.3

LCI values in this Table are only intended to be used for the purpose of the evaluation procedure described in Chapter 6. They are not intended as surrogates for (indoor) air quality guidelines.

Chemical Compounds	CAS No.	LCI [µg m^{-3}]	Reference to table 4.3	AQG or OEL/SF [µg m^{-3}]	Origin
AROMATIC HYDROCARBONS					
Toluene	108-88-3	**1 000** [1)]		1 000 [1)]	WHO
Ethylbenzene	100-41-4	**1 000**		1 000	DK
Xylenes	1330-20-7	**1 000**		1 500	DK
p.-Xylene	106-42-3	**1 000**		1 500	DK
m.-Xylene	108-38-3	**1 000**		1 500	DK
o-Xylene	95-47-6	**1 000**		1 500	DK
Isopropylbenzene (cumene)	98-82-8	**1 000**		1 200	DK, UK
n-Propylbenzene	103-65-1	**1 000**	a		
1-Propenylbenzene	637-50-3	**1 000**	b		
Trimethylbenzene		**1 000**	a		
1,3,5-Trimethylbenzene	108-67-8	**1 000**		1 200	DK, UK
1,2,4-Trimethylbenzene	95-63-6	**1 000**		1 200	DK, UK
1,2,3-Trimethylbenzene	526-73-8	**1 000**		1 200	DK,UK
2-Ethyl toluene	611-14-3	**2 000**		2 170	DK
1-Methyl-2-propylbenzene	1074-17-5	**1 000**	a		
1-Methyl-3-propylbenzene	1074-43-7	**1 000**	a		
1,2,4,5-Tetramethylbenzene	95-93-2	**1 000**	a		
n-Butylbenzene	104-51-8	**1 000**	a		
1,3-Diisopropyl benzene	99-62-7	**1 000**	a		
1,4-Diisopropyl benzene	100-18-5	**1 000**	a		
2-Phenyl octane	777-22-0	**1 000**	a		
5-Phenyl decane	4537-11-5	**1 000**	a		
5-Phenyl undecane	4537-15-9	**1 000**	a		
4-Phenyl cyclohexene (4-PCH)	31017-40-0	**800**	c		
Styrene	100-42-5	**70** [1)]		70 [1)]	WHO
Ethynylbenzene	536-74-3	**800**	c		
a-Methylstyrene	98-83-9	**1 000**		1 200	DK
o-Methylstyrene	611-15-4	**1 000**		1 200	DK
m.p.-Methylstyrene m: p:	100-80-1 622-97-9	**1 000**		1 200	DK
Naphtalene	91-20-3	**500**		500	DK, UK

Background

Year 2000

Approx. 35 pollutants

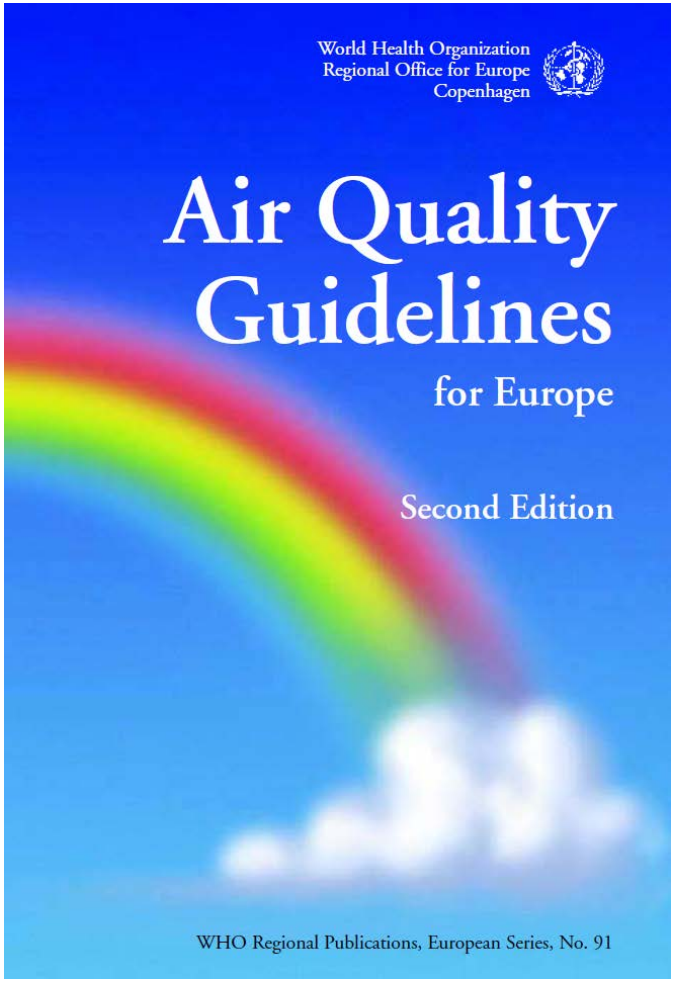


Table 2. Guideline values for individual substances based on effects other than cancer or odour/annoyance

Substance	Time-weighted average	Averaging time
Cadmium	5 ng/m³[a]	annual
Carbon disulfide[b]	100 µg/m³	24 hours
Carbon monoxide	100 mg/m³[c]	15 minutes
	60 mg/m³[c]	30 minutes
	30 mg/m³[c]	1 hour
	10 mg/m³	8 hours
1,2-Dichloroethane[b]	0.7 mg/m³	24 hours
Dichloromethane	3 mg/m³	24 hours
	0.45 mg/m³	1 week
Fluoride[d]	–	–
Formaldehyde	0.1 mg/m³	30 minutes
Hydrogen sulfide[b]	150 µg/m³	24 hours
Lead	0.5 µg/m³	annual
Manganese	0.15 µg/m³	annual
Mercury	1 µg/m³	annual
Nitrogen dioxide	200 µg/m³	1 hour
	40 µg/m³	annual
Ozone	120 µg/m³	8 hours
Particulate matter[e]	Dose–response	–
Platinum[f]	–	–
PCBs[g]	–	–
PCDDs/PCDFs[h]	–	–
Styrene	0.26 mg/m³	1 week
Sulfur dioxide	500 µg/m³	10 minutes
	125 µg/m³	24 hours
	50 µg/m³	annual
Tetrachloroethylene	0.25 mg/m³	annual
Toluene	0.26 mg/m³	1 week
Vanadium[b]	1 µg/m³	24 hours

Background

Year 2013

EUROPEAN COLLABORATIVE ACTION

URBAN AIR, INDOOR ENVIRONMENT AND HUMAN EXPOSURE

Environment and Quality of Life

Report No 29

Harmonisation framework for health based evaluation of indoor emissions from construction products in the European Union using the EU-LCI concept

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Table 9. *The content of the EU-LCI Master List (as of July 2013)*

EU-LCI no.	CAS no.	Compound	EU-LCI	NIK ($\mu g/m^3$)	Remarks / derived from	CLI ($\mu g/m^3$)	Remarks / derived from	Explanatory note	Status of EU-LCI values
Version: July 2013			Interim	AgBB		AFSSET/ ANSES			
			2012	2012		2009			
1		AROMATIC HYDROCARBONS							
1-1	108-88-3	Toluene	2900	1900	EU: Repr. 2; Individ. substance evaluation	300	VG Index 2005; EU Repr. Cat. 3		'Derived' Interim EU-LCI
1-2	100-41-4	Ethylbenzene	850	880	OEL D	750	VTR RIVM		'Derived' Interim EU-LCI
1-3	1330-20-7 106-42-3 108-38-3 95-47-6	Xylene (o-, m-, p-) and mix of o-, m- and p-xylene isomers	500	2200	EU-OEL	200	VG Index		'Derived' Interim EU-LCI
1-4	98-82-8	Isopropylbenzene (Cumene)		1000	EU-OEL/OEL D	400	VTR IRIS US EPA		EU-LCI 'with derivation pending'
1-5	103-65-1	n-Propylbenzene	950	1000	cf. lowest LCI of saturated alkylbenzenes 1-6; EU-OEL/OEL D	200	Analogy xylene 1-3; VG Index	Procedure for read-across applied	'Derived' Interim EU-LCI
1-6	108-67-8 95-63-6 526-73-8	Trimethylbenzene (1,2,3-;1,2,4-;1,3,5-)	450	1000	EU-OEL/OEL D	1000	OEL F		'Derived' Interim EU-LCI
1-7	611-14-3	2-Ethyltoluene		1000	cf. lowest LCI of saturated alkylbenzenes 1-6; EU-OEL/OEL D	200	Analogy 1-3; VG Index	Procedure for read-across to be applied	EU-LCI 'with derivation pending'
1-8	527-84-4 535-77-3 99-87-6 25155-15-1	Cymene (o-,m-,p-) (1-Isopropyl-2(3,4)-methylbenzene) and mix of o-,m- and p-cymene	1000	1100	cf. lowest LCI of saturated alkylbenzenes 1-6; conversion via molecular weight; EU-OEL/OEL D	1000	OEL Belgium	Precautionary approach by adopting the lower value	'Ascribed' Interim EU-LCI

Background

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Present definition of EU-LCI value

EU-LCI values are health-based reference concentrations of volatile organic compounds for inhalation exposure used to assess emissions after 28 days from a single product during a laboratory test chamber procedure.

The procedure is defined in the European Standard EN 16516.

EU-LCI values should be applied in product safety assessment with the ultimate goal to avoid health risks from long-term exposure of the general population.

Background

EUROPEAN STANDARD **EN 16516**

NORME EUROPÉENNE

EUROPÄISCHE NORM October 2017

ICS 13.040.20; 91.100.01 Supersedes CEN/TS 16516:2013

English Version

Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air

Produits de construction: Évaluation de l'émission de substances dangereuses - Détermination des émissions dans l'air intérieur

Bauprodukte: Bewertung der Freisetzung gefährlicher Stoffe - Bestimmung der Emissionen in die Innenraumluft

This European Standard was approved by CEN on 9 July 2017.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Background

Agreed EU-LCI values
Year 2017

Approx. 136 substances

No.	CAS no.	Compound	EU-LCI (µg/m³)	Status of EU-LCI value	Year of adoption
1		*Aromatic hydrocarbons*			
1-1	108-88-3	Toluene	2900	Derived EU-LCI	2013
1-2	100-41-4	Ethylbenzene	850	Derived EU-LCI	2013
1-3	1330-20-7 106-42-3 108-38-3 95-47-6	Xylene (o-, m-, p-) and mix of o-, m- and p-xylene isomers	500	Derived EU-LCI	2013
1-4*	98-82-8	Isopropylbenzene (cumene)	1700	Derived EU-LCI	2017
1-5	103-65-1	n-Propylbenzene	950	Derived EU-LCI	2013
1-6	108-67-8 95-63-6 526-73-8	Trimethylbenzene (1,2,3-,1,2,4-,1,3,5-)	450	Derived EU-LCI	2013
1-7	611-14-3	2-Ethyltoluene	550	Derived EU-LCI	2014
1-8	527-84-4 535-77-3 99-87-6 25155-15-1	Cymene (o-, m- ,p-,) (1-isopropyl-2(3,4)-methylbenzene) and mix of o-, m-, and p-cymene	1000	Ascribed EU-LCI	2013
1-9	95-93-2	1,2,4,5-Tetramethylbenzene	250	Derived EU-LCI	2016
1-10	104-51-8	n-Butylbenzene	1100	Derived EU-LCI	2014
1-11	99-62-7 100-18-5	Diisopropylbenzene (1,3-, 1,4-)	750	Derived EU-LCI	2013
1-12	2189-60-8	Phenyl octane and isomers	1100	Derived EU-LCI	2013
1-16	100-42-5	Styrene	250	Derived EU-LCI	2013
1-17*	98-83-9	2-Phenylpropene (α-methylstyrene)	1200	Derived EU-LCI	2018
1-20*	611-15-4 100-80-1 622-97-9 25013-15-4	Vinyl toluene (o-, m-, p-) and mix of o-, m-, and p-vinyl toluene	1200	Derived EU-LCI	2018
1-23	91-20-3	Naphthalene	10	Derived EU-LCI	2015
1-25	95-13-6	Indene	450	Ascribed EU-LCI	2013
2		*Saturated aliphatic hydrocarbons (n-, iso- and cyclo-)*			
2-1	110-54-3	n-Hexane	4300	Derived EU-LCI	2016
2-2	110-82-7	Cyclohexane	6000	Ascribed EU-LCI	2013
2-3	108-87-2	Methyl cyclohexane	8100	Ascribed EU-LCI	2013
2-4*	142-82-5	n-Heptane	15000	Derived EU-LCI	2018
2-5*		Other saturated aliphatic hydrocarbons C6-C8	14000	Derived EU-LCI	2018
2-6		Other saturated aliphatic hydrocarbons C9-C16	6000	Ascribed EU-LCI	2013

Method

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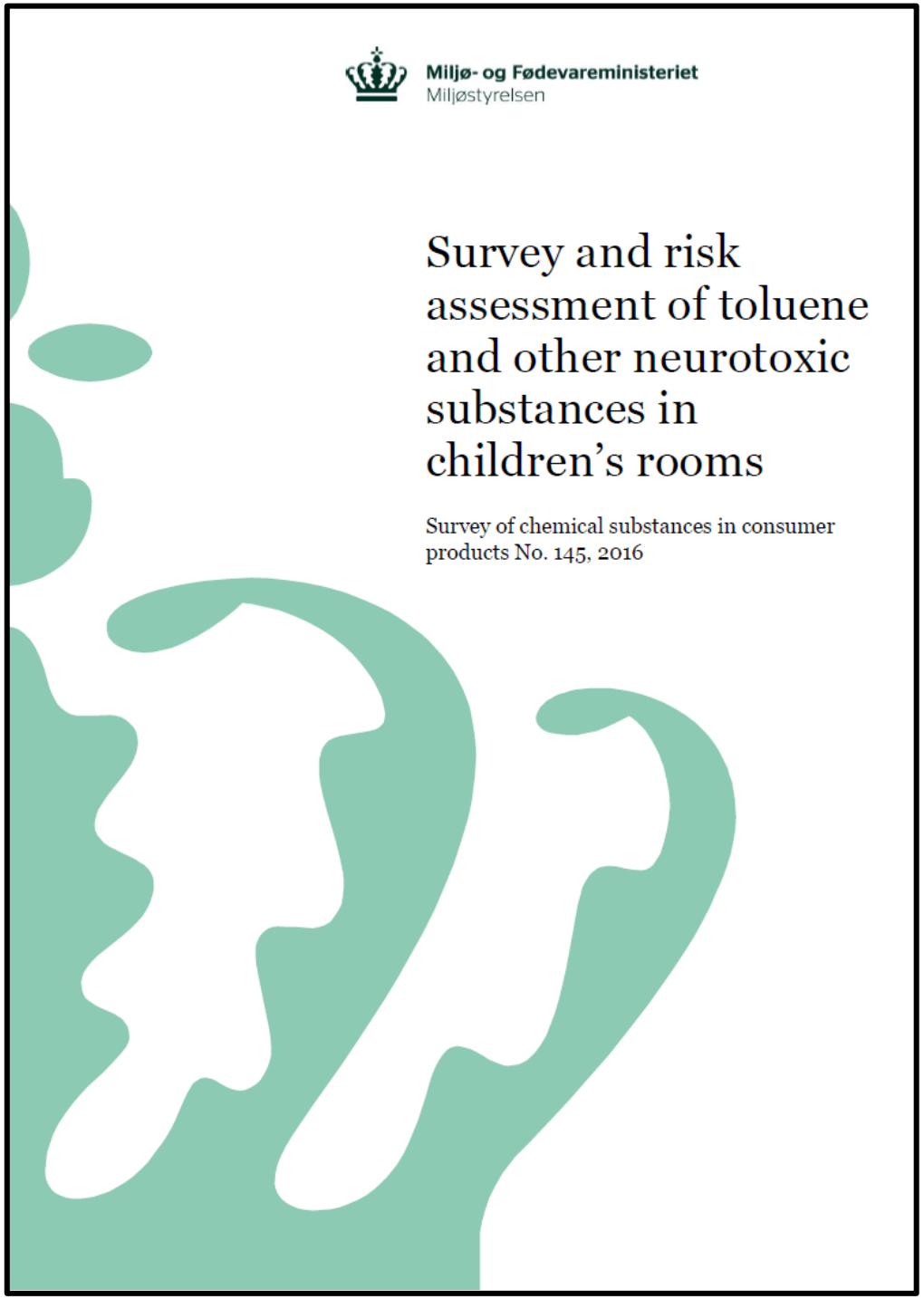
Litterature review, Identify neurotoxic substances and their Lowest Concentration of Interest (LCI)

Small scale emission measurements
Full scale emission measurements
Field measurements

Calculation of Risk Concentration Ratio (RCR) – Measured air concentration divided with LCI



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Priority substances from general review

Hydrocarbons:
n-hexane
n- heptane
benzene
toluene
xylenes
ethylbenzene
n-propylbenzene
styrene
methylstyrene

Chlorinated solvents:
monochloromethane
dichloromethane
1,1,1-trichloroethane
trichloroethylene
tetrachloroethylene

Alcohols:
methanol
ethanol

Ketones:
Methyl ethyl ketone
Methyl butyl ketone

+

JRC/EU-Commission (2013) report

toluene
ethylbenzene
xylenes
styrene
trimethylbenzenes
propylbenzene
diisopropylbenzene
phenyloctane (octylbenzene)

+

LOUS-projects

n-hexane
toluene
styrene
white spirit (C7-C12 hydrocarbons)

=

Priority substances

Hydrocarbons:
n-hexane
n- heptane
benzene
toluene
xylenes
ethylbenzene
propylbenzene
styrene
methylstyrene
trimehtylbenzenes
diisopropylbenzene
phenyloctane (octylbenzene)
white spirit (corr.to C7-C12 hydrocarbons)

Chlorinated subst.:
monochloromethane
dichloromethane
trichloroethylene
tetrachloroethylene

Method

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Exposure

The LCI-levels have been calculated from the daily inhalation volume of an adult. An adult of 70 kg is considered to inhale 20 m_3 air per day, i.e. the person inhales 0.29 m_3/kg bw/d (NCM 2011). Children aged 1-3, with an average body weight of 11.6 kg inhale on average 7.0 m_3 air per day corresponding to 0.60 m_3/kg bw/d.
Children receive twice as high a dose of air per kg body weight as adults.

Sensitivity

It is generally accepted that organ systems under development can be more sensitive than the fully developed organs. But no particular practice concerning increased sensitivity of children towards neurotoxic effects has been found in the literature.
This project uses an additional uncertainty factor of 2 to consider children's higher sensitivity associated with neurodevelopment.

Adjustment of tolerable exposure

The estimated LCI values will therefore be adjusted by a factor of 4 to obtain LCI values specifically applicable to children.

Method

TABLE 2.5. LCI VALUES FOR PROTECTION AGAINST NEUROTOXIC EFFECTS IN CHILDREN (1-3 YEARS)

Substance	LCI value child mg/m3	Odour threshold* mg/m3
n-hexane	0.700**	5.3
n-heptane	-	2.7
Benzene	0.600	8.6
Toluene	0.725	1.1
Xylenes	0.125	0.16-1.5
Ethylbenzene	0.200	0.67
Styrene	0.175	0.13
methylstyrene	0.200	-
propylbenzenes	0.240	0.02-0.04
trimethylbenzenes	0.100	0.56-0.79
diisopropylbenzene	0.200	-
phenyloctane	0.275	-
White spirit C7-C12 hydrocarbons	1425	0.5-5
Monochloromethane	0,045***	-
Dichloromethane	4200	556
Trichloroethylene	1.625	21
Tetrachloroethylene	1.650	5.2

Method

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Risk Characterization Ratio (RCR), for each neurotoxic substance:

$$RCR(1) = \frac{Calculated\ or\ measured\ exposure(1)}{LCI\ value(1)}$$

$$RCR(sum) = RCR(1) + RCR(2) + \ldots + RCR(n)$$

Method

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Concentrations measured in the CLIMPAQ chamber were converted to air concentration in a model children´s room according to

$$C_M = C_C \cdot q \cdot L/n$$

C_M: Concentration in the air of the model room (mg/m^3)
C_C: Concentration in the air of the climate chamber (mg/m^3)
q: Area specific airflow rate (m^3/(m^{2}h))
L: Loading factor of the material in the model room (m^2/m^3)
n: Air change rate in the model room (h^{-1})

The Danish EPA has previously assessed the exposure in children´s rooms from the following standard considerationsin accordance with the guidelines in Nordtest method NT Build 482:

V = 17.4 m^3 (Floor area: 7 m^2)
n = 0.5 h^{-1}

Method

Product	Number of tested articles (from different producers)	Emission scenario
Toys and decorations		
Plastic beads	5	Active full scale
White board and permanent markers	6	Active full scale
Self-adhesive decoration foil and shelf paper	2	Children´s room mock-up/full scale
Balloons	4	Small scale (CLIMPAQ)
Rubber figures	5	Small scale (CLIMPAQ)
Play tent	1	Small scale (CLIMPAQ)
Comics /printed advertising materials	5	Small scale (CLIMPAQ)
Plastic beach articles	3 (a beach ball, a swim ring and water wings)	Small scale (CLIMPAQ)
Modelling clay	3	Small scale (CLIMPAQ)
Teddy bear with lavendar odour for heating in the microwave	1	Small scale (CLIMPAQ)
Tape	6	Small scale (CLIMPAQ)

Method

Product	Number of tested articles (from different producers)	Emission scenario
Building materials		
Laminate flooring	1	Children´s room mock-up/full scale
Acrylic wall paint applied on gypsum board	2	Small scale (CLIMPAQ)
Alkyd wood paint, applied on wooden board	2	
Laquer for wood, applied on wooden board	1	
Furniture	4 (a desk, a bed and 2 kinds of shelf combinations)	Children´s room mock-up/full scale
Electronics	3 (computer screen, laptop charger and playstation)	Children´s room mock-up/full scale

Active full scale

Muck up – Full scale

Small Scale (Climpaq)

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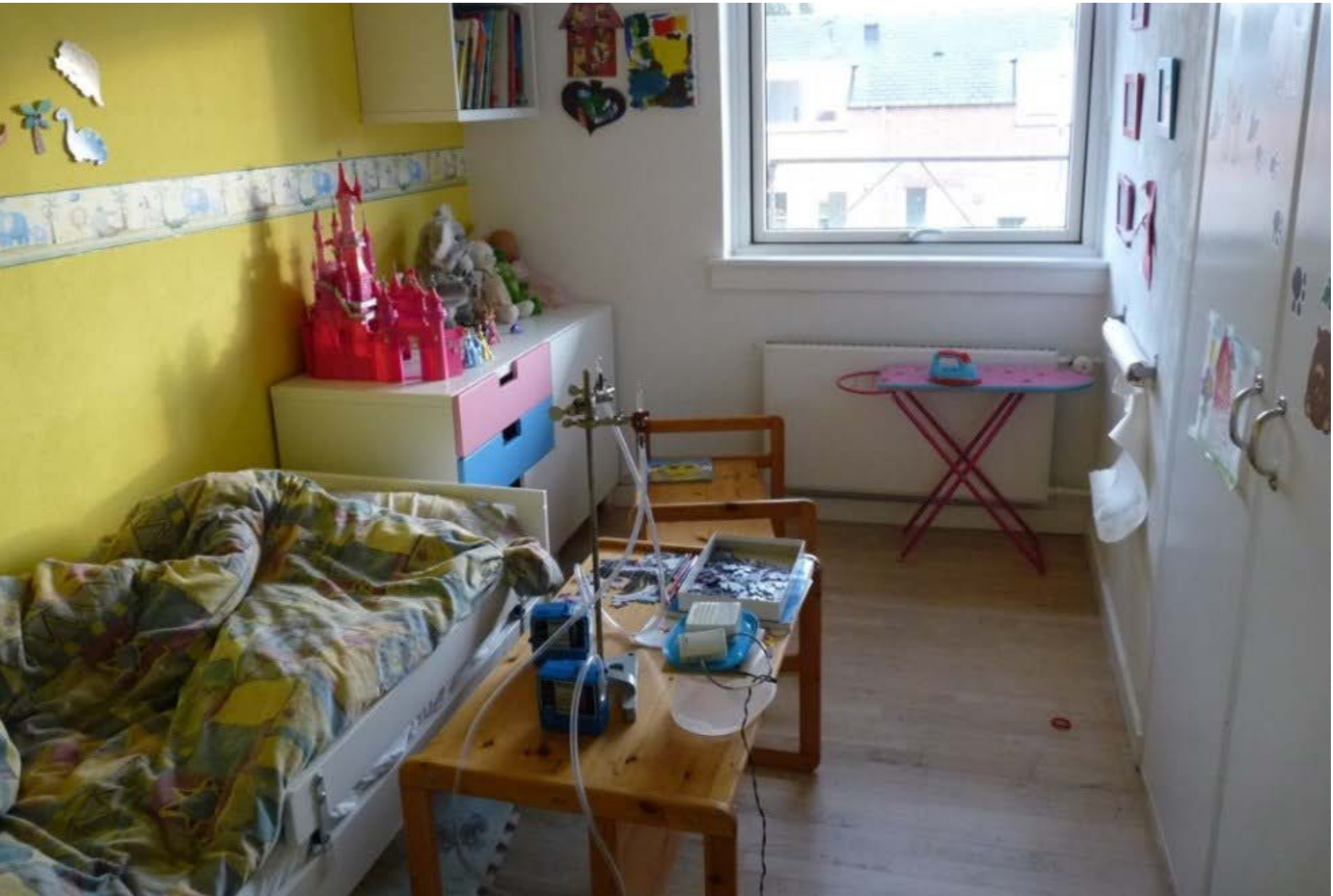
Field sampling in real rooms



Results

TABLE 6.9. EMISSION OF NEUROTOXIC SUBSTANCES FROM PRODUCTS EXAMINED IN THE CURRENT PROJECT (µg/m³)

Measured substances	Sources	Concentration during use or after 24 hours	48 hours	72 hours	2 weeks
Toluene	Markers	37.5	-	-	-
	Mock-up*	2.5	2.5	<DL	<DL
	Tape	6.9	<DL	<DL	<DL
	Modelling caly	2.2 (immediate), <DL (24)	<DL	<DL	<DL
	Paint/lacquer	3.3	<DL	<DL	<DL
m-/p-Xylene	Mock-up*	2.5	<DL	<DL	<DL
	Modelling clay	3.0 (immediate), <DL (24)	<DL	<DL	<DL
	Teddy bear	2.9 (immediate), <DL (24)	<DL	<DL	<DL
	Paint/lacquerRu	29	9.6	4.3	<DL
	bber figures	15	9.2	8.4	3.4
o-Xylene	Paint/lacquer	9.8	3.3	<DL	<DL
	Rubber figures	9.6	6.1	5.4	2.2
Ethylbenzene	Rubber figures	4.7	3.0	2.7	<DL
n-Heptane	Paint/lacquer	24	13	6.1	<DL
n-Octane	Paint/lacquer	28	15	6.9	<DL
n-Nonane	Swim articles	5.6	<DL	<DL	<DL
n-Decane	Plastic beads	6.3	-	-	-
	Paint/lacquer	23	9.6	4.5	<DL
	Balloons	4.2	<DL	<DL	<DL
n-Undecane	Plastic beads	23	-	-	-
	Paint/lacquerBa	18	7.4	3.9	<DL
	lloons	5.6	<DL	<DL	<DL
n-Dodecane	Paint/lacquer	9.9	5.5	2.7	<DL
	Teddy bear	7.4 (immediate), <DL (24)	<DL	<DL	<DL

TABLE 6.9. EMISSION OF NEUROTOXIC SUBSTANCES FROM PRODUCTS EXAMINED IN THE CURRENT PROJECT (µg/m³)

Measured substances	Sources	Concentration during use or after 24 hours	48 hours	72 hours	2 weeks
Trichlorethylene	Paint/lacquer	6.4	<DL	<DL	5.0
	Swim articles	2.8	<DL	<DL	6.8
2-Ethyltoluene	Paint/lacquer	4.4	<DL	<DL	<DL
3-Ethyltoluene	Paint/lacquer	8.9	2.5	<DL	<DL
4-Ethyltoluene	Paint/lacquer	6.1	<DL	<DL	<DL
1,2,3-Trimethylbenzene	Paint/lacquer	9.8	2.8	<DL	<DL
1,2,4-Trimethylbenzene	Paint/lacquer	23	7.7	3.5	<DL
1,3,5-Trimethylbenzene	Paint/lacquer	4.6	<DL	<DL	<DL
Naphthalene	Swim articles	4.5	<DL	<DL	<DL
	Paint/lacquer	4.5	<DL		
Styrene	Paint/lacquer	3.8	<DL	<DL	<DL
Ethylacetate	Markers	22	-	-	-
	Modelling clay	7.3 (immediate), <DL (24)	<DL	<DL	<DL
n-Propylbenzene	Paint/lacquer	4.0	<DL	<DL	<DL
TVOC	Markers	20500	-	-	-
	Plastic beads	220	-	-	-
	Mock-up	160	130	120	<DL
	Modelling clay	1300 (immediate), <DL (24)	710	290	<DL
	Swim articles	130	<DL	<DL	<DL
	Paint/lacquer	870	280	140	160
	Comics	220	<DL	580	<DL

*Mock-up contains furniture, flooring, electronics and self-adhesive foils

TABLE 7.1. INFORMATION CONCERNING THE CHILD, THE BUILDING, AIR CHANGE RATE MEASUREMENTS (ACR), AVERAGE TEMPERATURE (T) AND RELATIVE HUMIDITY (RH) IN THE SAMPLING PERIOD OF 19 CHILDREN´S ROOMS

Information on the child				Information on the house			Sampling conditions		
No.[a]	Gender	Age (years)	Construction year	Cooking in the sampling period	Close to busy road	Other possible sources	ACR, h^{-1}	T, °C	RH, %
1	Boy	11	1995/2008	No	No		0.14	22.7	56
2	Girl and boy	4; 2	1948	No	No		0.20	22	65
3	Girl and boy	3; 5	1970	Yes (a little)	No	Many rubber figures	0.05	22.1	65
4	Boy	17	1987	No	Yes	Electronics	0.18	26.9	53
5	Boy	5	1960	No	No		0.13	19.9	54
6	Boy	13	1981	No	No	Electronics	0.17	24.5	51
7	Boy	3	1959	No	No	Carpet	0.88[b]	23.9	49
8	Girl and boy	4; 1.5	2013	No	No		0.74[c]	23.2	41
9	Boy	4; 2	1960	No	No		0.19	25.0	47
10	Boy	2	1960	No	No		0.14	19.7	53
11	Boy	5	1962	No	No	Carpet	0.38	20.5	53
12	Girl and boy	5; 7	1973[d]	No	Yes	Lots of plastic toys; some electronics	-[e]	22.9	53
13	Boy	1	1970	Yes (a little)	No		1.2[c]	21.4	59
14	Girl and boy	5; 7	1954	No	No	Renovation of the house	0.12	22.6	57
15	Girl	5	1954	No	No	Adjacent shed with storage of petrol etc. (follow-up visit)	0.25	20.1	62
16	Boy	12	1960	No	No	Aircraft models, some electronics	0.24	21.5	55
17	Girl	16	1960	Yes	No	Electronics	0.29	22.6	51
18	Girl	3	1894[d]	No	Yes		0.84[f]	20.9	55
19	Boy	18	1964	No	No	Electronics	0.16	21.1	55

TABLE 7.2 AVERAGE CONCENTRATIONS AND THE LOWEST AND HIGHEST VALUES MEASURED IN CHILDREN´S ROOMS. AVERAGES, EXCL. CHILD ROOM 15, ARE SHOWN IN PARENTHESES

	No. of children´s room with concentration >DL	Average (excl. room 15) µg/m³	Min µg/m³	Max µg/m³
n-Heptane	4	13.1 (8.8)	4.4	27
n-Decane	4	7.4 (7.4)	1.9	22
n-Undecane	12	3.5 (3.5)	1.9	11
n-Dodecane	12	2.5 (2.5)	1.8	3.9
Methylcyclohexane	3	6.0 (4.9)	2.1	8.3
Cyclohexane	4	12.0 (2.4)	2.0	43
Ethylacetate	12	12.1 (11.5)	5.5	34
Toluene	19	21.0 (9.1)	1.6	230
Ethylbenzene	9	6.9 (3.2)	1.4	37
m-/p-xylene	14	12.7 (5.2)	1.5	110
o-xylene	6	8.5 (2.3)	1.7	36
Trichloroethylene	5	20.3 (22.5)	2.6	49
TVOC	12	430 (338)	100	1500

	Lab	RCR_{lab}	Field	RCR_{field}
	$\mu g/m^3$		$\mu g/m^3$	
Toluene	52	0.07	230	0.32
Xylenes	72	0.57	146	1.17
Ethylbenzene	14	0.07	370	0.19
Ethyltoluenes	19	0.19	38	0.38
Trimethylbenzenes	37	0.37	35	0.35
Sum		**1.33**		**2.49**

Lab: Calculated as if all sources were present simultaneously and all had only been emitting for 24 hours

Field: Worst case with unexpected storage of petrol and white spirit in adjoining room - Second worst case had RCR 0.42

Conclusions

Emission testing of construction materials, household furniture and a large number of toys show that these sources normally do not cause levels of concern for chronic neurotoxic effects in Danish children

Levels of concern may occur due to other sources, like incorrect storage of petrol/white spirit or other organic solvents in or around the house, or freshly painted/ varnished surfaces