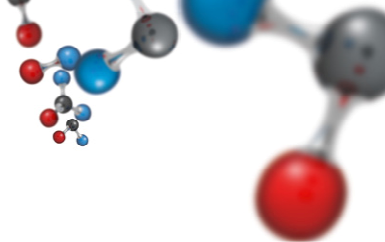


MATERIAL SAFETY DATA SHEET

N,N-DIETHYLANILINE



SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Chemical name: **N,N-Diethylaniline**
Registration no.: **01-2119943758-22-0001**
Index number: **612-054-00-8**
ES (EINECS) number: **202-088-8**
CAS number: **91-66-7**
Other names of the substance: **N-Phenylamine-N,N-diethylamine; N,N-Diethylaminobenzol**

1.2 Relevant identified uses of the substance or mixture and uses advised against

Uses of the substance: **N,N-diethylaniline is used for production of dyes, rubber and polymer products (the overview of exposure scenarios is set out in Annex 1).**

Uses advised against: **Not established.**

1.3 Details of the supplier of the material safety data sheet

Name: **BorsodChem MCHZ, s.r.o.**
Name or business name: **BorsodChem MCHZ, s.r.o.**
Place of business or headquarters: **Chemická 2039/1, 709 00 Ostrava-Mariánské Hory, Czech Republic**
Identification number: **26019388**
Telephone: **+420 596 641 111**
Fax: **+420 596 642 040**
E-mail of the technically competent person responsible for the material safety data sheet: **zsvobodova@bc-mchz.cz**

1.4 Emergency telephone number

Company telephone number: **+420 596 643 221 or 596 620 794 non-stop**
24-hours emergency contact: CHEMTREC, telephone number: 001-703-527-3887, company code CCN 206 072
**The National Poisons Information Service (NPIS), City Hospital, Birmingham, B18 7QH, UK
Tel: +44 121 507 4123, fax: +44 121 507 5580, e-mail: allistervale@npis.org, www.npis.org**
**National Capital Poison Center, 3201 New Mexico Ave, Suite 310 Washington, DC 20016
Emergency Line: 1-800-222-1222, fax: 202-362-8377, e-mail: pc@poison.org, www.poison.org**

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

According to Regulation (EC) no. 1272/2008:

Acute Tox. 3; H301 Toxic if swallowed.

Acute Tox. 3; H311 Toxic in contact with skin.

Acute Tox. 3; H331 Toxic if inhaled.

STOT RE 2; H373 May cause damage to organs through prolonged or repeated exposure.

Aquatic Chronic 2; H411 Toxic to aquatic life with long lasting effects.

The most important human health adverse effects during use of the substance or preparation:
Toxic in all types of contact.

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N,N-DIETHYLANILINE

The most important adverse effects to environment during use of the substance/preparation:
Toxic to aquatic organisms, may cause long lasting adverse effects in the aquatic environment.

2.2 Label elements

According to Regulation (EC) no. 1272/2008:

Symbols:



Signal word: DANGER

H phrases:

H301+H311+H331 Toxic if swallowed, in contact with skin or if inhaled.

H373 May cause damage to organs through prolonged or repeated exposure.

H411 Toxic to aquatic life with long lasting effects.

P phrases:

P260 Do not breathe vapours.

P273 Avoid release to the environment.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor.

P302+P352 IF ON SKIN: Wash with plenty of water.

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

2.3 Other hazards

The substance is not identified as persistent, bio-accumulative and toxic (PBT) or very persistent, very bio-accumulative (vPvB) under Annex XIII of Regulation 1907/2006/ES.

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	N,N-Diethylaniline
Index number	612-054-00-8
EC No.	202-088-8
CAS No.	91-66-7
Substance content (% w.)	99.00
Synonyms	N-Phenylamine-N,N-diethylamine; N,N-Diethylaminobenzol

Impurities: < 1 % w., CMR impurities < 0.1 % w.

3.2 Mixtures

This is a chemical substance.

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N,N-DIETHYLANILINE

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation: **Remove to fresh air, loosen clothing, remove contaminated clothing. Call a physician immediately!**

Skin: **Remove immediately contaminated clothing, wash affected skin area with plenty of cold or lukewarm water. If no injury to skin occurred, it is recommended to use soap, soap solution or shampoo. Call a physician!**

Contact with eyes: **Rinse immediately and thoroughly with plenty of cold or lukewarm water for at least 10 minutes, open eyelids (even by force). If the victim wears contact lenses, remove them immediately. Seek medical help immediately!**

Ingestion: **Induce vomiting only if the victim is conscious and only in one hour after ingestion. Give to drink 1 to 2 dcl of lukewarm water with a small spoon of liquid soap and powdered or crushed activated coal corresponding to about 5 tablets. Administrate 10 to 20 crushed tablets of activated coal stirred in water in 5 minutes - irrespective of vomiting. Call a physician immediately!**

4.2 Most important symptoms and effects, both acute and delayed

Toxic in all types of contact. Well absorbed by skin. Causes methemoglobinemia – blue coloration of lips, nails, skin, headaches, convulsions to loss of consciousness.

4.3 Indication of any immediate medical attention and special treatment needed

Symptomatic therapy. Methemoglobinemia therapy: administer intravenously toluidine blue (Koehler), or methylene blue (Coloxyd), thionine (Katalysin) or as supportive therapy (or in case of suspicion of slight methemoglobinemia) administer high intravenous doses of ascorbic acid. In severe cases, perform blood transfusion or exchange transfusion. High consumption of liquids. Maintain sufficient diuresis due to risk of anuresis during haemolysis. Beware of hypothermia!

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media: **big fire – foam for polar liquids or water mist or water spray
small fire – sprinkled water, dry powder, CO₂**

Unsuitable extinguishing media: **not specified**

5.2 Special hazards arising from the substance or mixture: **Flammable liquid, risk of ignition if heated up. Possibility of release of carbon monoxide and nitrogen oxides. Formation of toxic and explosive mixtures.**

5.3 Advice for firefighters: **Self-contained breathing apparatus, special protective clothing! (Hazchem. Code: 3X).**

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures: **Protection of air ways, protection of non-protected body parts, protection of eyes. Measure N,N-diethylaniline concentration in the environment, provide sufficient ventilation.**

6.2 Environmental precautions: **Prevent contamination of soil and water, check concentration of N,N-diethylaniline in the environment in the vicinity of accident. Substance dangerous for the environment.**

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6.3 Methods and material for containment and cleaning up: **Cover with an absorbent material (Vapex, Vermikulit) and sweep up into a waste container. For methods of disposal see Section 13.**

SECTION 7: Handling and storage

- 7.1 Precautions for safe handling: **Delivered in rail or truck tankers preferably under nitrogen, steel drums and IBC containers, the recommended maximum temperature during transport is 50 °C. Ventilation provided during emptying.**
- 7.2 Conditions for safe storage, including any incompatibilities: **Store in easily ventilated rooms in original packages or in steel tanks, best with nitrogen. The highest allowable storing temperature is 30 °C. Do not store together with foodstuffs, strong oxidising agents and strong inorganic acids.**
- 7.3 Specific end use(s): **Not specified.**

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Czech Republic: NPK-P(average)/NPK-P (lim.) = **5/20 mg.m⁻³**
(decision of Regional Hygiene Station in Ostrava)

EC countries (2000/39/EC): not established

8.1.1 DNEL (Derived No Effect Level) for exposure of workers

Systemic Long-term Effect – inhalation:	0.220 mg/m³
Systemic Long-term Effect – dermal:	0.125 mg/kg of weight/day
Acute exposure (local effects) – inhalation:	not established
Acute exposure (local effects) – dermal:	not established

8.2 Exposure controls

When used in a closed circuit or with sufficient vapour exhaust, it is necessary to use standard personal protective equipment. When used in an open facility and insufficient vapour exhaust (diethylaniline concentration > DNEL inhalation), it is necessary to use respiratory protection.

Engineering controls: **Ensure ventilation. Check measurement of diethylaniline concentration in the working environment.**

Respiratory protection: **protective mask or half mask with filter (EN 140) against organic vapours – type A/P2 (APF10).**

Hand protection: **protective gloves (EN 374) - recommended materials: Butyl rubber - IIR: thickness = 0.7 mm, resistance ≥ 480 min;**

Eye protection: **protective goggles or face shield (e.g. EN 166)**

Skin protection: **protective clothing**

Other data: **When using do not eat, drink and smoke. Wash your hands with hot water and soap after work, apply suitable reparative preparations.**

Environmental exposure controls:

Use in a closed circuit, waste gases burnt in a fire crack or cleaned by adsorption (activated carbon), wastewater treated biologically.

Use in a closed area, ensure exhaustion of vapours, use personal protective equipment.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state (at 20 °C):	liquid
Appearance:	oily liquid
Colour:	colourless to yellowish, getting red to brown on air
Odour:	characteristic aromatic
Odour threshold:	not established
pH (for 1% solution at 24 °C):	6.9
Melting point/freezing point (°C):	-39
Initial boiling point (at 1013 hPa in °C):	218
Initial boiling point (at 966 hPa in °C):	230.9
Flash point (at 966 hPa in °C):	84
Evaporation rate:	not established
Flammability (°C):	the product is liquid
Upper/lower explosive limits (% vol.):	5.3/1.1
Vapour pressure (in Pa at 20 °C):	13
Vapour pressure (in Pa at 25 °C)/QSAR:	19.6
Vapour pressure (in Pa at 50 °C):	140
Vapour density:	not established
Relative density (at 20 °C):	0.935
Solubility (at 20 °C in g.l ⁻¹) – in water:	10.0 – 27.0
Solubility (at 27 °C in g.l ⁻¹) – in ethanol:	120.0
Partition coefficient n-octanol/water (log p _{ow} at 27°C and pH 7.7):	-0.267
Auto-ignition temperature (at 1013 hPa in °C):	385.0
Decomposition temperature:	not established
Explosive properties:	none
Oxidising properties:	none
Autoflammability (°C):	not established

9.2 Other information

Dissociation constant (at 20 °C)	1.7·10⁻¹¹
Viscosity (at 20 °C mPa.s):	11.72

SECTION 10: Stability and reactivity

10.1 Reactivity: **0, the substance is not reactive under normal temperatures.**

10.2 Chemical stability: **Stable under normal conditions.**

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- 10.3 Possibility of hazardous reactions: **Strong heating up causes formation of toxic and explosive mixtures.**
- 10.4 Conditions to avoid: **Possibility of ignition in contact with hot surfaces, sparks or open fire.**
- 10.5 Incompatible materials: **Reacts vigorously with strong oxidising agents and inorganic acids. Avoid contact with food.**
- 10.6 Hazardous decomposition products: **Combustion may produce toxic carbon monoxide and nitrogen oxides.**

SECTION 11: Toxicological information

Information on toxicological effects

CLP evaluation

11.1 Acute toxicity: **Category 3**

- LD₅₀ (oral, rat) = **606 mg.kg⁻¹**
- LC₅₀ (inhal., rat) = **1 920 mg.m⁻³/4 h**

11.2 Irritation: **not classified**

Dermal irritation (rabbit): **slightly irritating**

Eye irritation (rabbit): **not irritating**

11.3 Sensitisation

Sensitisation (guinea pig): **not sensitising**

11.4 Mutagenicity (in vitro and in vivo studies): Ames test: **negative**

DNA damage/repair test: **negative**

11.5 Carcinogenicity (rat, mouse): **data not available**

11.6 Reproductive toxicity (rat): **not classified**

11.7 Specific target organs toxicity – single exposure: **data not available**

11.8 Specific target organs toxicity - repeated exposure: **classified as STOT RE, 2nd category**

11.9 Aspiration hazard: **data not available**

SECTION 12: Ecological information

Environmental behaviour and fate

Cumulation: **In case of release found in water. WGK = 2**

12.1 Toxicity

Aquatic toxicity:

Pimaphales promelas: LC₅₀ (96 h) = **16.4 mg.l⁻¹**

Daphnia magna: EC₅₀ (48 h) = **1.3 mg.l⁻¹**

Soil organisms:

Eisenia fetida: LC₅₀ (48 h) = **987 µg.cm⁻²**

Plants and land animals:

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Pseudokirchneriella subcapitata (Algae): EC_{50} (72 h) = 2,16 mg.l⁻¹
NOEC = 0.326 mg.l⁻¹

Classification conclusion: **Chronic toxic for aquatic environment (see Algae)**

12.1.2 Sediment toxicity: **not established**

12.1.3 PNEC (Predicated No Effect Concentration)

PNEC aqua (freshwater):	0.00216 mg/l
PNEC aqua (marine water):	0.000216 mg/l
PNEC sediment:	12.45 mg/kg of weight of dry sediment
PNEC sewage treatment plant:	3.26 mg/l
PNEC soil:	5.53 mg/kg of weight of dry soil
PNEC plants:	not established
PNEC oral:	not established

12.2 Persistence and degradability

Information on degradability:

Testing method: **biologic aerobic – kinetic test – degree of removal 94.2 %.**

Evaluation: **Not biodegradable. Degrades by ventilation. No negative effect to activation cleaning process was observed up to concentration of 400 mg.l⁻¹.**

Persistence: **Data is available to demonstrate that N, N-diethylaniline is non persistent in the aquatic environment and so the chemical is considered to have rapid biodegradation in the aquatic environment. Half-life of N, N-diethylaniline in soil is estimated as 75 days (1800 hrs) which does not exceed the persistence threshold criteria of 180 days (as per Annex XIII of the REACH regulation).**

12.3 Bio-accumulative potential: **BCF < 1000**

12.4 Mobility in soil: **May enter the environment from waste water.**

Stability: **Partially soluble in water.**

Adsorption: **log K_{oc} = 2.5 at 25 °C**

12.5 Results of PBT and vPvB assessment: **not PBT/vPvB**

12.6 Other adverse effects: **not known**

SECTION 13: Disposal considerations

13.1 Waste treatment methods: **Incineration in a hazardous waste incineration plant or disposal in a secure landfill in accordance with Act on Wastes under the catalogue numbers 16 03 05 or 16 05 08.**

Disposal of contaminated packaging: **Transport packaging designed only for N,N-diethylaniline. Rinse contaminated barrels with a lot of water, disposal of waste water in accordance with valid regulations.**

SECTION 14: Transport information

Land transport (ADR/RID)

Marine transport (IMPG)

Air transport (ICAO/IA TA)

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14.1 UN number:	2432
14.2 UN proper shipping name:	N,N-Diethylaniline
14.3 Transport hazard class(es):	6.1, T1
Hazard identification number (Kemler code):	60
14.4 Packing group:	III
14.5 Environmental hazards:	yes
Marine pollutant:	yes
14.6 Special precautions for user:	not included in "Segregation Groups"
EMS:	F-A, S-A
14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code	irrelevant

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.1.1 EU regulations concerning safety, health and environment/specific legislation concerning substances or mixtures, as amended:

- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006;
- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC;
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives;
- Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances.

15.1.2 Regulations valid in CR and concerning safety, health and environment/specific legislation concerning substances or mixtures, as amended:

- Act 350/2011 Coll., on chemical substances and chemical mixtures and on amendments to some acts;
- [Decree of Ministry of Environment no. 93/2016 Coll. laying down Waste Catalogue;](#)
- Governmental decree no. 361/2007 Coll., laying down occupational health and safety conditions.

15.2 Chemical safety assessment

Chemical safety assessment is part of the chemical safety report for N,N-diethylaniline - the overview of risk management measures is provided in Annex 1.

Detailed information on exposure scenarios will be contained in Annex 2 available at the customer's request.

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SECTION 16: Other information

16.1 This material safety data sheet supersedes all previous versions.

16.2 List of abbreviations

Carc.:	Carcinogenicity
CAS:	Chemical Abstracts Service
CLP:	Classification, labelling, packaging regulation
CSR:	Chemical safety report
DNEL:	Derived no-effect level
ES:	Exposure scenario
EC:	European Commission
EC ₅₀ :	Median effective concentration EC ₅₀ – used in toxicity tests. Median effective concentration EC ₅₀ is the concentration of substance that causes 50 % mortality or 50 % decrease of growth or growth rate with reference to the control sample.
EINECS:	European Inventory of Existing Commercial Chemical Substances
ELINCS:	European List of Notified Chemical Substances
Irrit.:	Irritant
LC ₅₀ :	Lethal concentration, 50 % (lethal concentration) is used for toxicity tests
LD ₅₀ :	Absolute lethal dose that kills 50 % of members of population
LOAEC:	Lowest observed adverse effect concentration
NOAEC:	No observed adverse effect concentration
NOEC:	No observed effect concentration
OECD:	Organisation for Economic Cooperation and Development
PBT:	Persistent, bioaccumulative and toxic
PNEC:	Predicted no-effect concentration
REACH:	Registration, Evaluation, Authorisation and Restriction of Chemicals
Sens.:	Sensitivity
STOT:	Specific target organs toxicity
STOT SE:	Specific target organs toxicity - single exposure
STOT RE:	Specific target organs toxicity - repeated exposure
STP:	Sewage treatment plant
SU:	Sector of use
Tox.:	Toxicity
vPvB:	Very persistent and very bioaccumulative

16.3 List of mentioned phrases

H phrases:

H301+H311+H331 Toxic if swallowed, in contact with skin or if inhaled.

H311 Toxic in contact with skin.

H331 Toxic if inhaled.

H373 May cause damage to organs through prolonged or repeated exposure.

H411 Toxic to aquatic life with long lasting effects.

P phrases:

P260 Do not breathe vapours.

P273 Avoid release to the environment.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor.

P302+P352 IF ON SKIN: Wash with plenty of water.

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

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16.4 Sources used

Material safety data list – N,N-diethylaniline, BC MCHZ, 6th edition (06/2015)

16.5 History of revisions

Issue	Date	Change
1.0	30 November 2010	Preparation of the safety data sheet according to Regulation (EC) No 1907/2006 of the European Parliament and of the Council
2.0	06 June 2011	Updating regulations valid in the Czech Republic.
3.0	30 April 2012	Overall revision of all sections of the safety data sheet according to Regulation (EC) No 453/2010 of the European Parliament and of the Council
4.0	1 December 2012	Update of classification (use of a combination of H-phrases), update of the regulations valid in the Czech Republic, and revisions according to Regulation (EC) No 286/2011 of the European Parliament and of the Council
5.0	5 June 2013	Overall revision of all section of SDS according to registration of DEA. Complementation of the overview of exposure scenarios
6.0	1 June 2015	Modification of Section 2 (deletion of classification under DSD) and other sections according to regulations 2015/830/EU
7.0	1 February 2018	Revision according to Commission Regulation (EU) no. 918/2016

Prepared by: Ing. Zuzana Svobodová - IT&Quality, ecology and safety department

Approved by: Ing. Stanislav Pekara, MBA – Head of IT&Quality, ecology and safety department

Version: English
Date: 01.02.2018
Material Safety Data Sheet
N,N-Diethylaniline

www.borsodchem-cz.com

The mentioned data reflect the present state of knowledge and experience and they are in compliance with valid legislation of the Czech Republic. The client is responsible for observing valid national legislation in the place of use.

Manufactured by:

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Annex No. 1

OVERVIEW OF EXPOSURE SCENARIOS

Number of exposure scenario	Volume (t/r)	Production	Identified use			Stage of life cycle		Areas of application (SU)	Chemical products (PC)	Processes (PROC)	Release to the environment (ERC)	Items (AC)
			Formulation	End use	Consumers	Period of use (for items)	Stage of waste					
ES1 Radical formation accelerator	N/A			X				SU3, 10		PROC1, 2, 3, 4, 5, 8a, 8b, 9	ERC2	N/A
ES2 Intermediate	N/A			X				SU3	PC19	PROC1, 2, 3, 4	ERC6a	N/A
ES3 Colouring agents, dyes	N/A							SU3, 10	PC34	PROC1, 2, 3, 4, 5	ERC4, 5, 7	N/A
ES4 Polymer products	N/A							SU3, 11, 12	PC32	PROC1, 2, 3, 4, 5	ERC6d	N/A
ES5 Building and construction preparations In mixture: < 5 % DEA	N/A							SU19, 21, 22	PC0	PROC8a, 8b, 9, 21	ERC8a, 8c, 8d, 8f, 10a	AC4, 7, 11

N/A – Not available (confidential)

SUMMARY OF RISK MANAGEMENT MEASURES

Title	Manufacture and use of N,N-diethylaniline (DEA)
Sector of Use	SU3, SU10, SU11, SU12, SU19, SU21, SU22
Process Category	PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15, PROC21
Product Category	PC19, PC32, PC34, PC0
Article Category	AC4, AC7, AC11
Environmental release Category	ERC1, ERC2, ERC4, ERC5, ERC6a, ERC6d, ERC7, ERC8a, ERC8c, ERC8d, ERC 8f, ERC10a
Processes, tasks, activities covered	Covers the manufacture and use of DEA in closed processes where exposure to DEA is contained, or where exposure (inhalation or dermal) to DEA may occur during sampling, maintenance or equipment breakage. Covers further processing (use) of DEA to form a number of

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	<p>different products such as rubber chemicals, dyes and polymer products during which <u>DEA is predominantly contained</u> but there may be some exposure during sampling, maintenance and equipment breakage.</p> <p>Covers the same processing (use) of DEA in batch or other processes where, due to the nature of the process design opportunity for exposure to DEA may occur but with <u>exposure to DEA controlled by operational conditions or risk management measures</u>.</p> <p>Covers the transfer of DEA by charging/discharging from/to small or large containers at dedicated or non-dedicated facilities, <u>with exposure to DEA controlled by operational conditions or risk management measures</u>.</p> <p>Covers use of aniline as laboratory reagent at small scale laboratories with quantities of 1 L or 1 kg DEA or less present in the workplace with <u>exposure to DEA controlled by operational conditions or risk management measures</u>.</p> <p>It is assumed that all processes are performed at room temperature.</p>
	Operational conditions and risk management measures
	Control of worker exposure
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated) [OC1]
Other Operational Conditions affecting worker exposure	<p>DEA carries a high hazard warning due to its H373 classification, therefore where procedures in the manufacture or use of DEA are not designed to contain emissions, workers exposure to DEA must be prevented by use of local exhaust ventilation and good work practices. These may include:</p> <ul style="list-style-type: none"> • keeping equipment under negative pressure, • control of staff entry to work area, • ensuring all equipment is well maintained, • permits to work for maintenance work, • regular cleaning of equipment and work area, • systems in place to ensure correct use of RMMs and that OCs are being followed, training for staff on good practice, • procedures and training for emergency decontamination and disposal, • good standards of personal hygiene, • recording of any 'near miss' situations. • sensitisers – pre-employment screening and appropriate health screening.
Process Categories	Risk Management Measures *
1, 2, 3, 4, 5, 8a, 8b, 9, 15 and 21	<p>DEA carries a high hazard warning due to its H373 classification, therefore where exceptional procedures may result in exposure to diethylaniline:</p> <p>Use suitable eye protection and gloves [PPE14].</p> <p>Wear a full face respirator conforming to EN140 with Type A/P2 filter or better [PPE32]</p> <p>Wear suitable coveralls to prevent exposure to the skin [PPE27].</p>

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1 – Use in closed process, no likelihood of exposure	Handle substance within a closed system [E47].
2 – Use in closed, continuous process with occasional controlled exposure (e.g. sampling)	Handle substance within a closed system [E47]. Wear suitable gloves tested to EN374 [PPE15] during material sampling.
3 – Use in closed, batch process (synthesis or formulation)	Handle substance within a predominantly closed system provided with extract ventilation [E49]. Ensure material transfers are under containment or extract ventilation [E66]. Ensure samples are obtained under containment or extract ventilation [E76].
4 – Use in batch and other process (synthesis) where opportunity for exposure arises	Provide extract ventilation to points where emissions occur [E54]. Ensure material transfers are under containment or extract ventilation [E66]. Ensure samples are obtained under containment or extract ventilation [E76]. Avoid carrying out operation for more than 4 hours [OC12]
5 – Mixing and blending in batch processes	Provide extract ventilation to points where emissions occur [E54]. Ensure material transfers are under containment or extract ventilation [E66]. Ensure samples are obtained under containment or extract ventilation [E76]. Avoid carrying out operation for more than 4 hours [OC12]
8a – Transfer of chemicals from/to vessels/ large containers at non-dedicated facilities.	Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51]. Provide extract ventilation to material transfer points and other openings [E82]. Avoid carrying out operation for more than 1 hour [OC11].
8b – Transfer of chemicals from/to vessels/ large containers at dedicated facilities.	Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51]. Provide extract ventilation to material transfer points and other openings [E82]. Avoid carrying out operation for more than 4 hours [OC12]
9 – Transfer of substance into small containers (dedicated filling line, including weighing)	Fill containers/cans at dedicated fill points supplied with local extract ventilation [E51]. Provide extract ventilation to material transfer points and other openings [E82]. Avoid carrying out operation for more than 1 hour [OC11].
15 – Use of laboratory reagents in small scale laboratories	Carry out in a vented booth or extracted enclosure [E57]. Ensure samples are obtained under containment or extract ventilation [E76]. Avoid carrying out operation for more than 1 hour [OC11].
21 – Low energy manipulation of substances bound in materials and/or articles	No other specific measures identified [EI20].

* standard phrases and codes are extracted from GES Worker Chemical Safety Assessment (CSA) Template on the Cefic web-site <http://www.cefic.org>