

SAFETY DATA SHEET

according to Regulation (EU) No 453/2010 ECOS® HC
Page 1 of 10

RAS AG, D-93055 Regensburg

Date of issue 26/07/2016
Replaces the release of: 08/11/2017

Revision date: 31/07/2020

SAFETY DATA SHEET

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

- 1.1 Product identifier**
ECOS® HC.
- 1.2 Relevant identified uses of the substance or mixture and uses advised against**
This product can be used as coating or as additive, respectively. ECOS® HC is intended for use by skilled and professional personal.
- 1.3 Details of the supplier of the safety data sheet**
- | | |
|--------------------------|--|
| Manufacturer/Distributor | RAS AG |
| Address/POB | An der Irler Hoehe 3a |
| IVR/ZIP/Place | D-93055 Regensburg |
| E-mail address: | office@ras-ag.com |
| Telephone: | +49 (0)941 60 717-300 |
- 1.4 Emergency telephone number** +49 (0) 89 19240
(Giftnotruf München – permanently manned)

SECTION 2 Hazards identification

2.1 Classification of the substance or mixture

according to Regulation (EC) No 1272/2008

Flammable liquid, Category 2, H225

Eye irritation, Category 2, H319

Acute toxicity (oral) category 4; – Acute tox. 4, H302

Specific target organ toxicity - single exposure, Category 3, Central nervous system, H336

2.2 Label elements

according to Regulation (EC) No 1272/2008

Hazard pictogram(s) and signal word of the product



GHS02

GHS07

GHS08

Signal word ***Danger***

Hazard statements

H225 Highly flammable liquid and vapour.

H302 Harmful if swallowed.

H319 Causes serious eye irritation.

H336 May cause drowsiness or dizziness.

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

Precautionary statements

P210 Keep away from heat/sparks/open flames/hot surfaces. -No smoking.

P240 Ground/bond container and receiving equipment.

P270 Do not eat, drink or smoke when using this product.

P280 Wear protective gloves/ eye protection/ face protection.

P301+312 IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337+P313 If eye irritation persists: Get medical advice/attention.

P403+P235 Store in a well-ventilated place. Keep cool.

2.3 Other hazards

Unknown.

SAFETY DATA SHEET

according to Regulation (EU) No 453/2010 ECOS® HC
Page 2 of 10 Revision date: 31/07/2020

RAS AG, D-93055 Regensburg

Date of issue 26/07/2016
Replaces the release of: 08/11/2017

SECTION 3 Composition/information on ingredients

3.1 Substances

This product is a mixture.

3.2 Mixtures

Suspension containing silver nano wires.

Hazardous ingredients

| Description | CAS number/ EU number | REACH reg. nr. | Conc. (%) | Classification: 1272/2008/EC (CLP) | | |
|-----------------------------|--------------------------|----------------|-----------|------------------------------------|---|----------------------|
| | | | | Hazard pict. | Hazard cat. | H phrase |
| Ethanediol** | 107-21-1/ 203-473-3 | - | > 60 | GHS07 GHS08 | Acute Tox. 4 STOT RE 2 | H302 H373 |
| Acetone** | 67-64-1 | | < 20 | GHS02 GHS07 | Flam. Liq. 2 Eye Irrit. 2 STOT Se 3 | H225 H319 H336 |
| Silver, metallic*/** | 7440-22-4/ 231-131-3 | - | 2 – 10 | - | - | - |
| Ethyl acetate** | 141-78-6 | | < 10 | GHS02 GHS07 | Flam. Liq. 2 Eye Irrit. 2 STOT Se 3 | H225 H319 H336 |

*: Substance classified by the manufacturer or substance which has no obligatory classification according to EU regulations.

** : Substance with workplace exposure limits

For the full text of H phrases: see Section 16.

SECTION 4 First aid measures

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

In case of inhalation of vapours: remove the person to fresh air, in case of indisposition obtain medical advice.

In case of skin contact

Take off contaminated clothing. Wash off affected skin with plenty of water using soap in case of indisposition obtain medical advice.

In case of eye contact

Spreading the eyelids, rinse thoroughly under running water, see an eye specialist.

If swallowed

Make the person rinse out the mouth and drink plenty of water, call a physician.

4.2 Most important symptoms and effects, both acute and delayed

After eye contact: Risk of corneal clouding

Following skin contact: Localised redness, drying-out effect resulting in rough and chapped skin.

After ingestion/inhalation: Abdominal pain, Vomiting, Circulatory collapse, Vertigo, Renal impairment, Drowsiness, Dizziness, Narcosis, Nausea, Headache, Somnolence, Salivation, Coma

4.3 Indication of any immediate medical attention and special treatment needed

No data available.

SECTION 5 Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Sprinkling water, solid extinguishing agent, CO₂, foam resistant to alcohol.

Unsuitable extinguishing media

Direct water-jet.

SAFETY DATA SHEET

according to Regulation (EU) No 453/2010 ECOS® HC
Page 3 of 10

Revision date: 31/07/2020

RAS AG, D-93055 Regensburg

Date of issue 26/07/2016
Replaces the release of: 08/11/2017

- 5.2 Special hazards arising from the substance or mixture**
Thermal decomposition to carbon monoxide and organic cracked products.
- 5.3 Advice for firefighters**
Tightly closing fireproof clothing and oxygen apparatus.
- 5.4 Further information**
No data available.

SECTION 6 Accidental release measures

- 6.1 Personal precautions, protective equipment and emergency procedures**
See section 8 "Exposures controls/personal protection".
- 6.2 Environmental precautions**
Do not allow to enter waters. Risk of explosion.
- 6.3 Methods and material for containment and cleaning up**
Pick up with absorbable materials and dispose according to local regulations, unless otherwise usable.
- 6.4 Reference to other sections**
For disposal, see section 13.

SECTION 7 Handling and storage

- 7.1 Precautions for safe handling**
Observe conventional hygiene precautions.
Avoid contact with eyes and skin.
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.
Keep away from open flames, hot surfaces and sources of ignition.
Take precautionary measures against static discharge.
- 7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place.
Keep away from heat and sources of ignition.
Protected from light.
Keep away container from concentrated mineral acids and strong oxidizing agents.
- 7.3 Specific end uses**
No data available.

SECTION 8 Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters (2000/39/EC)

| | |
|-----------------------|--------------------------------|
| Ethanediol | |
| EC No 203-473-3 | CAS No 107-21-1 |
| Limit value (8 h) | 52 mg/m ³ / 20 ppm |
| Limit value (15 min.) | 104 mg/m ³ / 40 ppm |
| Notations | Risk of resorption by skin. |

| | |
|-------------------|-----------------------------------|
| Acetone | |
| EC No 203-473-3 | CAS No 67-64-1 |
| Limit value (8 h) | 1.210 mg/m ³ / 500 ppm |

Components with workplace control parameters (TRGS 900 Germany)

| | |
|--------------------------------|--|
| Silver | |
| EC No 231-131-3 | CAS No 7440-22-4 |
| AGW | 0,1 mg/m ³ (airborne respirable fraction) |
| Peak limit factor of exceeding | 8(II) |
| Remarks | DFG, EU |

| | |
|--------------------------------|---|
| Ethanediol | |
| EC No 203-473-3 | CAS No 107-21-1 |
| AGW | 10 ml/m ³ (ppm) – 26 mg/m ³ |
| Peak limit factor of exceeding | 2(I) |
| Remarks | DFG, EU, H, Y, 11 |

SAFETY DATA SHEET

according to Regulation (EU) No 453/2010
Page 4 of 10

ECOS® HC
Revision date: 31/07/2020

RAS AG, D-93055 Regensburg

Date of issue 26/07/2016
Replaces the release of: 08/11/2017

Acetone
EC No 203-473-3
Limit value (8 h)
Limit value (15 min.)

CAS No 67-64-1
1.200 mg/m³ / 500 ppm
2.400 mg/m³ / 1.000 ppm

Ethyl acetate
EC No 203-473-3
Limit value (8 h)
Limit value (15 min.)

CAS No 141-78-6
1.500 mg/m³ / 400 ppm
3.000 mg/m³

Biological limits (TRGS 903)

Acetone
BLV 80 mg/l in urine

Relevant DNELs/DMELs/PNECs and other threshold levels

Human health values:

| Name of substance | CAS No | Endpoint | Threshold level | Protection goal, route of exposure | Used in | Exposure time |
|-------------------|----------|----------|-------------------------|------------------------------------|-------------------|----------------------------|
| Ethanediol | 107-21-1 | DNEL | 106 mg/kg | human, dermal | Worker (industry) | Chronic – systemic effects |
| Ethanediol | 107-21-1 | DNEL | 35 mg/m ³ | human, inhalatory | Worker (industry) | Chronic – local effects |
| Acetone | 67-64-1 | DNEL | 2.420 mg/m ³ | human, inhalatory | Worker (industry) | Acute – systemic effects |
| Acetone | 67-64-1 | DNEL | 2.420 mg/m ³ | human, inhalatory | Worker (industry) | Acute – local effects |
| Acetone | 67-64-1 | DNEL | 186 mg/kg | human, dermal | Worker (industry) | Chronic – systemic effects |
| Acetone | 67-64-1 | DNEL | 1.210 mg/m ³ | human, inhalatory | Worker (industry) | Chronic – systemic effects |
| Ethylacetate | 141-78-6 | DNEL | 1.468 mg/m ³ | human, inhalatory | Worker (industry) | Acute – local effects |
| Ethylacetate | 141-78-6 | DNEL | 1.468 mg/m ³ | human, inhalatory | Worker (industry) | Acute – systemic effects |
| Ethylacetate | 141-78-6 | DNEL | 734 mg/m ³ | human, inhalatory | Worker (industry) | Chronic – local effects |
| Ethylacetate | 141-78-6 | DNEL | 63 mg/kg | human, dermal | Worker (industry) | Chronic – systemic effects |
| Ethylacetate | 141-78-6 | DNEL | 734 mg/m ³ | human, inhalatory | Worker (industry) | Chronic – systemic effects |

SAFETY DATA SHEET

according to Regulation (EU) No 453/2010 ECOS® HC
Page 5 of 10

RAS AG, D-93055 Regensburg

Date of issue 26/07/2016
Replaces the release of: 08/11/2017

Revision date: 31/07/2020

Environmental values:

| Name of substance | CAS No | Endpoint | Threshold level | Environmental compartment | Exposure time |
|-------------------|----------|----------|-----------------|------------------------------|------------------------------|
| Ethanediol | 107-21-1 | PNEC | 10 mg/L | Freshwater | Short-term (single instance) |
| Ethanediol | 107-21-1 | PNEC | 1 mg/L | Marine water | Short-term (single instance) |
| Ethanediol | 107-21-1 | PNEC | 199,5 mg/L | Sewage treatment plant (STP) | Short-term (single instance) |
| Ethanediol | 107-21-1 | PNEC | 37 mg/kg | Freshwater sediment | Short-term (single instance) |
| Ethanediol | 107-21-1 | PNEC | 3,7 mg/kg | Marine sediment | Short-term (single instance) |
| Ethanediol | 107-21-1 | PNEC | 1,53 mg/kg | Soil | Short-term (single instance) |
| Ethanediol | 107-21-1 | PNEC | 10 mg/L | Water | continuous |
| Acetone | 67-64-1 | PNEC | 10,6 mg/L | Freshwater | Short-term (single instance) |
| Acetone | 67-64-1 | PNEC | 1,06 mg/L | Marine water | Short-term (single instance) |
| Acetone | 67-64-1 | PNEC | 100 mg/L | Sewage treatment plant (STP) | Short-term (single instance) |
| Acetone | 67-64-1 | PNEC | 30,4 mg/kg | Freshwater sediment | Short-term (single instance) |
| Acetone | 67-64-1 | PNEC | 3,04 mg/kg | Marine sediment | Short-term (single instance) |
| Acetone | 67-64-1 | PNEC | 29,5 mg/kg | Soil | Short-term (single instance) |
| Ethylacetate | 141-78-6 | PNEC | 0,25 mg/L | Freshwater | Short-term (single instance) |
| Ethylacetate | 141-78-6 | PNEC | 0,024 mg/L | Marine water | Short-term (single instance) |
| Ethylacetate | 141-78-6 | PNEC | 650 mg/L | Sewage treatment plant (STP) | Short-term (single instance) |
| Ethylacetate | 141-78-6 | PNEC | 1,15 mg/kg | Freshwater sediment | Short-term (single instance) |
| Ethylacetate | 141-78-6 | PNEC | 0,115 mg/kg | Marine sediment | Short-term (single instance) |
| Ethylacetate | 141-78-6 | PNEC | 0,148 mg/kg | Soil | Short-term (single instance) |
| Ethylacetate | 141-78-6 | PNEC | 1,65 mg/L | Water | continuously |

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with the skin and the eyes. When using do not eat, drink or smoke; preventive skin protection.

Personal protective equipment

Respiratory protection

In case of exceeding of permitted exposure limit in closed rooms use a self-contained breathing apparatus.

Eye protection

Use tightly closing protective goggles with lateral protection.

Skin protection

Use protective gloves according to EN 374-2 consisting of following materials:

Fluorocarbon rubber, layer thickness 0,5 mm, breakthrough time > 480 min., nitril rubber, layer thickness 0,5 mm, breakthrough time > 480 min., butyl rubber, layer thickness 0,7 mm, breakthrough time > 480 min.

SAFETY DATA SHEET

according to Regulation (EU) No 453/2010 ECOS® HC
Page 6 of 10

Revision date: 31/07/2020

RAS AG, D-93055 Regensburg

Date of issue 26/07/2016
Replaces the release of: 08/11/2017

SECTION 9 Physical and chemical properties

9.1 Information on basic physical and chemical properties

| Parameter | |
|--|----------------------------|
| 1. Appearance: | |
| a. Conditions: concentrate, at 20°C | |
| b. Aggregate state: gray liquid | |
| 2. Odour: | Not available. |
| 3. Melting/freezing point: | Not available. |
| 4. Initial boiling point/boiling range: | 56°C (Acetone) |
| 5. Flash point: | -17°C (Acetone) |
| 6. pH | Not available. |
| 7. Flammability: | Not available. |
| 8. Ignition temperature: | Not available. |
| 9. Auto flammability: | Not available. |
| 10. Oxidising properties: | Not applicable. |
| 11. Explosive properties | For vapour/air mixtures |
| 12. Explosion limits: | |
| <i>lower</i> | 3% by volume (Acetone) |
| <i>upper</i> | 43% by volume (Ethanediol) |
| 13. Relative density (water 0 1): | Not available. |
| 14. Water solubility: | Miscible. |
| 15. Vapour pressure: | Not available. |
| 16. Vapour density (air =1): | Not available. |
| 17. Partition coefficient (n-octanol/water): | Not available. |
| 18. Viscosity: | Not available. |
| 19. Separation of solvent: | Not applicable. |
| 20. Evaporation rate | Not applicable. |

9.2 Other information

No data available.

SECTION 10 Stability and reactivity

10.1 Reactivity

risk of ignition. Vapours can form explosive mixtures with air.

10.2 Chemical stability

This product is stable under normal conditions.

10.3 Possibility of hazardous reactions

Exothermic reaction with concentrated mineral acids and strong oxidising agents.

10.4 Conditions to avoid

No data available.

10.5 Incompatible materials

Concentrated mineral acids and strong oxidising agents. Different plastics.

10.6 Hazardous decomposition products

In case of fire only, see section 5.2.

SAFETY DATA SHEET

according to Regulation (EU) No 453/2010 ECOS® HC
Page 7 of 10 Revision date: 31/07/2020

RAS AG, D-93055 Regensburg

Date of issue 26/07/2016
Replaces the release of: 08/11/2017

SECTION 11 Toxicological information

11.1 Information on toxicological effects

Mixtures

Acute toxicity

Acute Toxicity of ingredients:

| Substance | Exposure route | Endpoint | Value | Species | Source |
|--------------|----------------|------------------|----------------|---------|--------|
| Ethanediol | inhalation | LC ₅₀ | <2,5 mg/L air | rat | ECHA |
| Ethanediol | oral | LD ₅₀ | 7712 mg/kg bw | rat | ECHA |
| Ethanediol | dermal | LD ₅₀ | >3500 mg/kg bw | mouse | ECHA |
| Acetone | oral | LD ₅₀ | 5.800 mg/kg | rat | ECHA |
| Ethylacetate | inhalation | LC ₅₀ | 1.600 mg/l/4h | rat | |
| Ethylacetate | oral | LD ₅₀ | 5.620 mg/kg | rat | GESTIS |
| Ethylacetate | dermal | LD ₅₀ | >18.000 mg/kg | rabbit | GESTIS |

Skin corrosion

No data available.

Skin irritation

No data available.

Skin sensitisation

No data available

Serious eye damage/irritation

Causes serious eye irritation.

Repeated dose toxicity

No data available.

Carcinogenicity

No data available.

Mutagenicity

No data available.

Toxicity for reproduction

No data available.

Signs and symptoms of exposure

See section 4.2.

Additional information

May be harmful if inhaled. May be harmful if swallowed.

SAFETY DATA SHEET

according to Regulation (EU) No 453/2010 ECOS® HC
Page 8 of 10 Revision date: 31/07/2020

RAS AG, D-93055 Regensburg

Date of issue 26/07/2016
Replaces the release of: 08/11/2017

SECTION 12 Ecological information

12.1 Toxicity

Ecotoxicological information of ingredients:

| Substance | Study design | Endpoint | Value | Species | Source |
|---------------|--|------------------|------------|-----------------------|--------|
| Ethanediol | Short-term toxicity to fish (96 h) | LC ₅₀ | 72860 mg/L | Pimephales promelas | ECHA |
| Ethanediol | Long-term toxicity to fish (28 d) | LC ₅₀ | >1500 mg/L | Menidia peninsulae | ECHA |
| Ethanediol | short-term toxicity to aquatic invertebrates (48h) | EC ₅₀ | <100 mg/L | Daphnia magna | ECHA |
| Acetone | Aquatic toxicity (acute – 96 h) | LC ₅₀ | 8.120 mg/L | fish | ECHA |
| Acetone | Aquatic toxicity (chronic – 24 h) | LC ₅₀ | 2.100 mg/L | aquatic invertebrates | ECHA |
| Acetone | Aquatic toxicity (chronic – 30 min) | EC ₅₀ | 61,15 g/L | microorganisms | ECHA |
| Acetone | Aquatic toxicity (chronic – 28 d) | NOEC | 2.212 mg/L | aquatic invertebrates | ECHA |
| Acetone | Aquatic toxicity (chronic – 28 d) | NOEC | 2.212 mg/L | aquatic invertebrates | ECHA |
| Ethyl acetate | Aquatic toxicity (acute – 96 h) | LC ₅₀ | 230 mg/L | Pimephales promelas | ECHA |
| Ethyl acetate | Aquatic toxicity (acute – 96 h) | EC ₅₀ | 220 mg/L | fish | ECHA |
| Ethyl acetate | Aquatic toxicity (chronic – 24 h) | EC ₅₀ | 2.306 mg/L | aquatic invertebrates | ECHA |
| Ethyl acetate | Aquatic toxicity (chronic – 21 d) | NOEC | 2,4 mg/L | aquatic invertebrates | ECHA |

12.2 Persistence and degradability

Ethanediol, Acetone and Ethylacetate are biodegradable. No relevant data for silver nano wires available.

12.3 Bioaccumulative potential

No data available.

12.4 Mobility in soil

No data available.

12.5 Results of PBT and vPvB assessment

According to the available statements the criteria are not fulfilled for the classification as a PBT or vPvB.

12.6 Other adverse effects

Spilling product harms waters by high consumption of oxygen and general pollution impact.

SECTION 13 Disposal considerations

13.1 Waste treatment methods

Dangerous waste according to the European waste catalogue (2000/532/EC). If recycling is not possible, wastes must be eliminated according to the provisions of the local authorities. Do not dispose by the sewage.

Waste codes

20 01 13 Solvents.
15 01 10 Packaging containing residues of or contaminated by dangerous substances.

SAFETY DATA SHEET

according to Regulation (EU) No 453/2010 ECOS® HC
Page 9 of 10 Revision date: 31/07/2020

RAS AG, D-93055 Regensburg

Date of issue 26/07/2016
Replaces the release of: 08/11/2017

SECTION 14 Transport information

- 14.1 UN number**
1090
- 14.2 Proper shipping name**
ADR/RID
Acetone / Ethylacetate, solution.
IMDG-Code / ICAO-TI / IATA-DGR
Acetone / Ethylacetate, solution.
- 14.3 Transport hazard class(es)**
3 (flammable liquids)
- 14.4 Packing group**
II (substances presenting medium danger)
- 14.5 Environmental hazards**
None (acc. to the dangerous goods regulations)
- 14.6 Special precautions for user**
See sections 6 – 8.
- 14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**
Not applicable.

SECTION 15 Regulatory information

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

Regulations of the EU

Denomination in Annex I of the Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances
Not applicable.

REGULATION (EU) No 528/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 May 2012 concerning the making available on the market and use of biocidal products.
Not applicable.

Regulation (EC) No 648/2004 (Regulation concerning detergents)
Not applicable.

Directive 1999/13/EC for the limitation of emissions of volatile organic compounds
Applicable: > 70 % VOC.

Directive 92/85/EEC on the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding
Applicable.

Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work
Applicable.

Directive 94/33/EC on the protection of young people at work
Applicable.

German regulation

Technical instructions on maintaining air purity (TA Luft)

Observe threshold values for organic materials of section 5.2.5.: 100%
WGK 1 (slightly water endangering)

Water hazard class

Other regulations, restrictions and prohibition ordinances

Observe the information sheet M 017 of the BG Chemie.

SAFETY DATA SHEET

according to Regulation (EU) No 453/2010 ECOS® HC
Page 10 of 10 Revision date: 31/07/2020

RAS AG, D-93055 Regensburg

Date of issue 26/07/2016
Replaces the release of: 08/11/2017

15.2 Chemical safety assessment

This mixture was not subject to a safety assessment.

SECTION 16 Other information

The text of the hazard statement codes of section 3

| | |
|---|--|
| Acute Tox. 4; H302 STOT RE 2; H373 | Acute toxicity (oral), Hazard Category 4; Harmful if swallowed. May cause damage to organs through prolonged or repeated exposure if swallowed. |
| Flam. Liq. 2, H225 Eye Irrit. 2, H319 STOT Se 3, H336 | highly flammable liquid and vapour causes serious eye irritation may cause drowsiness or dizziness |

Abbreviations

| | |
|-----------|--|
| AGW | Permitted exposure limit during work hours |
| BGW | Permitted biological limit value for work place |
| Y | no harm to the unborn child, if values of AGW and BGW are kept. |
| EU | European Union |
| DFG | German Research Community |
| DNEL | Derived No-Effect Level |
| PBT | Persistent, bioaccumulative and toxic |
| PNEC | Predicted no effect level |
| vPvB | Very persistent and very bioaccumulative |
| TRGS | Technical regulation for dangerous substances |
| WGK | Water hazard class |
| BG Chemie | Employer's liability insurance association of the German chemical industry |

This safety data sheet is developed on basis of the valid EU regulations and German regulations. It shows the present state of the knowledge and is no contractual warranty of quality properties of the product. These statements may not be changed or transferred to other products. Duplication in unchanged state is permitted.