Material Safety Data Sheet

value creation in chemicals

10220
Di-n-butylamine

Revision Date 22-Jun-2011
Revision Number 2 .02***

1. Identification of the substance / mixture and of the company / undertaking

Identification of the substance/preparation **Di-n-butylamine**

CAS-No 111-92-2
EINECS-No 203-921-8
Registration number (REACh) 01-2119475606-30-0001
Use of the Substance / Preparation Intermediate.
Identified uses Intermediate
Formulation
laboratory chemicals
Rubber production and processing

Company/Undertaking Identification
OXEA GmbH
Otto-Roelen-Str. 3
D-46147 Oberhausen
Germany

Product Information
Product Stewardship
FAX: +49 (0)208 693 2053
email: psq@oxea-chemicals.com

Emergency telephone number +44 (0) 1235 239 670 (UK)

2. Hazards identification

GHS / CLP

Basis for Classification This substance is classified based on Directive 1272/2008/EC and its amendments (CLP Regulation, GHS)

Classification

Flammable liquid	Category 3
Acute oral toxicity	Category 4
Acute dermal toxicity	Category 3
Acute inhalation toxicity	Category 2
Skin corrosion/irritation	Category 1A
Serious eye damage/eye irritation	Category 1

Labelling

Hazard symbols

Signal word	**Danger**
Hazard statements	H226: Flammable liquid and vapour H302: Harmful if swallowed H311: Toxic in contact with skin H330: Fatal if inhaled H314: Causes severe skin burns and eye damage
Precautionary statements	P210: Keep away from sources of ignition - No smoking P233: Keep container tightly closed P235: Keep cool P260: Do not breathe gas/mist/vapours P280: Wear protective gloves and eye/face protection P284: Wear respiratory protection P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P310: Immediately call a POISON CENTRE or doctor P501: Dispose of contents/container in accordance with local regulation
Other Hazards	Vapour/air-mixtures are explosive at intense warming Components of the product may be absorbed into the body by inhalation, ingestion and through the skin
PBT and vPvB assessment	This substance is not considered to be persistent, bioaccumulating nor toxic (PBT), nor very persistent nor very bioaccumulating (vPvB)

Classification and labelling according to Directive 67/548/EEC or 1999/45/EC

Basis for Classification	This substance is classified and labelled according to Annex I of Directive 67/548/EEC, as amended. EC Label
contains	Di-n-butylamine (CAS 111-92-2)
Symbol(s)	Xn - Harmful
R-phrase(s)	R10 - Flammable R20/21/22 - Harmful by inhalation, in contact with skin and if swallowed
Other hazards	In addition to the EC classification based on Oxea data this product should also be regarded as: Toxic by inhalation Causes severe burns Components of the product may be absorbed into the body by inhalation, ingestion and through the skin Vapour/air-mixtures are explosive at intense warming

3. Composition / Information on ingredients

Component	CAS-No	REACh-No	67/548/EEC	1272/2008/EC	Concentration (%)
Dibutylamine	111-92-2	01-2119475606-30-0001	R10 Xn;R20/21/22	Flam. Liq. 3; H226 Acute Tox. 4; H302 Acute Tox. 3; H311 Acute Tox. 2; H330 Skin Corr. 1A; H314 Eye Dam. 1; H318	> 99,5

4. First aid measures

General advice
Remove contaminated, soaked clothing immediately and dispose of safely. First aider needs to protect himself.

Inhalation
Keep at rest. Aerate with fresh air. Call a physician immediately. Symptoms of poisoning may develop many hours after exposure.

Eyes
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses. Immediate medical attention is required.

Skin
Wash off with 3% acetic acid followed by large amounts of plain water for at least 5 min as a final step. Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.

Ingestion
Call a physician immediately. Do not induce vomiting without medical advice.

Main symptoms
shortness of breath, convulsions, cough, hypertensive effect, allergic reactions, vomiting, unconsciousness, nausea, abdominal pain, circulatory collapse.

Special hazard
Stomach perforation, Lung oedema, Kidney disorders.

Notes to physician
Treat as an alkaline substance (similar to ammonia). If ingested, irrigate the stomach. Treat skin and mucous membranes with antihistamine and corticoids. In case of lung irritation, first treatment with cortisone spray. Symptoms may be delayed. Later control for pneumonia and lung oedema.

5. Firefighting measures

Suitable extinguishing media
alcohol-resistant foam, dry chemical, carbon dioxide (CO2), water spray

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

Special exposure hazards arising from the substance or preparation itself, its combustion products, or released gases
Under conditions giving incomplete combustion, hazardous gases produced may consist of:
carbon monoxide (CO)
carbon dioxide (CO2)
nitrogen oxides (NOx)
Combustion gases of organic materials must in principle be graded as inhalation poisons
Vapours are heavier than air and may spread along floors
Vapour/air-mixtures are explosive at intense warming

Special protective equipment for fire-fighters
Fire fighter protection should include a self-contained breathing apparatus (NIOSH-approved or EN 133) and full fire-fighting turn out gear.

Precautions for fire-fighting
Cool containers / tanks with water spray. Dike and collect water used to fight fire. Water run-off and vapor cloud may be corrosive. Water run-off can cause environmental damage. Keep people away from and upwind of fire.

6. Accidental release measures

Personal precautions
Avoid contact with skin and eyes. Avoid breathing vapors or mists. Keep people away from and upwind of spill/leak. Ensure adequate ventilation, especially in confined areas. Keep away from heat and sources of ignition. For emergency responders: Personal protection see section 8.

Environmental precautions
Prevent further leakage or spillage. Do not discharge product into the aquatic environment without pretreatment (biological treatment plant).

Methods for containment
Stop the flow of material, if possible without risk. Dike spilled material, where this is possible.

Methods for cleaning up
Soak up with inert absorbent material. DO NOT use combustible materials such as sawdust. Keep in suitable, closed containers for disposal. If liquid has been spilt in large quantities clean up promptly by scoop or vacuum. Dispose of in accordance with local regulations. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours).

7. Handling and storage

Handling

Advice on safe handling
Avoid contact with skin, eyes and clothing. Do not use compressed air for filling, discharging or handling. Wash hands before breaks and immediately after handling the product. Provide sufficient air exchange and/or exhaust in work rooms. Refill and handle product only in closed system.

Advice on protection against fire and explosion
Keep away from sources of ignition - No smoking. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). In case of fire, emergency cooling with water spray should be available. Ground and bond containers when transferring material. Vapour/air-mixtures are explosive at intense warming.

Advice on the protection of the environment
See Section 8: Environmental exposure controls.

Storage

Technical measures/Storage conditions
Keep containers tightly closed in a cool, well-ventilated place. Handle and open container with care. Handle under nitrogen, protect from moisture. Keep at temperatures between -18 and 38 °C (0 and 100 °F).

Unsuitable material
copper, Tin, Aluminium, including their alloys

Advice on common storage
Incompatible products:
acids
acid anhydrides
oxidizing agents

Temperature class
T3

Identified uses

Intermediate
Formulation
laboratory chemicals
Rubber production and processing
For specific end use information see the annex of this safety data sheet

8. Exposure controls / Personal protection

DNEL & PNEC

Dibutylamine, CAS: 111-92-2

Workers

DN(M)EL - acute / short-term exposure - systemic effects - Inhalation	29 mg/m³
DN(M)EL - acute / short-term exposure - local effects - Inhalation	29 mg/m³
DN(M)EL - long-term exposure - systemic effects - Inhalation	29 mg/m³
DN(M)EL - long-term exposure - local effects - Inhalation	29 mg/m³

Environment

PNEC aqua - freshwater	0,084 mg/l
PNEC aqua - marine water	0,0084 mg/l
PNEC aqua - intermittent releases	0,084 mg/l
PNEC STP	149,5 mg/l
PNEC sediment - freshwater	68,7 mg/kg
PNEC sediment - marine water	6,87 mg/kg
PNEC soil	13,6 mg/kg

Exposure limits European Union

No exposure limits established.

Exposure limits UK

No exposure limits established.

Occupational exposure controls

Engineering measures

General or dilution ventilation is frequently insufficient as the sole means of controlling employee exposure. Local ventilation is usually preferred. Explosion-proof equipment (for example fans, switches, and grounded ducts) should be used in mechanical ventilation systems.

Personal protective equipment

General industrial hygiene practice
Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist. Ensure that eyewash stations and safety showers are close to the workstation location.

Hygiene measures
When using, do not eat, drink or smoke. Take off all contaminated clothing immediately. Wash hands before breaks and immediately after handling the product.

Respiratory protection
Respirator with A filter. Full mask with above mentioned filter according to producers using requirements or self-contained breathing apparatus. Equipment should conform to EN 136 or EN 140 and EN 143.

Hand protection
Wear protective gloves. Recommendations are listed below. Other protective material may be used, depending on the situation, if adequate degradation and permeation data is available. If other chemicals are used in conjunction with this chemical, material selection should be based on protection for all chemicals present.

Suitable material	nitrile rubber
Evaluation	according to EN 374: level 6
Glove thickness	approx 0,55 mm
Break through time	> 480 min

Suitable material	polyvinylchloride
Evaluation	Information derived from practical experience
Glove thickness	approx 0,8 mm

Eye protection
Tightly fitting safety goggles. In addition to goggles, wear a face shield if there is a reasonable chance for splash to the face.
Equipment should conform to EN 166

Skin and body protection
Impervious clothing. Wear face-shield and protective suit for abnormal processing problems.

Environmental exposure controls

If possible use in closed systems. If leakage can not be prevented, the substance needs to be suck off at the emersion point, if possible without danger. Observe the exposure limits, clean exhaust air if needed. If recycling is not practicable, dispose of in compliance with local regulations. Inform the responsible authorities in case of leakage into the atmosphere, or of entry into waterways, soil or drains.

9. Physical and chemical properties

Physical state	liquid
Colour	colourless
Odour	ammonia-like
Molecular weight	129,24
Molecular formula	C8 H19 N
Flash point	40,5 °C
Method	DIN 51755
Autoignition temperature	255 °C
Method	DIN 51794
Lower explosion limit	1,1 Vol %
Upper explosion limit	6,8 Vol %
Melting point/range	-60 - -59 °C (Pour point)
Boiling point/range	160 °C @ 1013 hPa

Vapour pressure

Values [hPa]	Values [kPa]	Values [atm]	@ °C	@ °F
2,2	0,22	0,002	20	68
26	2,6	0,026	50	122

Density

Values [g/cm³]	@ °C	@ °F	Method
0,759	20	68	DIN 51757

Refractive index	1,417 @ 20 °C
Viscosity	0,85 mPa*s @ 20 °C
Method	dynamic
pH	11,3 (1 g/l in water @ 20 °C (68 °F))
Water solubility	3,8 g/l @ 20 °C
log Pow	2,06 (measured), OECD 107
Vapour density	4,5 (Air = 1) @ 20 °C (68 °F)
Surface tension	50,6 mN/m (1,0048 g/l @ 20°C), OECD 115

10. Stability and reactivity

Stability
Stable under recommended storage conditions.

Conditions to avoid
Avoid contact with heat, sparks, open flame and static discharge. Avoid any source of ignition.

Materials to avoid
acids, oxidizing agents.

Hazardous decomposition products
No decomposition if stored and applied as directed. If heated to thermal decomposition the following decomposition products may occur depending on the conditions. carbon monoxide (CO). nitrogen oxides (NOx). cyanides. nitric acid. nitriles.

11. Toxicological information

Principle Routes of Exposure Inhalation, Eye contact, Skin contact, Ingestion

Acute toxicity				
Dibutylamine (111-92-2)				
Routes of Exposure	Endpoint	Values	Species	Method
Oral	LD50	550 mg/kg	rat, male	
Dermal	LD50	768 mg/kg	rabbit	Draize Test
Inhalative	LC50	1,15 mg/l (4h)	rat, male/female	OECD 403

Irritation and corrosion				
Dibutylamine (111-92-2)				
Target Organ Effects	Species	Result	Method	
Skin	rabbit	corrosive	OECD 404	< 3 min
Eyes	rabbit	corrosive	OECD 405	

Sensitization				
Dibutylamine (111-92-2)				
Target Organ Effects	Species	Evaluation	Method	
Skin	guinea pig	not sensitizing	EPA OTS 798.4100	

Subacute, subchronic and prolonged toxicity				
Dibutylamine (111-92-2)				
Type	Dose	Species	Method	
Subchronic toxicity	NOAEC: 50 mg/m³ (90 d)	rat, male	OECD 413	Inhalation

Carcinogenicity, Mutagenicity, Reproductive toxicity					
Dibutylamine (111-92-2)					
Type	Dose	Species	Evaluation	Method	
Mutagenicity		Salmonella typhimurium	negative	Ames test	In vitro study
Mutagenicity		mouse	negative	OECD 475	Bone marrow
Mutagenicity		mouse lymphoma cells	negative	OECD 476 (Mammalian Gene Mutation)	In vitro study
Mutagenicity		CHL	ambiguous	OECD 473 (Chromosomal Aberration)	In vitro study
Reproductive toxicity	NOAEL 40 mg/kg/d	rat, parental		OECD 422, Oral	read across
Developmental Toxicity	NOAEL 15 mg/kg/d	rat	Maternal toxicity	OECD 414, Oral	read across
Developmental Toxicity	NOAEL 150 mg/kg/d	rat	Developmental toxicity	OECD 414, Oral	read across

Dibutylamine, CAS: 111-92-2

Main symptoms

shortness of breath, convulsions, cough, hypertensive effect, allergic reactions, vomiting, unconsciousness, nausea, abdominal pain, circulatory collapse.

Other adverse effects

Components of the product may be absorbed into the body by inhalation, ingestion and through the skin.

Note
Handle in accordance with good industrial hygiene and safety practice. Further details on substance data can be found in the registration dossier under the following link:
http://apps.echa.europa.eu/registered/registered-sub.aspx.

12. Ecological information

Acute aquatic toxicity			
Dibutylamine (111-92-2)			
Species	Exposure time	Dose	Method
Oncorhynchus mykiss (rainbow trout)	96h	LC50: 5,5 mg/l (soft water)	IRSA
Oncorhynchus mykiss (rainbow trout)	96h	LC50: 37 mg/l (hard water)	IRSA
Daphnia magna (Water flea)	48h	EC50: 65,98 mg/l	79/831/EEC.C2
Ceriodaphnia dubia	48h	LC50: 8,4 mg/l	
Desmodesmus subspicatus	72h	EC50: 16,91 mg/l (Growth rate)	DIN 38412, part 9
Desmodesmus subspicatus	72h	EC50: 9,43 mg/l (Biomass)	DIN 38412, part 9
Pseudomonas putida	17 h	EC50: 195,8 mg/l (Growth inhibition)	DIN 38412, part 8

Long term toxicity				
Dibutylamine (111-92-2)				
Type	Species	Dose	Method	
Reproductive toxicity	Daphnia magna (Water flea)	NOEC: 4,2 mg/l (21d)	OECD 211	read across
Reproductive toxicity	Daphnia magna (Water flea)	LC50: 5,7 mg/l/21d	OECD 211	read across

Dibutylamine, CAS: 111-92-2
Biodegradation
95 % (28 d), Sewage, aerobic, OECD 301 C.
PBT and vPvB assessment
This substance is not considered to be persistent, bioaccumulating nor toxic (PBT), nor very persistent nor very bioaccumulating (vPvB)
Note
Avoid release to the environment.

13. Disposal considerations

Product Information
Disposal required in compliance with all waste management related state and local regulations. The choice of the appropriate method of disposal depends on the product composition by the time of disposal as well as the local statutes and possibilities for disposal.
Hazardous waste according to European Waste Catalogue (EWC)

Uncleaned empty packaging
Contaminated packaging should be emptied as far as possible and after appropriate cleansing may be taken for reuse.

14. Transport information

ADR/RID

UN/ID No	UN 2248
Proper shipping name	Di-n-butylamine
Class	8
Subsidiary Risk	3
Packing group	II
ADR Tunnel restriction code	(D/E)
Classification Code	CF1
Hazard Number	83

ADN

	ADN Container
UN/ID No	UN 2248
Proper shipping name	Di-n-butylamine
Class	8
Subsidiary Risk	3
Packing group	II
Classification Code	CF1
Hazard Number	83

ICAO/IATA

UN/ID No	UN 2248
Proper shipping name	Di-n-butylamine
Class	8
Subsidiary Risk	3
Packing group	II

IMDG

UN/ID No	UN 2248
Proper shipping name	Di-n-butylamine
Class	8
Subsidiary Risk	3
Packing group	II
EmS	F-E, S-C

IBC-Code

Product name	Dibutylamine
Ship type	3
Pollution category	Y

15. Regulatory information

GHS / CLP

Basis for Classification This substance is classified based on Directive 1272/2008/EC and its amendments (CLP Regulation, GHS). (See chapter 2)

Regulation 1272/2008, Annex VI

Dibutylamine, CAS: 111-92-2

Classification	Flam. Liq. 3; H226 Acute Tox. 4*; H332 Acute Tox. 4*; H312 Acute Tox. 4*; H302
Hazard symbols	Flame Exclamation mark
Signal word	Warning
Hazard statements	H226, H332, H312, H302

DI 2012/18/EU (Seveso III) ***

Category	Annex I, part 1: P5a - c; depending on conditions***

DI 1999/13/EC (VOC Guideline)
***

Component	Status
Dibutylamine CAS: 111-92-2	regulated***

Chemical Safety Assessment (CSA)

The Chemical Safety Report (CSR) has been generated. For Exposure Scenarios see the annex.

International Inventories

Dibutylamine, CAS: 111-92-2
AICS (AU)
DSL (CA)
IECSC (CN)
EC-No. 2039218 (EU)
ENCS (2)-137 (JP)
ISHL (2)-137 (JP)
KECI 97-1-21 (KR)
KECI KE-04223 (KR)
INSQ (MX)***
PICCS (PH)
TSCA (US)
NZIoC (NZ)

National regulatory information Great Britain

This classification following EG guidelines is also in accordance with the Chemicals (Hazard Information and Packaging for Supply) Regulation CHIP (as amended).

Releases to air (Pollution Inventory Substances)
not subject

Releases to water (Pollution Inventory Substances)
not subject

Releases to sewer (Pollution Inventory Substances)
not subject

For details and further information please refer to the original regulation

16. Other information

Full text of H-Statements referred to under section 3
H226: Flammable liquid and vapour
H332: Harmful if inhaled
H312: Harmful in contact with skin
H302: Harmful if swallowed

Full text of R-phrases referred to under sections 2 and 3
R10 - Flammable
R20/21/22 - Harmful by inhalation, in contact with skin and if swallowed

Revision Date 22-Jun-2011
Issuing date 30-Oct-2013

Training advice
For effective first-aid, special training / education is needed.

Sources of key data used to compile the datasheet
Information contained in this safety data sheet is based on Oxea owned data and public sources deemed valid or acceptable. The absence of data elements required by ANSI or Annex II, Regulation 1907/2006/EC indicates, that no data meeting these requirements is available.

Further information for the safety data sheet
Changes against the previous version are marked by ***. Observe national and local legal requirements. For more information, other material safety data sheets or technical data sheets please consult the Oxea homepage (www.oxea-chemicals.com).

Disclaimer
For industrial use only. The information contained herein is accurate to the best of our knowledge. We do not suggest or guarantee that any hazards listed herein are the only ones which exist. Oxea makes no warranty of any kind, express or implied, concerning the safe use of this material in your process or in combination with other substances. User has the sole responsibility to determine the suitability of the materials for any use and the manner of use contemplated. User must meet all applicable safety and health standards.

Annex to the extended Safety Data Sheet (eSDS)

General information

Acute Health Hazard:
Qualitative approach used to conclude safe use
Risks resulting from short-term exposure are covered by the long-term exposure assessment

Operational conditions and risk management measures
Wear suitable gloves tested to EN 374 for activities, where direct contact with substance is possible. Wear suitable eye protection, where direct contact (e.g. splashes) with substance is possible.

1 **Industrial use resulting in manufacture of another substance (use of intermediates)**
2 **Formulation & (re)packing of substances and mixtures**
3 **Use in laboratories**
4 **Rubber production and processing**

Number of the ES 1

Short title of the exposure scenario

Industrial use resulting in manufacture of another substance (use of intermediates)

List of use descriptors

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites
SU8: Manufacture of bulk, large scale chemicals (including petroleum products)
SU9: Manufacture of fine chemicals

Process categories [PROC]
PROC1: Use in closed process, no likelihood of exposure
PROC2: Use in closed, continuous process with occasional controlled exposure
PROC3: Use in closed batch process (synthesis or formulation)
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Use as an intermediate (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (ncluding marine vessel/barge, road/rail car and bulk container).

Further explanations
Industrial use

Number of the contributing scenario 1
Contributing exposure scenario controlling worker exposure for PROC 1

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 1 hand (240 cm^2)
Other given operational conditions affecting workers exposure
Indoor and outdoor use
Technical conditions and measures to control dispersion from source towards the worker
Without local exhaust ventilation.

Number of the contributing scenario **2**
Contributing exposure scenario controlling worker exposure for PROC 2

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario **3**
Contributing exposure scenario controlling worker exposure for PROC 3

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 1 hand (240 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for PROC 4

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for PROC 8a

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to 2 hands (960 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario 6
Contributing exposure scenario controlling worker exposure for PROC 8b

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 97 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario 7
Contributing exposure scenario controlling worker exposure for PROC 9

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 1 hand (240 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Exposure estimation and reference to its source

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative short-term exposure [mg/m³]; EE(derm): Estimated dermal short-term exposure [mg/kg b.w./d]. Exposure estimates are given for either short-term or long-term exposure depending on which lead to more conservative risk characterisation ratios. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 1	EE(inhal): 0.108
Proc 2	EE(inhal): 1.077
Proc 3	EE(inhal): 3.230
Proc 4	EE(inhal): 5.383
Proc 8a	EE(inhal): 10.767
Proc 8b	EE(inhal): 1.615
Proc 9	EE(inhal): 5.383

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio; RCR(derm): dermal risk characterisation ratio; total RCR= RCR(inhal) +RCR(derm). Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 1	RCR(inhal): 0.004
Proc 2	RCR(inhal): 0.037
Proc 3	RCR(inhal): 0.111
Proc 4	RCR(inhal): 0.186
Proc 8a	RCR(inhal): 0.373
Proc 8b	RCR(inhal): 0.056
Proc 9	RCR(inhal): 0.186

Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES
Usage of relase factors allows downstream users to verify in a first approximation, if the combination of local usage and production conditions meets the defined release quantities resulting from this exposure scenario (calculated as M(site) [see amounts used, contributing scenario 1] x release factor [Technical conditions and measures at process level (source) to prevent release; contributing scenario 1])

associated uses:

Other combinations of operational conditions may also be safe. Please contact Oxea in case your local operational conditions differ from the ones described above and you are unsure if they are also safe

Number of the ES 2

Short title of the exposure scenario

Formulation & (re)packing of substances and mixtures

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites
SU10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)

Process categories [PROC]
PROC3: Use in closed batch process (synthesis or formulation)
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Processes and activities covered by the exposure scenario
Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenanance and associated laboratory activities.

Further explanations
Industrial use

Number of the contributing scenario 1
Contributing exposure scenario controlling worker exposure for PROC 3

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 1 hand (240 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario 2
Contributing exposure scenario controlling worker exposure for PROC 5

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario 3
Contributing exposure scenario controlling worker exposure for PROC 8a

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to 2 hands (960 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); 0 % (dermal).

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario **4**
Contributing exposure scenario controlling worker exposure for PROC 8b

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 97 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario **5**
Contributing exposure scenario controlling worker exposure for PROC 9

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 2 hands (480 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Human exposure prediction (oral, dermal, inhalative)

Oral exposure is not expected to occur. EE(inhal): Estimated inhalative short-term exposure [mg/m³]; EE(derm): Estimated dermal short-term exposure [mg/kg b.w./d]. Exposure estimates are given for either short-term or long-term exposure depending on which lead to more conservative risk characterisation ratios. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 3	EE(inhal): 3.230
Proc 5	EE(inhal): 5.383
Proc 8a	EE(inhal): 10.767
Proc 8b	EE(inhal): 1.615
Proc 9	EE(inhal): 5.383

Risk characterisation

RCR(inhal): inhalative risk characterisation ratio; RCR(derm): dermal risk characterisation ratio; total RCR= RCR(inhal) +RCR(derm). Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 3	RCR(inhal): 0.111

Proc 5	RCR(inhal): 0.186
Proc 8a	RCR(inhal): 0.371
Proc 8b	RCR(inhal): 0.056
Proc 9	RCR(inhal): 0.186

Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES
Usage of relase factors allows downstream users to verify in a first approximation, if the combination of local usage and production conditions meets the defined release quantities resulting from this exposure scenario (calculated as M(site) [see amounts used, contributing scenario 1] x release factor [Technical conditions and measures at process level (source) to prevent release; contributing scenario 1])

associated uses:

Other combinations of operational conditions may also be safe. Please contact Oxea in case your local operational conditions differ from the ones described above and you are unsure if they are also safe

Number of the ES 3

Short title of the exposure scenario
Use in laboratories

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Process categories [PROC]
PROC15: Use as laboratory reagent

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Use of the substance within laboratory settings, including material transfers and equipment cleaning

Further explanations
Industrial use

Number of the contributing scenario 1
Contributing exposure scenario controlling worker exposure for PROC 15

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 1 hand (240 cm²)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); 0 % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Human exposure prediction (oral, dermal, inhalative)
Oral exposure is not expected to occur. EE(inhal): Estimated inhalative short-term exposure [mg/m³]; EE(derm): Estimated dermal short-term exposure [mg/kg b.w./d]. Exposure estimates are given for either short-term or long-term exposure depending on which lead to more conservative risk characterisation ratios. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 15 EE(inhal): 5.383

Risk characterisation
RCR(inhal): inhalative risk characterisation ratio; RCR(derm): dermal risk characterisation ratio; total RCR= RCR(inhal) +RCR(derm). Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 15 RCR(inhal): 0.186

Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES
Usage of relase factors allows downstream users to verify in a first approximation, if the combination of local usage and production conditions meets the defined release quantities resulting from this exposure scenario (calculated as M(site) [see amounts used, contributing scenario 1] x release factor [Technical conditions and measures at process level (source) to prevent release; contributing scenario 1])

associated uses:

Other combinations of operational conditions may also be safe. Please contact Oxea in case your local operational conditions differ from the ones described above and you are unsure if they are also safe

Number of the ES 4

Short title of the exposure scenario

Rubber production and processing

Sector of uses [SU]
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites

Process categories [PROC]
PROC7: Industrial spraying
PROC14: production of preparations or articles by tabletting, compression, extrusion, pelettisation
PROC21: Low energy manipulation of substances bound in materials and/or articles
PROC24: High (mechanical) energy work-up of substances bound in materials and/or articles

Product characteristics
Refer to attached safety data sheets

Processes and activities covered by the exposure scenario
Manufacture of tyres and general rubber articles, including processing of raw (uncured) rubber, handling and mixing of rubber additives, vulcanising, cooling and finishing

Further explanations
Industrial use

Number of the contributing scenario 1
Contributing exposure scenario controlling worker exposure for PROC 7

Further specification
StoffenManager
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume 100 - 1000 m3
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 97% % (inhalative); n.a. % (dermal).
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Conditions and measures related to personal protection, hygiene and health evaluation
Wear respiratory protection (Efficiency: 80 %). Wear suitable coveralls to prevent exposure to the skin. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario 2
Contributing exposure scenario controlling worker exposure for PROC 7

Further specification
StoffenManager
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Other given operational conditions affecting workers exposure
Indoor use
Room volume 100 - 1000 m3
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 97 % (inhalative); n.a. % (dermal). Use cabin with filtered air for operator.
Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day
Conditions and measures related to personal protection, hygiene and health evaluation
Wear suitable coveralls to prevent exposure to the skin. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario 3
Contributing exposure scenario controlling worker exposure for PROC 14

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to palm of 2 hands (480 cm^2)
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); n.a. % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario 4
Contributing exposure scenario controlling worker exposure for PROC 21

Further specification
Ecetoc TRA V2 modified

Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Solid, high dustiness
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to 1980 cm²
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); n.a. % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Number of the contributing scenario 5
Contributing exposure scenario controlling worker exposure for PROC 24

Further specification
Ecetoc TRA V2 modified
Product characteristics
Covers percentage substance in the product up to 100 % (unless stated differently)
Solid, high dustiness
Frequency and duration of use
8 h (full shift)
Human factors not influenced by risk management
corresponds to 1980 cm²
Other given operational conditions affecting workers exposure
Indoor use
Technical conditions and measures to control dispersion from source towards the worker
Effectiveness of LEV (local exhaust ventilation): 90 % (inhalative); n.a. % (dermal).
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Human exposure prediction (oral, dermal, inhalative)

Oral exposure is not expected to occur. EE(inhal): Estimated inhalative short-term exposure [mg/m³]; EE(derm): Estimated dermal short-term exposure [mg/kg b.w./d]. Exposure estimates are given for either short-term or long-term exposure depending on which lead to more conservative risk characterisation ratios. The RMMs described above suffice to control risks for both local and systemic effects.

Proc 7	EE(inhal): 7.54 ; EE(derm): n.a. - Contributing Scenarios 1
	EE(inhal): 5.87 ; EE(derm): n.a. - Contributing Scenarios 2
Proc 14	EE(inhal): 5.383
Proc 21	EE(inhal): 2
Proc 24	EE(inhal): 4

Risk characterisation

RCR(inhal): inhalative risk characterisation ratio; RCR(derm): dermal risk characterisation ratio; total RCR= RCR(inhal) +RCR(derm). Where required local and systemic effects were evaluated both for short-term and long-term exposure. The RCR's given correspond in each case to the most conservative calculated values.

Proc 7	RCR(inhal): 0.260 - Contributing Scenarios 1
	RCR(inhal): 0.200 - Contributing Scenarios 2
Proc 14	RCR(inhal): 0.186
Proc 21	RCR(inhal): 0.069
Proc 24	RCR(inhal): 0.138

Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES
Usage of relase factors allows downstream users to verify in a first approximation, if the combination of local usage and production conditions meets the defined release quantities resulting from this exposure scenario (calculated as M(site) [see amounts used, contributing scenario 1] x release factor [Technical conditions and measures at process level (source) to prevent release; contributing scenario 1])

associated uses:

Other combinations of operational conditions may also be safe. Please contact Oxea in case your local operational conditions differ from the ones described above and you are unsure if they are also safe