

**References**

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**I U C L I D D a t a S e t**

Existing Chemical ID: 112-24-3  
CAS No. 112-24-3  
EINECS Name trientine  
EC No. 203-950-6  
TSCA Name 1,2-Ethanediamine, N,N'-bis(2-aminoethyl)-  
Molecular Formula C6H18N4

Producer Related Part  
Company: Bayer AG  
Creation date: 15-MAR-1993

Substance Related Part  
Company: Bayer AG  
Creation date: 15-MAR-1993

Memo: AKTUELL OECD-SIDS

Printing date: 24-JUL-2002  
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confidential, WGK (DE), TA-Luft (DE), Material  
Safety Dataset, Risk Assessment, Directive  
67/548/EEC, SIDS

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**1. GENERAL INFORMATION**

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**1.0.1 Applicant and Company Information**

Type: cooperating company  
Name: Bayer AG  
Town: 51368 Leverkusen 1  
Country: Germany

10-MAY-1994

**1.0.2 Location of Production Site, Importer or Formulator****1.0.3 Identity of Recipients****1.0.4 Details on Category/Template****1.1.0 Substance Identification****1.1.1 General Substance Information**

Substance type: organic  
Physical status: liquid  
Purity: 60 - 70 % w/w  
Remark: technical mixture

**1.1.2 Spectra****1.2 Synonyms and Tradenames**

1,2-Bis-(2-aminoethylamino)-ethan  
1,2-Di-(aminoethylamino)-ethan  
1,4,7,10-Tetraazadecan  
1,8-Diamino-3,6-diaza-octan  
2,2'-(1.2-Ethylenbis-amino-)bis-ethanamin  
3,6-Diazaoctan-1,8-diamin  
N,N'-Bis-(2-aminoethyl)-1,2-ethanediamine  
N,N'-Bis-(2-aminoethyl)-ethylendiamin  
N,N'-Di-(2-aminoethyl)-1.2-ethandiamin  
N,N'-Di-(2-aminoethyl)-1.2-ethylendiamin  
TETA  
Tetramin  
Trien  
Triethylentetramin

**1. GENERAL INFORMATION****1.3 Impurities**

**EINECS-Name:** N,N'-Bis-(2-aminoethyl)piperazin  
**Contents:** 11 - 13 % w/w

**EINECS-Name:** N-(Piperazin-1-ethyl)-ethan-1,2-diamin  
**Contents:** 10 - 13 % w/w

**EINECS-Name:** Tris-(2-aminoethyl)-amin  
**Contents:** 4 - 6 % w/w

**CAS-No:** 111-40-0  
**EC-No:** 203-865-4  
**EINECS-Name:** 2,2'-iminodi(ethylamine)  
**Contents:** <= 3 - % w/w

**EINECS-Name:** Water  
**Contents:** <= ,5 - % w/w

**1.4 Additives****1.5 Total Quantity**

**Quantity:** 1000 - 5000 tonnes produced

**Remark:** in 1989-1991 (BRD)  
 29-NOV-1994 (1)

**Remark:** Netherland: ca. 6000 t/a  
 USA: ca. 1100 t/a  
 Japan: ca. 1800 t/a  
 29-NOV-1994 (1)

**1.6.1 Labelling**

**Labelling:** as in Directive 67/548/EEC  
**Symbols:** (C) corrosive  
**R-Phrases:** (21) Harmful in contact with skin  
 (34) Causes burns  
 (43) May cause sensitization by skin contact

**S-Phrases:** (26) In case of contact with eyes, rinse immediately with  
 plenty of water and seek medical advice  
 (36/37/39) Wear suitable protective clothing, gloves and  
 eye/face protection

**Country:** Germany

**1.6.2 Classification**

**Classified:** as in Directive 67/548/EEC  
**Class of danger:** corrosive  
**R-Phrases:** (21) Harmful in contact with skin  
 (34) Causes burns  
 (43) May cause sensitization by skin contact

**Country:** Germany

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**1. GENERAL INFORMATION**

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**1.6.3 Packaging****1.7 Use Pattern**

Type: industrial

Category: Chemical industry: used in synthesis

Remark: Intermediate for - hardeners for epoxy resins > 80 %  
- agents used in glues, paper industry  
and textile industry > 15 %

Type: use

Remark: TETA can also be used directly as hardener in epoxy resins  
(approx. 8 % of total production)

**1.7.1 Detailed Use Pattern****1.7.2 Methods of Manufacture****1.8 Regulatory Measures****1.8.1 Occupational Exposure Limit Values****1.8.2 Acceptable Residues Levels****1.8.3 Water Pollution**

Classified by: other: Bayer AG  
Labelled by: other: Bayer AG  
Class of danger: 2 (water polluting)  
Country: Germany

**1.8.4 Major Accident Hazards**

Substance listed: no

**1.8.5 Air Pollution**

Classified by: TA-Luft (DE)  
Labelled by: TA-Luft (DE)  
Number: 3.1.7 (organic substances)  
Class of danger: III

**1.8.6 Listings e.g. Chemical Inventories****1.9.1 Degradation/Transformation Products****1.9.2 Components****1.10 Source of Exposure**

Country: Germany

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**1. GENERAL INFORMATION**

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**Remark:** air: 6 kg/a at one processing site;  
no release into the atmosphere at all other  
production and processing sites  
water: 4,4 kg/a at all production and processing sites  
waste treatment:  
water: biological waste water treatment plant  
air: incineration  
There is no solid waste from production and processing.  
Possible emission of very small amounts through migration out  
of epoxy resins (residual concentration of TETA in  
hardeners: at max. approx. 7.9 %)

29-NOV-1994

(1)

**1.11 Additional Remarks****1.12 Last Literature Search****1.13 Reviews**

2.1 Melting Point

Value: = 12 degree C (2)

Remark: Solidification point: approx. -35 degree C (technical product)  
26-APR-1994 (3)

2.2 Boiling Point

Value: 266 - 267 degree C (4)

Value: = 277,5 degree C  
Decomposition: yes

Remark: 93 - 96 % purity (5)

Value: = 277,9 degree C (6)

Value: = 278 degree C  
Decomposition: yes (7)

Value: ca. 280 degree C

Remark: technical product  
26-APR-1994 (3)

2.3 Density

Type: density  
Value: = ,9739 g/cm<sup>3</sup> at 20 degree C (8)

Type: density  
Value: ca. ,98 g/cm<sup>3</sup> at 20 degree C

Remark: technical product  
26-APR-1994 (3)

Type: density  
Value: = ,9818 g/cm<sup>3</sup> at 20 degree C (5)

Type: density  
Value: = ,9839 g/cm<sup>3</sup> at 20 degree C (6)

Type: density  
Value: = ,977 g/cm<sup>3</sup> at 25 degree C (9)

## 2.3.1 Granulometry

2.4 Vapour Pressure

Value: = ,013 hPa at 20 degree C (6)

Value: < ,1 hPa at 20 degree C

Remark: technical product (3)  
26-APR-1994

2.5 Partition Coefficient

log Pow: = -1,66

Remark: calculated (no further information) (10)

log Pow: = -1,41

Remark: calculated (no further information) (11)

log Pow: = -1,4

Method: other (calculated): Leo, Hansch: A. Leo, CLOGP-3.63 (1991)  
Daylight, Chemical Information Systems, Inc. Irvine, CA, USA

Remark: undissociated form (12)

2.6.1 Solubility in different media

Remark: completely miscible (7)

2.6.2 Surface Tension2.7 Flash Point

Value: = 118 degree C (13)

Value: = 125 degree C (6)

Value: ca. 129 degree C

Method: other: DIN 51758

Remark: technical product (3)  
26-APR-1994

Value: = 135 degree C (5)

2.8 Auto Flammability



2.9 Flammability

Remark: LFL: 1.0 % v/v (180 deg. C)  
UFL: 3.6 % v/v (180 deg. C)  
Source: DOW Europe S.A., Switzerland  
24-MAY-1994 (14)

2.10 Explosive Properties2.11 Oxidizing Properties2.12 Dissociation Constant2.13 Viscosity2.14 Additional Remarks

Remark: Henry-constant :  $6.7 \times 10^{-11}$  Pa.m<sup>3</sup>/mol (at 25 degree C,  
calculated)  
29-NOV-1994 (1)

Remark: Ignition-temperature : 335 Grad C (DIN 51794)  
26-APR-1994 (3)

Remark: Ignition-temperature : 338 Grad C  
(5)

Remark: UV-Spectrum in water : epsilon < 10 e/molxcm at lamda > 240 nm  
(15)

3.1.1 Photodegradation

Type: other: photochemical degradation in atmosphere  
INDIRECT PHOTOLYSIS  
Sensitizer: OH  
Rate constant: ,000000000225 cm<sup>3</sup>/(molecule \* sec)  
Degradation: 50 % after 1,7 hour(s)

Method: other (calculated): according to Atkinson

29-NOV-1994

(16) (1)

3.1.2 Stability in Water

Type: abiotic

Year: 1985

Test substance: other TS: technical grade (purity > 70 %)

Remark: No hydrolysis in water during the experiment of 36 days.  
Tested concentrations: 1, 100 and 200 mg/l

(17)

3.1.3 Stability in Soil3.2.1 Monitoring Data (Environment)3.2.2 Field Studies3.3.1 Transport between Environmental Compartments

Remark: Based on the physico-chemical properties transport from water to air is not to be expected (Henry-constant:  $H = 6.7 \times 10E-11$  Pa.m<sup>3</sup>/mol, 25 degree C, calculated)

29-NOV-1994

(1)

3.3.2 Distribution

Remark: Based on the physical-chemical data, the preferred environmental compartment of TETA is the hydrosphere

3.4 Mode of Degradation in Actual Use3.5 Biodegradation

Type: aerobic  
Inoculum: activated sludge, industrial  
Concentration: 100 mg/l related to DOC (Dissolved Organic Carbon)  
Degradation: 0 % after 28 day(s)  
Result: under test conditions no biodegradation observed

Method: OECD Guide-line 302 B "Inherent biodegradability: Modified Zahn-Wellens Test"

## 3. ENVIRONMENTAL FATE AND PATHWAYS

SUBSTANCE ID: 112-24-3

Year: 1989  
GLP: no data  
Remark: technical product (18)

Type: aerobic  
Inoculum: predominantly domestic sewage, adapted  
Concentration: related to Test substance  
Degradation: 0 % after 20 day(s)  
Result: under test conditions no biodegradation observed

Method: other: in accordance with OECD Guide-line 301 D "Ready Biodegradability: Closed Bottle Test"

Year: 1977  
GLP: no data

Remark: technical product;  
Substance concentrations: 2.6, 8.5, 25.5, 85 mg/l (18)

3.6 BOD5, COD or BOD5/COD Ratio3.7 Bioaccumulation

Remark: Bioaccumulation is not to be expected (logPow = -1,4; -1.66 calculated)

3.8 Additional Remarks

AQUATIC ORGANISMS4.1 Acute/Prolonged Toxicity to Fish

**Type:** semistatic  
**Species:** Poecilia reticulata (Fish, fresh water)  
**Exposure period:** 96 hour(s)  
**Unit:** mg/l **Analytical monitoring:** no  
**LC0:** 180 -  
**LC50:** 570 -  
**LC100:** 1800 -

**Method:** Directive 84/449/EEC, C.1 "Acute toxicity for fish"  
**Year:** 1989  
**GLP:** yes  
**Test substance:** other TS: Triethylenetetramine, purity: 97.5%

**Remark:** 48h-LC50 = 1140 mg/l  
 10-MAY-1994 (19)

**Species:** Leuciscus idus (Fish, fresh water)  
**Exposure period:** 48 hour(s)  
**Unit:** mg/l **Analytical monitoring:**  
**LC0:** 200 -

**Method:** other: Bestimmung der akuten Wirkung von Stoffen auf Fische.  
 Arbeitskreis "Fischtest" im Hauptausschuss "Detergentien"  
 (15.10.73)  
**GLP:** no

**Remark:** open system;  
 at 500 mg/l, all test organisms had died after 27 h;  
 no further information on test conditions (18)

**Species:** Pimephales promelas (Fish, fresh water)  
**Exposure period:** 96 hour(s)  
**Unit:** mg/l **Analytical monitoring:**  
**LC50:** 495 -

**Remark:** validation not possible  
**Source:** DOW Europe S.A., Switzerland  
 26-APR-1995 (20)

4.2 Acute Toxicity to Aquatic Invertebrates

**Species:** Daphnia magna (Crustacea)  
**Exposure period:** 48 hour(s)  
**Unit:** mg/l **Analytical monitoring:** no  
**EC0:** 18 -  
**EC50:** 31,1 -  
**EC100:** 56 -

**Method:** Directive 84/449/EEC, C.2 "Acute toxicity for Daphnia"  
**Year:** 1989  
**GLP:** yes  
**Test substance:** other TS: Triethylentetramine, purity: 97.5%