

## SAFETY DATA SHEET

### SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

#### 1.1. PRODUCT IDENTIFIER

### **CADMIAGE 2023 or ANTICO CD 2023 (code: 11028)** **CADMIUM 2023 (code: DPS6123)**

#### 1.2. RELEVANT IDENTIFIED USES OF THE SUBSTANCE OR MIXTURE AND USES ADVISED AGAINST

The CADMIUM 2023 solution is used at room temperature for applying cadmium-plating on most materials, using the selective brush plating process or the Dalistick tool. Cadmium is still often designed to protect metals against atmospheric corrosion notably in aeronautics.

These DALIC electrolysis processes (brush or DALISTICK) can be applied locally without immersion of the part, just where it is necessary. Thus, only small quantities of solutions need to be stored or used.

With the DALISTICK, the solution circulates in a closed loop without flowing on the area to be treated.

**Restricted to professional users.**

**There are in Europe restrictions on placing on the market cadmium plated articles.**

It is inadvisable to use this product outside the prescriptions provided in its technical data sheet and in this safety data sheet.

#### 1.3. DETAILS OF THE SUPPLIER OF THE SAFETY DATA SHEET

**DALIC** - ZI de Plagué - 41, rue des Eaux - B.P. 90139 - 35501 VITRE CEDEX, FRANCE

Manufacturer and Seller, tel.: (33) 2.99.75.36.99, fax: (33) 2.99.74.49.31.

For information: [sclaverie@dalicworld.com](mailto:sclaverie@dalicworld.com), tel.: (33) 2.99.75.53.88.

#### 1.4. EMERGENCY TELEPHONE NUMBER

RELEVANT OFFICIAL ADVISORY BODY (France): **INRS / Orfila**, tel. (33) 1.45.42.59.59 – 24 hours a day

For information concerning specific countries, see the web site: [echa.europa.eu](http://echa.europa.eu), heading: Support. Click on: Helpdesks,

Contact details of national helpdesks, choose the country, click on: national emergency telephone number.

For additional product information in the case of an emergency: tel. (33) 6.07.99.56.06 - 24 hours a day.

### SECTION 2: HAZARDS IDENTIFICATION

#### 2.1. CLASSIFICATION OF THE SUBSTANCE OR MIXTURE

**Acute Tox. 4 (oral) H302 - Acute Tox. 2 (inhalation) H330 - Skin Corr. 1B H314 - Resp. Sens. 1 H334 - Skin Sens. 1 H317 - Muta. 1B H340 - Carc. 1B H350 - Repr. 1B H360FD - STOT RE 1 H372 - Aquatic Acute 1 H400 - Aquatic Chronic 1 H410**

#### 2.2. LABEL ELEMENTS



**Danger**

**Alkaline aqueous mixture, contains: ethylenediamine, cadmium sulphate**

**Restricted to professional users**

H302 - Harmful if swallowed

H314 - Causes severe skin burns and eye damage

H317 - May cause an allergic skin reaction

H330 - Fatal if inhaled

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled

H340 - May cause genetic defects

H350 - May cause cancer

H360FD - May damage fertility. May damage the unborn child

H372 - Causes damage to organs through prolonged or repeated exposure

H410 - Very toxic to aquatic life with long lasting effects

P201 - Obtain special instructions before use

P260 - Do not breathe mist, vapours, spray

P280 - Wear protective gloves, protective clothing, eye protection

P285 - In case of inadequate ventilation wear respiratory protection

P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower

P304+P340+P310 - IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician

P305+P351+P338+P310 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician

P501 - Dispose of contents/container to an approved waste disposal plant

#### MAIN HAZARDS

- **Fire or explosion:** this product is not classified as flammable or explosive.
- **Adverse effects on health:** according to the applicable data, this mixture must be considered as corrosive, sensitizing by inhalation and contact with skin, very toxic by inhalation and toxic in case of prolonged or repeated exposure. It contains a carcinogen, a mutagen and toxic agent for reproduction of category 1B (there is sufficient evidence to provide a strong presumption that human exposure may result in such effects, this being largely based on animal tests). If protective measures are not taken, the risks of development of cancer, of hereditary genetic changes, loss of fertility and of a possible delay on the child's development, as before than after birth, are very likely increased.



- Effects on the environment: VERY TOXIC to the aquatic environment.

Refer also to the paragraphs 11, 12 and 13.

### 2.3. OTHER HAZARDS

Does not contain PBT (persistent, bioaccumulative and toxic) or vPvB (very persistent and very bioaccumulative) substances in accordance with the criteria set out in Annex XIII of REACH regulation.

Formation of air contaminants during electrolysis. Very little if DALISTICK is used.

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1. SUBSTANCES

Not applicable

### 3.2. MIXTURES

COMPONENTS OR IMPURITIES CONTRIBUTING TO THE HAZARDS ACCORDING TO EC REGULATION

Classified substances present in concentrations higher than the triggering concentration for listing (0.1% or 1% according to the hazard, [annexes I](#) and VI): YES

Classified substances present in concentrations lower than the triggering concentration for listing (0.1% or 1% according to the hazard, [annexes I](#) and VI, or less for sensitizing substances): NO

SUBSTANCES WITH COMMUNITY WORKPLACE EXPOSURE LIMITS: NO.

Identification	Classification		Labelling		Specific concentration limits, M-factors	Concentration range in the mixture
	Hazard Class and category code(s)	Hazard statement code(s)	Pictogram, Signal Word Code(s)	Hazard statement code(s)		
Cadmium sulphate Index Nr: 048-009-00-9 EC Nr: 233-331-6 CAS Nr: 10124-36-4 Registration Nr: no, in-situ produced, < 1 T/y	Carc. 1B Muta. 1B Repr. 1B Acute Tox. 2 (inhalation) Acute Tox. 3 (oral) STOT RE 1 Aquatic Acute 1 Aquatic Chronic 1	H350 H340 H360FD H330 H301 H372 H400 H410	GHS06 GHS08 GHS09 Dgr	H350 - H340 - H360FD - H330 - H301 - H372 - H410 - Suppl. Hazard statement code(s): no	Carc. 1B H350: ≥ 0.01% oral STOT RE 1 H372: ≥ 7% STOT RE 2 H373: 0.1-7% M = 10 (chronic)	<b>15.9%</b> 8.6% as Cd
Ethylenediamine; 1,2-diaminoethane Index Nr: 612-006-00-6 CE Nr: 203-468-6 CAS Nr: 107-15-3 Registration Nr: 01-2119480383-37-xxxx	Flam. Liq. 3 Acute Tox. 4 (oral) <b>Acute Tox. 3 (dermal)</b> <b>Acute Tox. 4 (inhalation)</b> Skin Corr. 1B Resp. Sens. 1B Skin Sens. 1B <b>Aquatic Chronic 3</b>	H226 H302 <b>H311</b> <b>H332</b> H314 H334 H317 <b>H412</b>	GHS02 GHS08 GHS05 <b>GHS06</b> Dgr	H226 - H302 - <b>H311 - H332 - H314 - H334 - H317 - H412</b> Suppl. Hazard statement code(s): no	-	<b>&lt; 15%</b>

### OTHER INFORMATION

PBT or vPvB substances: NO.

Substances subject to authorisation (Annex XIV, since 13.06.2017, 43 substances): NO.

Substances included in the Candidate List for eventual inclusion in Annex XIV (since 27.06.2018, 191 substances): cadmium sulphate (see also section 15), ethylenediamine.

Cadmium content (Cd): ≈ 100 g/L (for the non-used solution).

Contains also unregulated salts.

## SECTION 4: FIRST AID MEASURES

### 4.1. DESCRIPTION OF FIRST AID MEASURES

Protection of the first-aiders: wear gloves and goggles and according to the situation, protective clothes and shoes or a mask.

Contact with skin: take off contaminated clothing and shoes. Wash immediately with plenty of water.

Contact with eyes: rinse immediately with plenty of water for approximately 15 minutes. Consult quickly an ophthalmologist.

Inhalation: under abnormal conditions of use causing considerable inhalation, remove the casualty from the contaminated area, let him take a rest in a well-ventilated room and seek medical advice. Hospitalize quickly the person to monitor the effects that may be delayed and initiate medical treatment.

Ingestion: try to induce vomiting if the person is perfectly conscious. Call immediately the medical service. Hospitalize quickly the person for a supervision of the effects and initiate treatment.

### 4.2. MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

See section 11.

### 4.3. INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED

No supplementary information.

## SECTION 5: FIREFIGHTING MEASURES

### 5.1. EXTINGUISHING MEDIA

Suitable: special powders for metal fires, or failing this, other inert powders.

Unsuitable: do not use water or carbon dioxide.

### 5.2. SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE

Avoid contact with powerful oxidising agents and with acidic products.



**Dangerous thermal decomposition products:** ethylenediamine has a closed-cup flash point of 34-38°C, boils at 117°C at atmospheric pressure and ignites at 385-405°C. Then the combustion gives ammonia and oxides (of carbon and of nitrogen). Cadmium sulphate decomposes above 840°C with the formation of oxides of sulphur and of cadmium. Prevent any material from entering drains or waterways or soil. The contaminated extinguishing agents must be treated and eliminated in accordance with regulations.

### 5.3. ADVICE FOR FIREFIGHTERS

Because of the substances produced during thermal decomposition, use approved self-contained breathing equipment and protective clothing in the event of intervention.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1. PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

For non-emergency personnel and for emergency responders: avoid contact with the skin, clothes and eyes: wear gloves and goggles (in all conditions). Wear in addition a protective respiratory mask with an A2P3 or A2B2P3 cartridge in case of vapours or aerosols (unusual conditions occurring if the temperature is higher than room temperature).

Dispose of all contaminated clothing or shoes and wash thoroughly with water.

### 6.2. ENVIRONMENTAL PRECAUTIONS

Do not allow the product to be thrown away. Recover as much as possible by absorbing with paper or pumping for processing within the firm or by an approved centre.

### 6.3. METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP

With water to remove all non-recoverable product. Collect the recoverable rinsing water for processing within the firm or by an approved centre.

### 6.4. REFERENCE TO OTHER SECTIONS

Refer also to sections 8, 12 and 13.

## SECTION 7: HANDLING AND STORAGE

### 7.1. PRECAUTIONS FOR SAFE HANDLING

Use as supplied. Close containers (of PE) tightly after use with the original cap. Do not re-use containers with another product. No drinking, eating or smoking on the workplace.

Maintain the premises and the work stations in perfect state of cleanliness and clean them frequently.

Observe a very strict cutaneous hygiene and change clothes after work, especially before eating: wash your hands and face before eating, take a shower and change clothes. For that purpose, each worker will have 2 separated clothing cabinets to avoid any contamination of town clothes by working clothes.

During brush electrolysis, even if the product is used at room temperature generally for a short time, it is important to protect the respiratory system and to avoid contact with skin and eyes.

**Wear the recommended protective equipment listed in section 8.**

### 7.2. CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES

Store in a room on a spill-retaining vat, away from acidic or oxidising agents and organic products in general. Keep in tightly closed original containers only, between 5 and 30°C away from direct sun-light or heat. The maximum recommended shelf life is three years from the date of manufacture under normal conditions of storage.

### 7.3. SPECIFIC END USE(S)

DALIC processes – See section 1.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. CONTROL PARAMETERS

#### EXPOSURE LIMIT VALUES IN AIR

	Cadmium & cadmium compounds except CdO & CdS, total or respirable dust (as Cd)		Cadmium sulphate (as Cd)		1,2-Diaminoethane (Ethylenediamine)	
	8 h (mg/m³)	Short term (mg/m³)	8 h (mg/m³)	Short term (mg/m³)	8 h (mg/m³)	Short term (mg/m³)
Australia	0.01 total dust				25	
Austria	0.15 total dust	0.6 total dust, 0.002 respirable dust	0.015 inhalable aerosol	0.06 inhalable aerosol	25	100
Belgium	0.01 total dust - 0.002 alveolar particulates, respirable dust				25	
Canada – Quebec / Ontario	0.025 total dust / 0.01 total dust, 0.002 alveolar particulates				25 / 25	
Denmark	0.005 total dust	0.01 total dust			25	50
European Union, Directives 91/322/EC, 98/24/EC, 2000/39/EC, 2004/37/EC, 2006/15/EC, 2009/161/EU, 2017/2398/EU						
Finland			0.004 inhalable fraction		25	50
France, up to decisions of 23.03.2016	0.05 total dust				25	35



Germany (AGS)	0.001 inhalable fraction 0.00016 respirable fraction	0.008 inhalable fraction			
Germany (DFG)					
Hungary	0.015 total dust	0.015 total dust			
Ireland	0.01 total dust 0.002 respirable fraction			25	
Israel	0.01 (0.005 women) total dust				
Italy					
Japan	0.05 total dust			25	
Latvia	0.01 total dust	0.05 total dust		2	
New Zealand	0.01 inhalable aerosol 0.002 respirable aerosol			25	
China	0.01 total dust	0.02		4	10
Poland	0.01 total dust, 0.002 respirable fraction			20	50
Singapore	0.01 total dust 0.002 (compounds)			25	
South Korea	0.01 total dust 0.002 respirable dust			25	
Spain	0.01 inhalable aerosol 0.002 respirable aerosol			25	
Sweden	0.02 total dust 0.005 respirable dust			25	35
Switzerland	0.015 inhalable aerosol, 0.004 respirable dust / alveolar particulates			25	50
The Netherlands			0.005		
USA - NIOSH	0.01 dust and fume			25	
USA - OSHA	0.005 total dust			25	
United Kingdom	0.025 total dust			(25)	

**DERIVED NO-EFFECT LEVEL (DNEL) FOR CADMIUM SULPHATE (as Cd)**

Workers, long term exposure, systemic effects, inhalation: 4 µg/m<sup>3</sup> (AF: 1)

General population, long-term exposure, systemic effects, oral: 1 µg/kg bw/day (AF: 1), i.e. 2 µg Cd/g creatinine.

**DERIVED NO-EFFECT LEVEL (DNEL) FOR ETHYLENEDIAMINE**

Workers, long-term exposure, systemic effects, inhalation: 25 mg/m<sup>3</sup>

Workers, long-term exposure, systemic effects, dermal: 3.6 mg/kg bw/day

General population, long-term exposure, systemic effects, inhalation: 12.5 mg/m<sup>3</sup>

General population, long-term exposure, systemic effects, oral: 0.275 mg/kg bw/day (AF: 80)

**INDICATIVE BIOLOGICAL EXPOSURE VALUES FOR CADMIUM AND INORGANIC COMPOUNDS**

Reference values for the adult general population:

*Cadmium in blood*: 0.7 / 3 µg/L for non-smoking / smoking people (ANSES 2018), 1 µg/L for non-smoking people (BAR-DFG 2010), < 1.7 µg/L (NHANES 2015).

*Urinary cadmium*: 0.8 / 1.0 µg/g creatinine for non-smoking / smoking people (ANSES 2018), 0.8 µg/L for non-smoking people (BAR-DFG 2010), 1 µg/L (HBM-I, Germany, 2011).

Guide values at work for cadmium in blood:

- France (ANSES): 4 µg/L (2018)
- Germany (DFG), Europe (SCOEL): undetermined value.
- Finland (FIOH): 5.6 µg/L (2007)
- USA (ACGIH): 5 µg/L (2001)

Guide values at work for urinary cadmium:

- France (ANSES, 2018), USA (ACGIH, 2001): 5 µg/g of creatinine
- Europe (SCOEL): 2 µg/g creatinine (2010)
- Finland (FIOH): 2.2 µg/L
- Germany (DFG): no value.

The sample is to be taken at any time of the day or of the week (preferably on the next Monday).

Urinary cadmium analysis alone does not ensure effective prevention and should be associated with the analysis of cadmium in blood, which is a marker of recent exposure, especially if urinary cadmium is above 2 µg/g creatinine.

Tobacco, food (cereals, potatoes) and age increase the cadmium level in body and slightly its urinary excretion. Eating of offal and shellfishes should be avoided 3 days before sampling.

**PREDICTED NO-EFFECT CONCENTRATION (PNEC) FOR THE CADMIUM SULPHATE (as Cd)**

Fresh water: 0.19 µg/L (AF: 2) - Marine water: 1.14 µg/L (AF: 2)

Sewage treatment plant (STP): 20 µg/L (AF: 10)

Sediment (freshwater): 1.8 mg/kg sediment dw (AF: 1) - Sediment (marine water): 0.64 mg/kg sediment dw (AF: 1)

Soil: 0.9 mg/kg soil dw (AF: 1)

Oral, secondary poisoning: 0.16 mg/kg food (AF: 10)

**PREDICTED NO-EFFECT CONCENTRATION (PNEC) FOR ETHYLENEDIAMINE**

Fresh water: 0.016 mg/L (AF: 10) - Marine water: 0.002 mg/L (AF: 100)

Aqua (intermittent releases): 0.167 mg/L - Sewage treatment plant (STP): 0.5 mg/L (AF: 1)

Sediment (freshwater): 7.68 mg/kg sediment dw - Sediment (marine water): 0.768 mg/kg sediment dw

Soil: 4.36 mg/kg soil dw

Oral, secondary poisoning: 4.9 mg/kg food (AF: 90)

## 8.2. EXPOSURE CONTROLS

Appropriate engineering controls: formation of air contaminants during electrolysis. Very little if DALISTICK is used. Check that the limit values are not reached. Exposure levels depend on the treatment time, the surface area treated and on the quality of the workshop air extraction.

An air exhaust pipe placed at 30 cm from the area to be treated with inside a speed of 7 to 10 m/s of air normally provides conformable air contaminants levels (0.5 to 1.0 m/s at the level of the piece).

Personal protection equipment: provide a shower, a powerful tap and sink unit, an eye basin and a protective breathing mask for emergency interventions near the work place.

- Respiratory protection: during brush plating, provide an effective inhaling of the aerosols / vapours where they are created and extraction out of the premises, and if insufficient, wear a filtering mask with an A2P3 or A2B2P3 cartridge (EN 405 standard).

*During electrolysis with the DALISTICK tool, these measures can be eased, work taking place practically in a closed loop. At least and as a precaution, work in an aired room and wear a filtering FFP3 mask (EN 149 standard).*

- Hand protection: wear gloves (of nitrile or latex for example).
- Eye protection: wear goggles with lateral protections or a facial screen. Do not wear contact lenses.
- Skin protection: wear overalls (at least of type 6 according to NF EN 13034 standard) and safety shoes.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1. INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES

- Appearance: colourless liquid.
- Odour: odourless.
- pH:  $\approx$  10.5-11.
- Relative density: 1.16
- Solubility: miscible in water.
- Boiling point: approximately 100°C.
- Crystallisation / melting point: -3°C
- Flammability: nil.
- Oxidising properties: nil.
- Risk of fire or explosion: nil.

### 9.2. OTHER INFORMATION

No

## SECTION 10: STABILITY AND REACTIVITY

### 10.1. REACTIVITY

Alkaline aqueous mixture, see 10.5.

### 10.2. CHEMICAL STABILITY

Good at normal temperature. Good in humidity. Slight oxidation and yellowing is possible with air and light.

### 10.3. POSSIBILITY OF HAZARDOUS REACTIONS

See 10.4 to 10.6.

### 10.4. CONDITIONS TO AVOID

Heat sources.

### 10.5. INCOMPATIBLE MATERIALS

Avoid contact with powerful oxidising or acidic agents.

### 10.6. HAZARDOUS DECOMPOSITION PRODUCTS

According to the temperature, formation of ammonia and of oxides (of carbon, nitrogen, cadmium and sulphur).

## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1. INFORMATION ON TOXICOLOGICAL EFFECTS

**No data are available regarding the mixture. The evaluation of health hazards is based on applicable regulations and bibliographical data on the substances present in the mixture.**

#### Acute toxicity

Data on substances present in the mixture: cadmium sulphate

**LD50, oral, rat**: 29-327 mg Cd/kg, classified as Acute Tox. 3. These read-across values are derived from cadmium dichloride. As a remark, the acute toxicity of cadmium is enhanced in fasted rats. Intense digestive troubles almost immediately, considerable vomiting, muscular cramps, hyper-salivation. May be fatal in case of massive swallowed quantities.

**LD50 dermal**: no available data, not classified

**LC50 inhalation, mist, rat, 3 h**: 4.6 - 8.4 mg Cd/m<sup>3</sup>, classified as Acute Tox. 2. These read-across values are derived from other cadmium compounds, notably cadmium dichloride. **Acute toxicity estimate (ATE)** considered for aerosols in this category: 0.05 mg/L.



According to the inhaled dose, these compounds can induce digestive disorders, shivers, fever, a pulmonary oedema or death. In accordance with the reported cases on humans, death can be caused by exposures for 10 min to 150-300 mg/m<sup>3</sup> of Cd, for 1 h to 40-50 mg/m<sup>3</sup> or 8 h to 5 mg/m<sup>3</sup>. The symptoms outbreak may be delayed.

Data on substances present in the mixture: ethylenediamine

**LD50 oral, male rat:** 866 mg/kg, classified as Acute Tox. 4.

**LD50 dermal, rabbit:** 560 mg/kg - **LD50 dermal, rat:** ≈ 1000 mg/kg, classified as Acute Tox. 3.

**LC50 inhalation, 4 h, vapours, rat:** 14.7 mg/L, classified as Acute Tox. 4 - **Acute toxicity estimate (ATE)** considered for aerosols in this category: 1.5 mg/L.

Calculated data for the mixture:

**ATE mix (oral):** 300-2000 mg/kg, classified as Acute Tox. 4, harmful if swallowed.

**ATE mix (dermal):** > 2000 mg/kg, not classified.

**ATE mix (inhalation, mist):** 0.05-0.5 mg/L air, classified as Acute Tox. 2, fatal if inhaled.

Skin corrosion/irritation: corrosive (the severity depends on the length of the contact).

Serious eye damage/irritation: corrosive, can cause burns (the severity depends on the length of the contact). Possible lesions if decontamination with water is not quickly realized.

Skin sensitisation: yes, due to the presence of ethylenediamine, repeated exposure may cause the appearance of recurring dermatosis on some sensitive people.

Respiratory sensitisation: yes, may cause sensitisation by inhalation (rhinitis asthma...) on some people because of ethylenediamine presence.

Germ cell mutagenicity: cadmium sulphate is classified as a mutagen, category 1B. In vivo tests (mice) have shown an increase of sister chromatid exchanges in mammalian cells and chromosomal aberrations. Slightly positive results for some bacterial in vitro assays with ethylenediamine.

Carcinogenicity: cadmium sulphate is classified as a carcinogen of category 1B. Studies in rats provide strong evidence of the lung carcinogenic potential of chronically inhaled cadmium. Epidemiologic studies (on human being) in workplace, have revealed also a significant dose response relationship for lung cancer. Ethylenediamine is not classified according to animal tests.

Reproductive toxicity: cadmium sulphate is classified as toxic for reproduction in the category 1B. The tests have shown a decrease in fertility in female rats but no changes in the length of their oestrous cycle. Offspring of female rats orally exposed had reduced exploratory locomotor activity (at 2 months). Ethylenediamine is not classified according to animal tests.

Summary of evaluation of the CMR properties: because of cadmium sulphate presence, the mixture is CMR (mutagen category 1B, carcinogen category 1B and reproductive toxicant category 1B).

STOT-single exposure: not classified.

STOT-repeated exposure: classified. Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard: not classified.

#### OTHER INFORMATION CONCERNING SOLUBLE CADMIUM COMPOUNDS

Cadmium is a cumulative poison (especially accumulates in liver and kidneys). Its biological elimination is biphasic with a first blood half-life of 100 days and a second of 10 to 40 years in liver and kidneys. This explains the gradual development of the pathological symptoms, even after the end of exposure.

Avoid exposing the pregnant women and warn the women in age to procreate of possible risks.

OCCUPATIONAL DISEASES: tables n° 49, 49a and 61 (in FRANCE).

## SECTION 12: ECOLOGICAL INFORMATION

**There are no ecological data on this mixture.**

**Prevent any material from entering drains or waterways or soil.**

### 12.1. TOXICITY

Bibliographic data concerning cadmium sulphate

**LC50 96 h, fish:** 0.748 – 6.47 mg/L [5 data]

**NOEC 2.96 years, fish:** 0.90 – 6.40 µg/L [4 data]

**LC50 72 h, aquatic invertebrates:** 8.88 µg/L [1 data]

**NOEC 9 months, aquatic invertebrates:** 50 - 100 µg/L [2 data]

**EC50 72 h, algae:** 18 - 120 µg/L [6 data]

**NOEC 72 h, algae:** 2.4 µg/L [2 data]

**NOEC 3 h, microorganisms:** 0.20 – 32.6 mg/L [2 data]

**NOEC 3.33 months, terrestrial plants:** 1.8 mg/kg soil dw [1 data]

M-factor acute = 10 (self-classification) - M-factor chronic = 10

**The concentration of cadmium sulphate is sufficient to classify this mixture as "HAZARDOUS TO THE AQUATIC ENVIRONMENT" with the GHS09 pictogram and the hazard statement code H410.**

Bibliographic data concerning ethylenediamine

**LC50 96 h, fish (Poecilia reticulata):** 640 mg/L

**EC50 48 h, aquatic invertebrates (Daphnia Magna):** 16.7 mg/L

**EC50 72 h, algae (S. Capricornutum):** EbC50 = 71 mg/L, ErC50 = 645 mg/L

**NOEC 28 d, fish (Gasterosteus aculeatus):** > 10 mg/L

**NOEC 21 d, aquatic invertebrates (Daphnia Magna), reproduction rate:** 0.16 - 2 mg/L

**NOEC 72 h, algae (S. Capricornutum):** ~3.2 mg/L



Not toxic as per annex XIII of REACH regulation.

#### 12.2. PERSISTENCE AND DEGRADABILITY

Cadmium is not degradable. Methods to determine biodegradability are not applicable to inorganic substances which dissociate quickly in their relative ions.

Ethylenediamine is easily biodegradable (method: OECD 301C; ISO 9408; 92/69/EEC, C.4-F, activated muds, destruction level: 93 - 95 % (28 days)).

#### 12.3. BIOACCUMULATIVE POTENTIAL

Cadmium is bioaccumulable in some aquatic species and also in plants growing in contaminated soils. Ethylenediamine does not bio-magnify.

#### 12.4. MOBILITY IN SOIL

Despite its high solubility in water, ethylenediamine is strongly adsorbed in soils and is barely mobile.

#### 12.5. RESULTS OF PBT AND vPvB ASSESSMENT

The mixture does not contain PBT or vPvB substances according to annex XIII of REACH regulation.

#### 12.6. OTHER ADVERSE EFFECTS

**Danger to drinking water.**

### SECTION 13: DISPOSAL CONSIDERATIONS

#### 13.1. WASTE TREATMENT METHODS

This product and water used for rinsing must not be disposed of in sinks or drains notably because of their pH and cadmium content. They must be processed within the firm or destroyed by an approved organization.

Contaminated packaging if not re-used with the same product is also a hazardous waste to be sent to an approved organization for recycling or disposal.

Classification according to the commission directive 2000/532/EC of 3 May 2000 and its modifications (up to 2014/955/UE, OJ L370). Use the mandatory documents for accompanying the waste products.

06 03 13*	Solid salts and solutions containing heavy metals
11 01 11*	Aqueous rinsing liquids containing dangerous substances
15 01 10*	Packaging containing residues of or contaminated by dangerous substances
15 02 02*	Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances

As the volume of rinsing water is small, it can be added to the waste solutions or to an existing water treatment station.

**NOTE:** in addition to the community provisions, there may be specific legislative, regulatory and administrative, national or local provisions on this topic.

### SECTION 14: TRANSPORT INFORMATION

#### 14.1. UN NUMBER: 2570

14.2. UN PROPER SHIPPING NAME: cadmium compound (aqueous alkaline mixture, contains notably cadmium sulphate)

14.3. TRANSPORT HAZARD CLASS(ES): 6.1. Subsidiary risk: not applicable (ADR, IATA); marine pollutant (IMDG).

14.4. PACKING GROUP: III

14.5. ENVIRONMENTAL HAZARDS: very toxic to aquatic life with acute and long lasting effects.

14.6. SPECIAL PRECAUTIONS FOR USER: in case of accident, wear eye protectors, nitrile gloves, light protective clothing and for emergency interventions in case of emission of gas/fumes/vapour/spray, a protective breathing mask with an A2B2P3 or A2P3 cartridge. Keep water available for washing hands and eyes. In case of contact with eyes, rinse immediately with plenty of water for approximately 15 minutes and seek quickly medical advice.

14.7. TRANSPORT IN BULK ACCORDING TO ANNEX II OF MARPOL AND THE IBC CODE: not applicable, small quantities.

#### ADDITIONAL INFORMATION

Risk label: TOXIC, 6.1, + marine pollutant (IMDG).

A.D.R. (road transport): classification code T5, restricted quantities 5 kg, excepted quantities E1, hazard code n°60.

I.M.D.G. (sea transport): restricted quantities 5 kg, excepted quantities E1, stowing and dock work: category A, safety sheets F-A, S-A.

I.A.T.A. (air transport): passenger and Cargo aircraft: packaging instructions 670, maximum quantity per package: 100 kg, Cargo aircraft only: packaging instructions 677, maximum quantity per package: 200 kg, instruction IDC 6L.

### SECTION 15: REGULATORY INFORMATION

#### 15.1. SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS/LEGISLATION SPECIFIC FOR THE SUBSTANCE OR MIXTURE

**SAFETY DATA SHEET:** it has been established in accordance with the annex of EC regulation n°2015/830 of May 28, 2015 (OJ L132, 29.05.2015), which amends EC regulation n°1907/2006 of December 18, 2006 (OJ L136 dated 29.05.2007, Reach regulation).

**LABELLING:** it has been established in compliance with EC regulation n°1272/2008 of December 16, 2008 (CLP regulation, OJ L353 of 31.12.2008) and its adaptations up to commission regulation 2018/1480 of October 4, 2018 (OJ L251, 05.10.2018).

**SUBSTANCES SUBJECT TO AUTHORISATION,** annex XIV of REACH, 43 substances, up to commission regulation (EC) n°2017/999 of June 13, 2017 (OJ L150 of 14.06.2017): NO



CANDIDATE LIST OF SUBSTANCES FOR AUTHORISATION: ECHA's consolidated list of 27.06.2018, 191 substances: ethylenediamine, cadmium sulphate. Additionally, metal cadmium is included in the candidate list since 20.06.2013. Any supplier plating cadmium on articles shall provide the recipient with available information to allow safe use of these articles, if the concentration of cadmium contained in them is above 0.1% weight by weight.

RESTRICTIONS ON THE MANUFACTURE, PLACING ON THE MARKET AND USE OF CERTAIN DANGEROUS SUBSTANCES, MIXTURES AND ARTICLES (annex XVII of REACH, up to commission regulation (EC) n° 2018/1513 of October 10, 2018, OJ L256 dated 12.10.2018: YES

- Products classified as carcinogen, mutagen or toxic to reproduction of categories 1A or 1B (substances or mixtures) shall not be supplied to the general public. The packaging shall be marked with: "**Restricted to professional users**".
- Metallic articles or their components used in equipment and machinery for food production, agriculture, cooling and freezing, printing and book-binding, for household goods, furniture, sanitary ware, central heating and air conditioning plant, for paper and board, textiles and clothing, industrial handling equipment and machinery, road and agricultural vehicles, rolling stock and vessels, shall not be cadmium plated.  
In any case, whatever their use or intended final purpose, the placing on the market of cadmium-plated articles or components of such articles used in these sectors is prohibited.

In addition:

- Brazing fillers shall not be placed on the market if the concentration of cadmium metal is equal to or greater than 0,01 % by weight.
- Metal parts of jewellery shall not contain more than 0,01 % of cadmium metal by weight.

These restrictions shall not apply to:

- articles and components used in the aeronautical, aerospace, mining, offshore and nuclear sectors whose applications require high safety standards and in safety devices in road and agricultural vehicles, rolling stock and vessels,
- electrical contacts in any sector of use, where it is necessary to ensure the reliability required of the apparatus on which they are installed.

END-OF-LIFE VEHICLES (directive 2000/53/EC of the European parliament and of the council of September 18, 2000, and its modifications): cadmium is allowed only on spare parts or for repair of vehicles placed on the market before July 1, 2003.

ELECTRICAL AND ELECTRONIC EQUIPEMENTS (directive n°2011/65/EU, RoHS 2): more than 0.01% cadmium is banned in electrical and electronic equipment (EEE) put on the market. There are exemptions that are regularly updated.

SUBSTANCES THAT DEplete THE OZONE LAYER (regulation EC n°1005/2009 of 16 September 2009, OJ L286 of 31.10.2009, in its last update): no substance of the mixture is included in these lists.

PERSISTENT ORGANIC POLLUTANTS (regulation EC n°850/2004 of 29 April 2004, OJ L158 of 30.4.2004, in its last update): no substance of the mixture is included in these lists.

EXPORT AND IMPORT OF DANGEROUS CHEMICALS (regulation EC n°649/2012 of 4 July 2012, OJ L201, 27.07.2012, in its last update): cadmium and its compounds are subject to export notification procedure (ANNEX I, PART 1).

#### HEALTH SURVEILLANCE

Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work

Corrigendum to Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (OJ L229, 29.06.2004), and its modifications. Information, training and intensified health surveillance of the exposed workers.

For each worker who undergoes this health surveillance, individual health and exposure records are to be made and kept up-to-date. An exposure certificate is provided to the worker who leaves the company, regardless of the reason.

Please be aware of specific legislative and administrative, national or local provisions on the following topics:

- occupational diseases,
- health surveillance,
- post-occupational health surveillance,
- Case of pregnant women and nursing mothers,
- not allowed workers,
- forbidden uses of cadmium,
- work in another company,
- administrative declarations and rules for doing cadmium plating,
- environment laws regarding rinsing water treatment and disposal of the waste products.

Additional regulatory information is provided in paragraphs 8, 13 and 14.

#### 15.2. CHEMICAL SAFETY ASSESSMENT

Has not been performed for this mixture as well as a chemical safety report following the model of REACH, because of the quantities of substances produced (less than 10 T/year) and used (less than 1 T/year) to manufacture this mixture and because as applicator of our processes, we are using less than 1 T/year of this mixture.

We are therefore not required to establish exposure scenarios to be joined in annex of this SDS.

We include information of exposure scenarios of substances transmitted by our suppliers, when they apply to our uses, directly in the 16 chapters of the SDS, as well as other relevant data available from different databases.

### SECTION 16: OTHER INFORMATION

#### RECOMMENDATIONS



Only people trained to the DALIC processes and informed about the risks should use this product. We remain available to bring you the training, advice or studies you may need.

#### METHOD OF EVALUATING CLASSIFICATION

Calculation method, bibliography, self-classification

#### ABBREVIATIONS

**Dgr:** danger

**Flam. Liq. 3:** flammable liquid of category 3

**Carc. 1B:** carcinogenic of category 1B

**Muta. 1B:** germ cell mutagen of category 1B

**Repr. 1B:** category 1B reproductive toxicant

**Acute Tox. 2 / 3 / 4:** acute toxic, category 2 or 3 or 4

**Skin Corr. 1B:** corrosive of category 1B

**Resp. Sens. 1:** respiratory sensitiser of category 1

**Skin Sens. 1:** skin sensitiser of category 1

**STOT RE 1:** specific target organ toxicant, repeated exposure, of category 1

**STOT RE 2:** specific target organ toxicant, repeated exposure, of category 2

**Aquatic Acute 1:** hazardous to the aquatic environment - Acute of category 1

**Aquatic Chronic 1 / 3:** hazardous to the aquatic environment - Chronic of category 1 or 3

**LD50 / LC50 / EC50:** median (50%) lethal dose / concentration - median (50%) effective concentration

**AF:** assessment factor

**ATE / ATE mix:** acute toxicity estimate / acute toxicity estimate for the mixture

**NOEL / NOEC:** no observed effect level / concentration

**PBT / vPvB:** persistent, bioaccumulative and toxic / very persistent and very bioaccumulative

#### HAZARD STATEMENTS OF THE PURE COMPONENTS LISTED IN SECTION 3

**H226:** flammable liquid and vapour

**H301:** toxic if swallowed

**H302:** harmful if swallowed

**H311:** toxic in contact with skin

**H314:** causes severe skin burns and eye damage

**H317:** may cause an allergic skin reaction

**H330:** fatal if inhaled

**H332:** harmful if inhaled

**H334:** may cause allergy or asthma symptoms or breathing difficulties if inhaled

**H340:** may cause genetic defects

**H350:** may cause cancer

**H360FD:** may damage fertility. May damage the unborn child

**H372:** causes damage to organs through prolonged or repeated exposure

**H400:** very toxic to aquatic life

**H410:** very toxic to aquatic life with long lasting effects

**H412:** harmful to aquatic life with long lasting effects.

#### HAZARD STATEMENTS OF THE MIXTURE ACCORDING TO SECTION 2

**H302:** harmful if swallowed

**H314:** causes severe skin burns and eye damage

**H317:** may cause an allergic skin reaction

**H330:** fatal if inhaled

**H334:** may cause allergy or asthma symptoms or breathing difficulties if inhaled

**H340:** may cause genetic defects

**H350:** may cause cancer

**H360FD:** may damage fertility. May damage the unborn child

**H372:** causes damage to organs through prolonged or repeated exposure

**H410:** very toxic to aquatic life with long lasting effects

#### BIBLIOGRAPHIC REFERENCES

European directives, INRS and INERIS websites, safety data sheets of the components established by their manufacturers or distributors, websites of ECHA (European chemicals Agency), NLM (National Library of Medicine), IFA (Institut für Arbeitsschutz) and of OECD eChemPortal.

#### MODIFICATIONS

A vertical line in the left margin or a grey colour identify the modifications.

#### OTHER INFORMATION

This sheet is provided to complement, not replace, the user instructions.

Information contained herein is bona fide and based on current knowledge relating to the product on the date of publication. Furthermore, the attention of the user is drawn to the risks which may be incurred when the product is used for purposes other than those for which it is designed.

Information provided herein relates to this product only; it cannot take account of every situation which may arise at every work place. This safety data sheet therefore represents only a part of the information required for establishing a safety programme.

Under no circumstances does this sheet exempt the user from the need to know and to apply all of the regulations governing its activity, which are not all necessarily quoted herein in an exhaustive manner.