

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

1.1. Product identifier

Trade Name: Electrochromic Ink EC-SC1

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

Relevant identified uses: Electrochromic blue ink used in electrochromic devices.

Uses advised against: None known.

1.3. Details of the supplier of the safety data sheet

YD Ynvisible, S.A.

Rua Quinta do Bom Retiro, 12C, 2820-690 Charneca de Caparica, Portugal

Telephone: +351 211 308 817

Email: info@ynvisible.com

Web: www.ynvisible.com

1.4. Emergency telephone number

Portugal: Centro de Informação Anti-Venenos: +351 808 250 250

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) no. 1272/2008 [CLP/GHS]:

Specific Target Organ Toxicant, Repeated Exposure Category 2 (Kidney), H373

For abbreviations, refer to Section 16.

2.2. Label elements

Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]:

Hazard Pictogram:



Signal Word:

Warning

Hazard Statements:

H373 May cause damage to organs (Kidney) through pro-longed or repeated exposure if swallowed.

Precautionary Statements:

General:

P101 If medical advice is needed, have product container or label at hand.

P102 Keep out of reach of children.

Prevention:

P260 Avoid breathing dust/fume/gas/mist/vapours/spray.

Response:

P314 Get medical advice/ attention if you feel unwell.

Disposal:

P501 Dispose of contents/container in accordance with local regulations.

Hazardous components which must be listed on the label:

2,2'-oxydiethanol

Additional Labelling:

EUH205 Contains epoxy constituents. May produce an allergic reaction.

2.3. Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0,1% or higher.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

Description of the mixture:

Electrochromic mixture used as blue ink in electrochromic devices.

Chemical nature:

Organic.

Hazardous ingredients:

Chemical Name	CAS-No.	EC-No.	Index No.	Concentration range (% by wt.)	CLP (Reg. 1272/2008) Classification
2,2'-oxydiethanol	111-46-6	203-872-2	603-140-00-6	≥10 - <20	Acute Tox. 4 H302 STOT RE 2 H373
Benzenesulfonic acid, ethenyl-, homopolymer, compd. with 2,3-dihydrothieno[3,4-b]-1,4-dioxin homopolymer	155090-83-8	-	-	≥1 - <3	Eye Dam. 1 H318

For full text of H statements and abbreviations, see Section 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

General notes:

First aider needs to protect himself. Move out of dangerous area. Show this safety data sheet to the doctor in attendance.

Following inhalation:

Move to fresh air.

Following skin contact:

Take off all contaminated clothing immediately. Wash off with soap and plenty of water.

Following eye contact:

In case of eye contact, remove contact lens and rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep eye wide open while rinsing. Protect unharmed eye. Call a physician immediately.

Following ingestion:

Immediately give large quantities of water to drink. Do NOT induce vomiting.

4.2. Most important symptoms and effects, both acute and delayed

May cause damage to organs through prolonged or repeated exposure if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2. Special hazards arising from the substance or mixture

Specific hazards during firefighting:

Exposure to decomposition products may be a hazard to health.

Hazardous combustion products:

Carbon oxides and Sulphur oxides.

5.3. Advice for firefighters

In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.

5.4. Additional information

Provide storage and work areas with suitable fire extinguishers.

Call the Fire Brigade at once to deal with all fires involving chemicals unless the fire is small and immediately controllable. Spray unopened containers with a mist spray to keep cool. If without risk, remove intact containers from exposure to fire. Contain fire-fighting water, bunding if necessary with sand or earth. Do not allow contamination of public drains or surface or ground waters. Dispose of fire debris and contaminated water by containing and soaking up the spillage with inert and adsorbent material before disposing of safely and legally, for example through a licensed waste disposal contractor.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Follow safe handling advice and personal protective equipment recommendations.

Ensure adequate ventilation.

Evacuate personnel to safe areas.

Refer to protective measures listed in sections 7 and 8.

6.2. Environmental precautions

Use appropriate containment to avoid environmental contamination. Control the release at its source. Contain the spill to prevent it from spreading, contaminating soil or entering sewage and drainage systems or any body of water. Inform the local water company if the release enters drains.

6.3. Methods and material for containment and cleaning up

For containment:

Clean up spills immediately and place in a compatible disposal container. Contain spill by diking with earth, sand or absorbent material and place into a compatible marked disposal container.

For cleaning up:

Sweep up or vacuum up spillage and collect in suitable container for disposal.

6.4. Reference to other sections

See sections 7, 8, 11, 12 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Provide sufficient air exchange and/or exhaust in work rooms.

Wear personal protective equipment.

Avoid inhalation, ingestion and contact with skin and eyes.

Smoking, eating and drinking should be prohibited in the application area.

Keep away from food and drink. Wash hands before breaks and at the end of workday. Keep working clothes separately. Remove and wash contaminated clothing and gloves, including the inside, before re-use.

7.2. Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry, cool, and well-ventilated place.

7.3. Specific end use(s)

Electrochromic blue ink used in electrochromic devices.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Contains no substances with occupational exposure limit values.

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Substance name	End Use	Exposure routes	Potential health effects	Value
2,2'-oxydiethanol	Consumers	Skin contact	Long-term systemic effects	53 mg/kg bw/day
	Workers	Skin contact	Long-term systemic effects	106 mg/kg bw/day
	Consumers	Inhalation	Long-term local effects	12 mg/m ³
	Workers	Inhalation	Long-term local effects	60 mg/m ³

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:

Substance name	Environmental Compartment	Value
2,2'-oxydiethanol	Fresh water	10 mg/l
	Marine water	1 mg/l
	Intermittent use/release	10 mg/l
	Sewage treatment plant	199,5 mg/l
	Fresh water sediment	20,9 mg/kg
	Soil	1,53 mg/kg
	Marine sediment	2,09 mg/kg

8.2. Exposure controls

Appropriate engineering controls:

Provide sufficient air exchange and/or exhaust in work rooms.

Personal protection equipment:

Eye and face protection:

Avoid contact with eyes. If there is a significant potential for contact, wear safety glasses with side-shields.

Skin protection:

Hand protection:

Before removing gloves clean them with soap and water. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough. Please observe the instructions regarding permeability and break-through time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. As the product is a mixture of several substances, the durability of the glove materials can-not be calculated in advance and has to be tested before use.

Body protection:

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Other skin protection:

None specified.

Respiratory protection:

Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. Recommended filter type ABEK-P.

SECTION 9: Physical and chemical properties**9.1. Information on basic physical and chemical properties**

a) Appearance: Colour:	Paste Blue
b) Odour:	Slight
c) Odour threshold:	Not determined
d) pH:	Not determined
e) Melting point/range:	Not determined
f) Boiling point/boiling range:	112 °C (1.013 hPa)
g) Flash point:	>112 °C (1.013 hPa)
h) Evaporation rate:	Not determined
i) Flammability (solid, gas):	Not applicable
j) Upper/lower flammability or explosive limits:	Not determined
k) Vapour pressure:	≤1.100 hPa (50 °C)
l) Relative vapour density:	Not determined
m) Density:	1,06 g/cm ³ (23 °C, 1.013 hPa)
n) Solubility(ies) Solubility (water):	Not determined Soluble (20 °C, 1.013 hPa)
o) Partition coefficient: n-octanol/water:	Not determined
p) Auto-ignition temperature:	Not determined
q) Decomposition temperature:	Not determined
r) Viscosity, dynamic:	3.000 mPa.s (23 °C)
s) Viscosity, kinematic:	>40 mm ² /s (23 °C); >20,5 mm ² /s (40 °C)
t) Explosive properties:	Not applicable
u) Oxidising properties:	Not applicable

9.2. Other information

Not available.

SECTION 10: Stability and reactivity**10.1. Reactivity**

No dangerous reaction known under conditions of normal use.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

No dangerous reaction known under conditions of normal use.

10.4. Conditions to avoid

No data available.

10.5. Incompatible materials

No data available.

10.6. Hazardous decomposition products

No data available.

SECTION 11: Toxicological information**11.1. Information on toxicological effects**

a) acute toxicity	<p>Not classified based on available information.</p> <p>Product: Acute oral toxicity: Acute toxicity estimate: >2.000 mg/kg Method: Calculation method</p> <p>Components: 2,2'-oxydiethanol: Acute oral toxicity: LD50 (Humans): 1.120 mg/kg Benzenesulfonic acid, ethenyl-, homopolymer, compd. with 2,3-dihydrothieno[3,4-b]-1,4-dioxin homopolymer: Acute oral toxicity: LD50 (Rat): >2.500 mg/kg</p>
b) skin corrosion/irritation	<p>Not classified based on available information.</p> <p>Product: No skin irritation Remarks: Expert judgement</p> <p>Components: 2,2'-oxydiethanol: Species: Rabbit No skin irritation Benzenesulfonic acid, ethenyl-, homopolymer, compd. with 2,3-dihydrothieno[3,4-b]-1,4-dioxin homopolymer: Species: Rabbit No skin irritation</p>
c) serious eye damage/irritation	<p>Not classified based on available information.</p> <p>Product: No eye irritation Remarks: The toxicological data has been taken from products of similar composition. Expert judgement</p> <p>Components: 2,2'-oxydiethanol: Species: Rabbit No eye irritation Benzenesulfonic acid, ethenyl-, homopolymer, compd. with 2,3-dihydrothieno[3,4-b]-1,4-dioxin homopolymer: Species: Rabbit Severe irritation</p>
d) respiratory or skin sensitisation	<p>Skin sensitization: Not classified based on available information.</p> <p>Respiratory sensitization: Not classified based on available information.</p> <p>Components: 2,2'-oxydiethanol: Test Type: Maximisation Test Exposure routes: Skin contact Species: Guinea pig Result: Negative</p>

e) germ cell mutagenicity	<p>Not classified based on available information.</p> <p>Components:</p> <p>2,2'-oxydiethanol:</p> <p>Genotoxicity in vitro:</p> <p>Test Type: Bacterial reverse mutation assay (AMES)</p> <p>Method: OECD Test Guideline 471</p> <p>Result: negative</p> <p>Genotoxicity in vivo:</p> <p>Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)</p> <p>Species: Mouse</p> <p>Application Route: Intraperitoneal injection</p> <p>Method: OECD Test Guideline 474</p> <p>Result: negative</p> <p>Benzenesulfonic acid, ethenyl-, homopolymer, compd. with 2,3-dihydrothieno[3,4-b]-1,4-dioxin homopolymer:</p> <p>Genotoxicity in vitro:</p> <p>Test Type: Ames test</p> <p>Result: negative</p>
f) carcinogenicity	<p>Not classified based on available information.</p> <p>Components:</p> <p>2,2'-oxydiethanol:</p> <p>Species: Rat</p> <p>Application Route: Ingestion</p> <p>Exposure time: 104 weeks</p> <p>Result: negative</p>
g) reproductive toxicity	<p>Not classified based on available information.</p> <p>Components:</p> <p>2,2'-oxydiethanol:</p> <p>Effects on fertility:</p> <p>Test Type: Two-generation reproduction toxicity study</p> <p>Species: Rat</p> <p>Application Route: Ingestion</p> <p>Result: negative</p> <p>Effects on foetal development:</p> <p>Test Type: Embryo-foetal development</p> <p>Species: Rat</p> <p>Application Route: Ingestion</p> <p>Method: OECD Test Guideline 414</p> <p>Result: negative</p>
h) STOT - single exposure	<p>Not classified based on available information.</p>
i) STOT - repeated exposure	<p>May cause damage to organs (Kidney) through prolonged or repeated exposure if swallowed.</p> <p>Components:</p> <p>2,2'-oxydiethanol:</p> <p>Exposure routes: Ingestion</p> <p>Target Organs: Kidney</p> <p>Assessment: Shown to produce significant health effects in animals at concentrations of >10 to 100 mg/kg bw.</p> <p>Repeated dose toxicity</p> <p>Components:</p> <p>2,2'-oxydiethanol:</p> <p>Species: Rat</p> <p>NOAEL: 100 mg/kg</p> <p>Application Route: Ingestion</p> <p>Exposure time: 225 Days</p>
j) aspiration hazard	<p>Not classified based on available information.</p>

SECTION 12: Ecological information**12.1. Toxicity**

Components:

2,2'-oxydiethanol:

Toxicity to fish:

LC50 (*Pimephales promelas* (fathead minnow)): 75.200 mg/l

Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates:

EC50 (*Daphnia magna* (Water flea)): >10.000 mg/l

Exposure time: 24 h

Toxicity to algae:

EC50 (*Selenastrum capricornutum* (green algae)): 6.500 - 13.000 mg/l

Exposure time: 96 h

Remarks: Based on data from similar materials

Toxicity to fish (Chronic toxicity):

NOEC: 15.380 mg/l

Exposure time: 7 d

Species: *Pimephales promelas* (fathead minnow)

Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity):

NOEC: >15.000 mg/l

Exposure time: 21 d

Species: *Daphnia magna* (Water flea)

Benzenesulfonic acid, ethenyl-, homopolymer, compd. with 2,3-dihydrothieno[3,4-b]-1,4-dioxin homopolymer:

Toxicity to fish:

LC0 (Zebrafish): >100 mg/l

Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates:

EC0 (*Daphnia magna Straus*): >100 mg/l

Exposure time: 48 h

12.2. Persistence and degradability

Components:

2,2'-oxydiethanol:

Biodegradability:

Result: Readily biodegradable.

Biodegradation: 70 - 80 %

Exposure time: 29 d

Method: OECD Test Guideline 301B

12.3. Bioaccumulative potential

Components:

2,2'-oxydiethanol:

Bioaccumulation:

Species: *Leuciscus idus* (Golden orfe)

Bioconcentration factor (BCF): 100

Benzenesulfonic acid, ethenyl-, homopolymer, compd. with 2,3-dihydrothieno[3,4-b]-1,4-dioxin homopolymer:

Partition coefficient: n-octanol/water: log Pow: <0,3

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0,1% or higher.

12.6. Other adverse effects

No data available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product: If recycling is not practicable, dispose of in compliance with local regulations.

Contaminated packaging: Dispose of as unused product.

SECTION 14: Transport information

14.1. UN number

Not regulated as a dangerous good.

14.2. UN proper shipping name

Not regulated as a dangerous good.

14.3. Transport hazard class(es)

Not regulated as a dangerous good.

14.4. Packing group

Not regulated as a dangerous good.

14.5. Environmental hazards

Not regulated as a dangerous good.

14.6. Special precautions for user

Not classified as dangerous in the meaning of transport regulations.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

SECTION 15: Regulatory information

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

- REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59): Not applicable
- REACH - List of substances subject to authorisation (Annex XIV): Not applicable
- Regulation (EC) No 1005/2009 on substances that deplete the ozone layer: Not applicable
- Regulation (EC) No 850/2004 on persistent organic pollutants: Not applicable
- Regulation (EC) No 649/2012 of the European Parliament and the Council concerning the export and import of dangerous chemicals: Not applicable
- REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII): Conditions of restriction for the following entries should be considered:
 - (3) Storage class (TRGS 510): 10: Combustible liquids
- Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances: Not applicable

Other regulations:

- Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.
- Take note of Directive 92/85/EEC regarding maternity protection or stricter national regulations, where applicable.

15.2. Chemical safety assessment

A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information**a) Indication of changes:**

This is the 2nd version of this safety data sheet issued in accordance with Commission Regulation (EC) 453/2010 (REACH regulation for safety data sheets) and Regulation EC 1272/2008 (CLP regulation) and amending Regulation (EC) No. 2015/830.

b) Abbreviations and acronyms:

Acute Tox.	Acute toxicity
bw	Body weight
CLP	Classification Labelling Packaging Regulation, Regulation (EC) No 1272/2008
EC	European Community
Eye Dam.	Serious eye damage
GHS	Globally Harmonized System
IBC	International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk
LC50	Lethal Concentration to 50 % of a test population
LD50	Lethal Dose to 50% of a test population (Median Lethal Dose)
MARPOL	International Convention for the Prevention of Pollution from Ships
NOEC	No Observable Effect Concentration
OECD	Organization for Economic Cooperation and Development
PBT	Persistent, Bioaccumulative and Toxic substance
REACH	Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals
STOT RE	Specific target organ toxicity - repeated exposure
TRGS	Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States)
UN	United Nations
vPvB	Very Persistent and Very Bioaccumulative

c) Key literature references and sources for data:

Individual component safety data sheets.

ECHA Guidance on the compilation of safety data sheets (Version 1.1, December 2011).

Regulation (EC) No. 2015/830 on the compilation of safety data sheets.

d) Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]

Classification of the mixture: STOT RE 2 H373

Classification procedure: Calculation method

e) Relevant R-phrases, H-statements and precautionary statements not written out in full under Sections 2 to 15:

H302: Harmful if swallowed.

H318: Causes serious eye damage.

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

f) Training advice:

General occupational hygiene training recommended.

g) Further information:

The information and recommendations in this publication are, to the best of our knowledge, information and belief, accurate at the date of publication. Nothing herein is to be construed as a warranty, expressed or implied. In all cases it is the responsibility of the user to determine the applicability of such information or the suitability of any products for their own particular purpose. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.