

MATERIAL SAFETY DATA SHEET

radiello[®]: calibration solution for aldehydes code 302

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I.R.C.C.S.

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1. Product and company identification

1.1 Product identification	radiello [®] : calibration solution for aldehydes code 302
1.1.1 Use	Product to use to create a calibration curve for quantifying aldehydes.
1.1.2 Trade name	Calibration solution for aldehydes code 302
1.2 Company identification	
1.2.1 Name of supplier	Fondazione Salvatore Maugeri
Address	Centro di Ricerche Ambientali/Padova Via Svizzera 16, 35127 Padova E-mail: fsm@fsm.it
Telephone number	Tel. 0498 064 511 - Fax 0498 064 555
1.3 Emergency contact number	
National Toxicology Center	Tel. 0382 24444

2. Composition. Information on ingredients

The product, contained in a pierceable vial, is 10 mL of an acetonitrile solution of the 2,4 dinitrophenylhydrazones of nine aldehydes at known concentrations expressed in µg/ml (formaldehyde 50; acetaldehyde 50; acrolein 10; propanal 50; butanal 50; isopentanal 50; pentanal 50; hexanal 50; benzaldehyde 50).

<i>Ingredients</i>	<i>%</i>	<i>Symbol</i>	<i>R phrases</i>
ACETONITRILE (CAS 75-05-8 CE200-835-2)	>98	Xn; F	R11;R20/21/22;R36
2-4 DINITROPHENYLHYDRAZONES OF ALDEHYDES	< 0.05	not required	not required

3. Health hazard identification

The product is classified as dangerous according to directive 1999/45, Law N. 65 of 14/03/03 and Law N. 260 of 28/07/04 (Hazardous Products) since the concentration of ACETONITRILE is 98%; therefore the risk phrases R11- R20/21/22- R36, (“easily inflammable” “inhalation, contact with the skin and ingestion are harmful” and “irritant to the eyes”) are reported.

The nine 2-4 DINITROPHENYLHYDRAZONES OF ALDEHYDES are present at concentrations below 0.05% (value expressed as the sum of the single compounds), thus below the minimum values allowed for any impurities in the product, indicated as 0.1% (Enclosure IV, Law N. 65 of 14 March).

4. First aid measures

- 4.1 General indications** In the case of doubt or in the presence of symptoms consult a doctor, taking a copy of this material safety data sheet. Do not administer any substances by mouth to an unconscious person.
- 4.2 First aid procedures in the case of:**
- 4.2.1 Inhalation** Inhalation of the product is not foreseen in normal conditions of its use. However, should inhalation occur, it is not expected that there would be effects deriving from inhalation of airborne substances that could be released from the product. In the case of respiratory symptoms (cough, dyspnea) move the person to fresh air, place in a semi-seated position, and provide artificial respiration if the person is not breathing.
- 4.2.2 Contact with the skin** Wash the skin with soap and flush with running water for several minutes. Consult a doctor if there are symptoms of irritation (reddening, pain).
- 4.2.3 Contact with the eyes** Flush the eyes, kept open, with large amounts of running water for at least 15 minutes. Consult a doctor if symptoms of irritation (reddening, pain) develop.
- 4.2.4 Ingestion** Rinse the mouth with water if the subject is conscious and consult a doctor.

5. Fire fighting measures

The product, contained in a hermetically sealed 10 ml vial is inflammable and emits toxic fumes. In the case of a fire in a closed environment (e.g. in a warehouse in which the product is stored) follow the rules below:

- 5.1 General indications** Move all people away and upwind of the fire. Do not enter closed rooms without adequate protection.
- 5.2 Extinguishing media** For small fires use foam, dry powder or carbon dioxide. For larger fires use water in nebulized or spray form, keeping as far away as possible and protecting oneself from possible explosions. Cool all involved containers with large quantities of water.
- 5.3 Extinguishing media that must not be used** Not known.
- 5.4 Exposure risks in the case of fire** Irritant or toxic fumes may develop in the case of fire. Furthermore, the vapor may diffuse considerable distances reaching heat sources and causing further flames.

6. Accidental release measures

The product is contained in a hermetically sealed 10 ml vial.

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| 6.1 Personal precautions | It is advisable to wear protection, a filtering mask with activated charcoal and gloves. |
| 6.2 Environmental precautions | Given the amount of the product and its packaging, it does not appear possible that accidental damage can be caused to the environment. Do not dispose of the product (or part of it) in the environment. |
| 6.3 Cleaning-up methods | |
| 6.3.1 Decontamination | In the case of spills, ventilate the zone, recover the product completely and then wash the contaminated area with abundant quantities of water. |

7. Handling and storage

7.1 Handling

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| 7.1.1 Technical measures | There are no specific technical requirements for handling the product. |
| 7.1.2 Precautionary measures | Avoid contact with the eyes. Avoid prolonged and repeated exposures. Avoid inhaling the vapors. |

7.2 Storage

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| 7.2.1 Technical measures | Take the necessary measures to avoid accidental spills of the product in the case of breakage of the containers. |
| 7.2.2 Storage conditions | Store in original containers or other appropriately labeled, suitable containers. Store in a cool, dry environment away from sources of heat, sparks or flames. Handle and store under a nitrogen atmosphere. |

8. Exposure control. Personal protection

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| 8.1 General hygiene measures | Respect existing safety regulations and use according to the recommendations of the supplier, as indicated in point 7.1. Ensure good ventilation. Wash hands after handling the product. |
| 8.2 Limits of occupational exposure | Limits of exposure ACGIH 2005. |

Type TWA 34 mg/mc

Limits of exposure UE 2006
8-hour limit 70 mg/mc**8.3 Personal protection measures**

- 8.3.1 Respiratory protection** In the case of spills use a full facial mask with a type AXBEK filter.
- 8.3.2 Eye protection** Wear protective glasses to prevent splashes of solution entering the eyes.
- 8.3.3 Hand protection** Wear appropriate protective gloves
- 8.3.4 Skin protection** Wear work clothes or suitable protective clothing.

9. Physical and chemical properties

- 9.1 Physical state** Liquid.
- 9.2 Color** Dark yellow (color due to the presence of DINITROPHENYLHYDRAZONES).
- 9.3 Odor** Pungent.
- 9.4 pH** Not applicable.
- 9.5 Boiling point** 81.0-82.0°C at 760 mmHg.
- 9.6 Melting point** -48°C.
- 9.7 Flash point** 2°C (closed melting box method).
- 9.8 Auto-ignition** 523°C.
- 9.9 Explosion limits** Lower: 4.4%
Upper: 16%.
- 9.10 Oxidizing properties** Not applicable.
- 9.11 Vapor pressure** 72.8 mmHg (at 20°C).
- 9.12 Density** 0.782 g/cm³.
- 9.13 Solubility in water** Soluble.
- 9.14 Solubility in organic solvents** Ethyl acetate, ether, chloroform, carbon tetrachloride, met.
- 9.15 Vapor density** 1.41 g/L.
- 9.16 Evaporation rate** 5.79
- 9.17 Conductivity** Not applicable.
- 9.18 Viscosity** 0.35 pass at 20°C.
- 9.19 Surface tension** 29.04 mN/m (at 20°C)

10. Stability and reactivity

10.1 Conditions to avoid	Stable product, avoid sources of heat.
10.2 Materials to avoid	Acids, bases, reducing agents, oxidizing agents and alkaline metals.
10.3 Hazardous decomposition products	The product is stable. The thermal decomposition products in the case of fire are carbon monoxide, carbon dioxide, nitrogen oxide, hydrocyanic acid.

11. Toxicological information

11.1 Toxicity data	<p>ACETONITRILE is the only component in the product for which the acute toxicity has been determined. The oral LD₅₀ in the rat is 2460 mg/kg.</p> <p>The other LD₅₀ values in the rat are: intraperitoneal 850 mg/Kg; subcutaneous 3500 mg/Kg; intravenous 1680 mg/Kg; parenteral 1100 mg/Kg.</p> <p>The LD₅₀ values in the mouse are: oral 269 mg/Kg; intraperitoneal 175 mg/Kg; intravenous 612 mg/Kg subcutaneous 4480 mg/Kg;</p> <p>The oral LD₅₀ in the cat is 200 mg/Kg.</p> <p>The LD₅₀ values in the rabbit are: oral 50 mg/Kg; skin 1250 UL/Kg;</p> <p>The oral LD₅₀ in the guinea pig is 177 mg/Kg. The oral LD₅₀ in mammals is 1670 mg/Kg.</p>
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11.2 Acute toxicity

The onset of symptoms is generally delayed during the conversion to cyanide. This products produces effects similar to those caused by cyanide. Possible side effects include nausea, diarrhea, headache, disorientation, skin eruptions and cyanosis. Other symptoms are mental depression and excitation, drowsiness, deterioration in perception, lack of coordination, stupor, coma, and death.

ACETONITRILE is metabolized by the liver into water, formic acid, hydrocyanide acid and then the cyanide is further metabolized into thiocyanate.

11.2.1 Inhalation

The product can be harmful if inhaled. It can irritate the mucosa and the upper respiratory tract if inhaled.

The inhalation LD₅₀ in the rat is 7551 ppm/8H; this causes changes in sleep and hemorrhages with consequent convulsions or changes in the threshold of convulsions.

The inhalation LD₅₀ in the mouse is 2693 ppm/1H with effects on the liver, that for the cat is 1800 mg/m³.

The inhalation LD₅₀ in the rabbit is 2828 ppm/4H with the same effects as in the rat, that for the guinea pig is 5655 ppm/4H, again with the same effects as in the rat.

11.2.2 Skin contact

If it comes in contact with the skin, ACETONITRILE can be irritant.

11.2.3 Eye contact

Contact with ACETONITRILE can cause severe irritation to the eyes.

11.2.4 Ingestion

The ingestion of ACETONITRILE is harmful.

11.3 Chronic toxicity

11.3.1 Inhalation

This is not a normal route of exposure.

11.3.2 Skin contact

This is not a normal route of exposure.

11.3.3 Eye contact

This is not a normal route of exposure.

11.3.4 Ingestion

This is not a normal route of exposure.

11.4 Delayed effects

See point 11.2

11.5 Corrosiveness. Irritant potential

11.5.1 Skin ACETONITRILE can cause irritation to the skin.

11.5.2 Mucosa ACETONITRILE can cause irritation to the mucosa.

11.5.3 Eyes ACETONITRILE can cause serious irritation to the eyes.

11.6 Sensitizing potential Not known

11.7 Carcinogenicity ACETONITRILE is not classified on the basis of a carcinogenic effect according to the IARC, ACGIH, NTP and EPA classifications.

11.8 Mutagenicity Genotoxic and/or mutagenic effects of ACETONITRILE have been documented in the hamster at a dose of 5 gm/L on the ovary, where exchange of sister chromatids was observed.

11.9 Effects on reproduction At the current state of knowledge, studies to determine the potential effect on reproduction have been conducted in the:
 rat – with an inhalation dose of 1800 ppm/6H having effects on fertility and post-implantation mortality;
 rabbit – with an oral dose of 390 mg/Kg causing developmental abnormalities, effects on the embryo and fetus and effects on the female reproductive tract;
 hamster – with an oral dose of 400 mg/Kg affecting fertility and post-implantation mortality and with an inhalation dose of 5000 ppm/1H causing developmental anomalies and effects on fertility.

11.10 Teratogenic effects Specific tests have been conducted in hamsters with the application of oral doses of 300 mg/Kg, with possible developmental abnormalities. An inhalation dose of 8000 ppm/1H in the hamster was associated with effects on the embryo and fetus and, again, developmental abnormalities.

11.11 Narcotic effect Not expected.

12. Ecological information

12.1 Mobility Data not available.

12.2 Persistence and degradability Data not available.

12.3 Bioaccumulation potential Data not available.

12.4 Aquatic toxicity Data not available.

- 12.5 Ecotoxicological effects** The LC50 test on fish of the *Pimephales promelas* species gave a value of 1,640mg/L after 96 hours.
The EC50 test on *Daphnia magna* gave a value of 3,600 mg/L after 48 hours.
- 12.6 Remarks** Do not dispose of the product (or part of it) in the environment.

13. Disposal considerations

For disposal purposes, the product (or part of it) is considered as special waste. After use, the material must be disposed of in conformity with the disposal of other laboratory products. Contact a Center authorized to dispose of this type of waste. Do not dispose of the product in the environment.

14. Transport information

- 14.1 General information** The product is subject to international regulations concerning its transport.
- 14.2 Road and rail transport (ADR/RID)** #UN:1648
class 3 PG:II Delivery name: Acetonitrile
- 14.3 Sea transport (IMDG/IMO)** #UN:1648
class 3 PG:II Delivery name: Acetonitrile
Not a sea pollutant
- 14.4 Air transport (ICAQ/IATA)** #UN:1648
class 3 PG:II Delivery name: Acetonitrile
no inhalation – packing class

15. Regulatory information

- 15.1 Labeling** According to European directives.
- 15.2 Hazard symbols** F “easily inflammable”
Xn “noxious”
- 15.3 Risk phrases** R11; R20/21/22; R36.
- 15.4 Safety phrases** S16: “Keep away from flames or sparks – do not smoke”.
S36/37: “Wear protective gloves”.

16. Other information

<i>Ingredients</i>	<i>Symbol</i>	<i>R phrases</i>
2-4 DINITROPHENYLHYDRAZONES OF ALDEHYDES	not required	not required
ACETONITRILE	F; Xn	R11: easily inflammable. R20/21/22: inhalation, contact with skin and ingestion are harmful. R36: irritant to the eyes

Advice to users

The information in this material safety data sheet is based on our current knowledge and on Italian and European Community regulations. The product must not be used for any purposes other than those specified in section 1, in the absence of written instructions on its handling. It is the user's responsibility to take all measures necessary to conform with local and national regulations.

The information in this data sheet complies with Directive CEE 1999/45 (assimilated in Italy by Law No. 65 of 14/03/03) and with Directive CEE 2001/58 (assimilated in Italy by Ministerial Decree 7/9/2002). The set of regulations mentioned is simply intended to help the user comply with his or her obligations during the use of the products.