Laboratory Safety Manual

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1. Introduction

Laboratories are workplaces where the concern for safety and health at work must be well defined, laboratory activities pose several risks, particularly associated with the handling of equipment, chemicals and biological agents. All laboratory work must be carried out with the utmost attention to all the conditions of the environment, in order to prevent and minimize the risks.

This manual is intended to be a useful tool of essential information for users of CIIMAR laboratories, regarding safety matters. **All laboratory rules are established for all users, and everyone's safety depends on each individual's behaviour**.

Safety in the Laboratories is essential to guarantee quality work and the health of users, as a small distraction can jeopardize the safety not only of themselves, but also of third parties.

- **Please – After reading this manual sign the responsibility statement.**

2. Emergency Contacts

These are the most important contacts in case of an emergency / accident:

EUROPEAN EMERGENCY NUMBER	**112**
HEALTH ISSUES (SAÚDE 24 - NOT URGENT) NATIONAL HEALTH SYSTEM	808 24 24 24
ANTIVENOM INFORMATION CENTER	808 250 143
FIRE DEPARTMENT (MATOSINHOS – LEÇA)	22 998 4190
POLICE-MATOSINHOS	22 209 2000
CIMMAR´S FRONT OFFICE (SÓNIA LOPES)	223 401 800
HEALTH & SAFETY DELEGATE (VITOR RODRIGUES)	223 401 888/919 246 500
BIOSAFETY DELEGATE (PEDRO LEÃO)	22 340 1814/916257988
LAB RESIDUES DELEGATE (JOANA AZEVEDO)	223401837/916682848

CIIMAR address: Novo Edifício do Terminal de Cruzeiros do Porto de Leixões - Avenida General Norton de Matos, S/N 4450-208 Matosinhos

Phone: 22 340 18 00 **E-mail:** secretariado@ciimar.up.pt

It is also recommended that in each laboratory there is a **person responsible for the safety and handling of waste**, and that the contact details of that person and / or the PI (Principal Investigator) of the laboratory be made available **to all users**. **These contacts should be next or close to emergency contacts.**

3. Basic Rules

The experimental work must be prepared in advance taking into account all potential hazards inherent in the handling of reagents, materials and equipment. In addition, all users should read the Safety Manual before starting any experimental activity in the laboratory for the first time. All experimental activities and tests must be expressly authorized by the supervisor / superior. Here are some basic rules of mandatory compliance:

- Do not eat, drink, store food or apply cosmetics in the laboratory;
- It is mandatory to keep the benches clean and tidy, the floor clean and dry and the passages unobstructed;
- It is forbidden to use open shoes (for example slippers, sandals) in the laboratory;
- Long hair should always be put up in the execution of the experimental work;
- Use the recommended Personal Protective Equipment (PPE) (lab coat, gloves and safety glasses if the experimental work requires it);
- Wash your hands before and after using gloves;
- Do not leave the laboratory wearing gloves. If a reagent is being carried, keep the glove on the hand that is directly in contact with the product bottle, and the other hand without gloves so that you are free to open the doors, touch the handles and buttons on the elevator;
- Regarding laboratory equipment, it is only allowed to be used after reading and understanding the respective handling and safety instructions;
- Do not handle the keyboards of computers associated with HPLC's using gloves;
- All material washing stands must be kept clean and tidy;

- After using the analytical scales, users should keep them free from any residues. The brushes should be washed / cleaned regularly.
- The disposal of waste produced must be previously prepared in accordance with all the safety rules contained in the section of this manual "Waste Management";
- All laboratory users must know the escape routes and emergency exits from the space where they are located;
- The last person to leave the laboratory must check their safety (check the closing of water and gas taps, disconnected equipment, lights, etc.);

3.1 Safety Equipment

All laboratories must be equipped with the following safety devices:

Figure 1 shower and eye wash

• Showers and eye wash, make sure to provide good access and to not store electrical devices like fridges nearby (Figure 1);

• Fireproof blankets;

• Portable fire extinguisher, they normally are inside the cabinet near the entry door of each laboratory at CIIMAR;

• First aid box (composed of: antiseptic solution, saline solution, blunt-ended scissors, tweezers, compresses, bandages, adhesive roll, sterile disposable gloves). Never place first aid boxes in locked cabinets. Its content should be checked periodically.

3.2 Personal Protective Equipment (PPE)

Personal Protective Equipment is a device intended to be used by workers as a protection against health and safety risks (Decreto-Lei N.º 348/93 de 1 October). This equipment should always be used when the existing risks cannot be avoided.

All Personal Protective Equipment must comply with the rules applicable to its design and manufacture in matters of safety and health. They must be suitable for the risks to be prevented and for the conditions existing in the laboratory, and be suitable for the user. PPE should only be used for the purpose for which it is intended. PPE includes lab coats, protective goggles, visors, masks, gloves, protective suits, protective shoes and hearing protectors, among others. The lab coat to be used must be made of 100% cotton. The shoes to be used in the laboratories cannot be opened (do not use slippers or sandals, for example). In addition, they must be non-slip.

Depending on the activities to be developed, other types of equipment may be necessary, such as masks with breathing filters, suits and / or safety shoes with non-slip soles.

Chemical safety data sheets provide information for handling the products and also about the protections to be used, which must be consulted and the appropriate PPE selected.

PPE must be purchased in accordance with the following requirements:

- Type of risk to be protected;
- Be comfortable, light and robust;
- Have CE marking;
- Have a declaration of conformity from the manufacturer and proof of conformity of the PPE.

3.3 Chemicals Handling

Regarding the handling of chemical products, the following rules must be complied with:

- Never inhale, touch or ingest a chemical;
- Containers containing volatile and flammable solvents must not be left close to sources of flame or exposed to the sun;

• All containers must be clearly identified and dated. Containers whose contents are not known should never be used, and if detected by residue delegates it will be discarded as unknown residues;

• Liquids should be poured from the bottles with the labels facing upwards, so that any drops that run down the outside do not damage the labels.

• Any reagent should be added slowly. The reaction should be observed after a few seconds after each addition before re-adding the reagent;

• Solutions diluted in water should be prepared by always placing the water first and then the reagent. Extremely important rule in the case of preparing dilute acid solutions, always water first and only then the acid that should always be added slowly;

• All experimental work that favors the release of toxic gases / vapors must always be carried out in a *hotte*, for example, preparation of dilute acid solutions;

• Flammable liquids must not be heated directly to the flame;

• If a chemical spill occurs, the place must be cleaned immediately;

The reagent safety data sheet should always be consulted to check its properties (for example if it is volatile, or flammable) to plan the safest way to handle the reagent.

4. Chemical Safety

Any chemical element or compound to which the worker may be exposed during the course of his work is considered a chemical agent (Decreto-lei n.º 24/2012, de 6 February). There are several chemical agents that have the capacity to cause damage to human health, and, despite all current legislation, dangerous substances continue to represent one of the main problems in terms of Safety and Health in the workplace. For this reason, **the rules set out in this manual must be complied with by all users of CIIMAR laboratories.**

Sources of information on chemical hazards / hazards include: packaging labels (notably the hazard indication pictograms, the word sign, hazard warnings and precautionary statements), the safety data sheets (SDS) provided by the manufacturers, the scientific and technical literature, the guides published by the entities and the legislation in force.

4.1 Chemicals Identification and Labelling

In order to prevent accidents, a substance or chemical must be identified. Thus, the labels must contain the pictograms and information in Figures 2 and 3. Whenever it is verified that the label is becoming illegible, it must be reproduced with all the information and placed in the packaging / container.

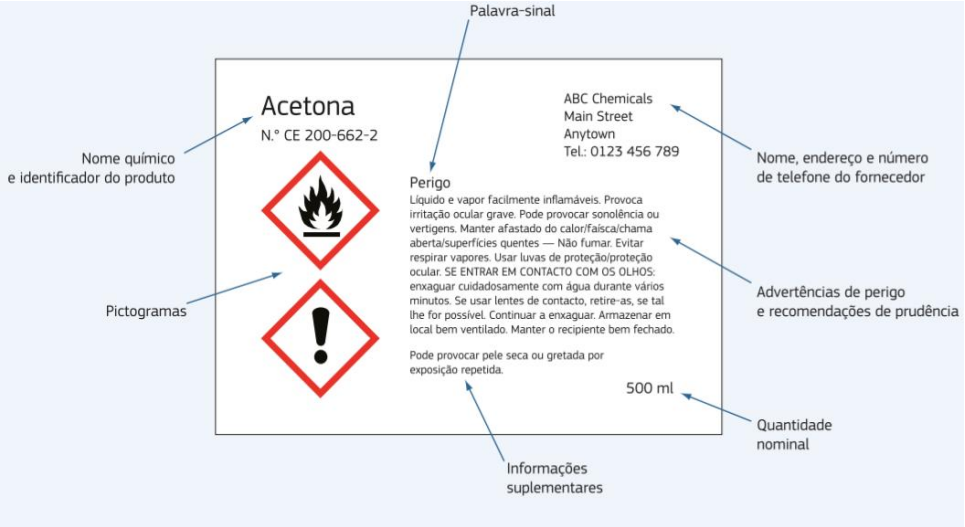

Figure 2- Label example source: https://www.act.gov.pt/(pt-PT)/crc/PublicacoesElectronicas/Documents/Folheto_rotulos_produtos_quimicos.pdf

Pictograms List

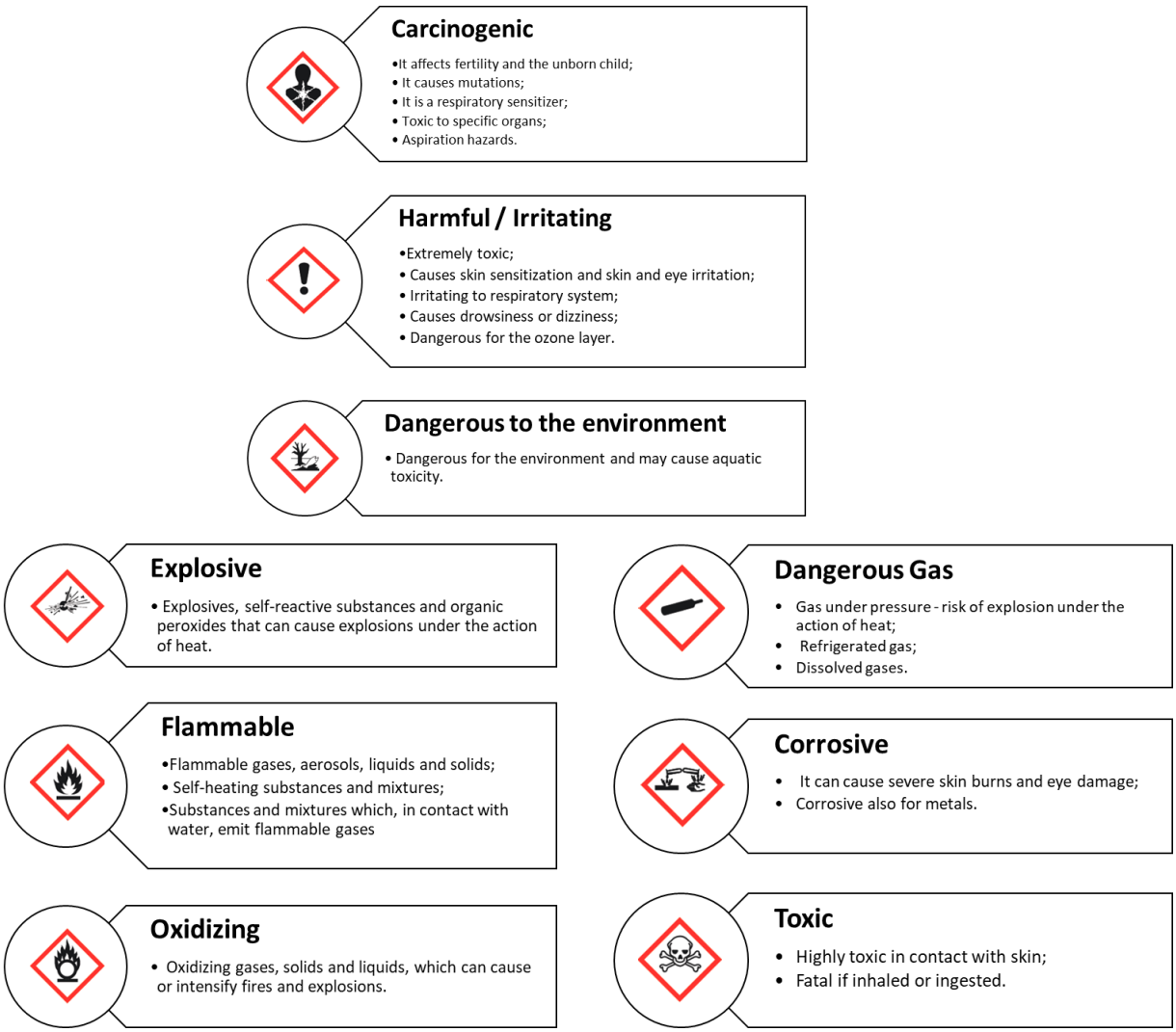

Figure 3 - List of Chemical Hazard Pictograms (Source: https://osha.europa.eu/pt/publications/promotional-material/clp-leaflet)

4.2 Chemicals Storage

The safe storage of chemicals is of enormous importance. For your promotion, the following requirements must be taken into account:

- ✓ Maintain an updated inventory of chemicals used in the laboratory;
- ✓ All products must contain identification;
- ✓ Incompatible substances must be separated (See Annex 1);
- ✓ Ventilation, lighting and temperature conditions must be ensured.

The following rules must also be complied with:

• The storage of flammable products must be done in safe and approved packaging. They must be kept in cabinets for flammable products only;

• Strong acids (eg nitric acid, sulfuric acid, hydrochloric acid) must be separated from concentrated bases (eg sodium hydroxide, potassium hydroxide);

• Oxidizing chemicals (eg hydrogen peroxide…) must be stored alone (especially away from flammable ones);

• Corrosive substances must be separated from those that can exhale, by contact, corrosive, toxic or flammable fumes;

• Toxic products, carcinogens, and teratogens must be stored in unbreakable containers and in places with restricted access;

• Chemical products should be separated according to the following categories (see figure 4 as a good example on how to store):

- **Liquids:** acids / bases / oxidants / flammable and combustible / perchloric acid;
- **Solids:** oxidizers / flammable solids / reactive to water / others;
- **Gases:** toxic / oxidizing and inert / flammable;

• All containers that are heavy and that contain toxic, corrosive or flammable substances must be stored below eye level;

• Chemical products must not be stored on the floor or laboratory benches;

• All solvents, standards and samples that are kept in refrigerators and freezers must be properly identified (identification of the substance, date and name of the responsible user / researcher) and in appropriate containers **(avoid as much as possible the storage of solutions in volumetric flasks).**

• Containers containing acids and bases must be stored with holding basins;

• Volatile chemical substances must be stored in ventilated cabinets;

NOTE: The extraction system of the hoods must always remain **on,** even when not in use, as the cabinets at the bottom of the hoods require continuous ventilation.

Figure 4 Examples of how to keep reagents, solvents and an *hotte.*

4.3 Safety Data sheets

Safety data sheets (SDS) are documents that provide information about the hazards related to a chemical. This document also contains safety procedures and risk management measures, in order to ensure the protection of health and environment. Safety data sheets should be prepared and supplied by chemical suppliers and manufacturers. **Each laboratory must have, for consultation, the safety data sheets for the chemicals used in its research work**. They should be properly stored and in a place where all users can have access. See figure 5 as an example on EcoBioTec lab

Figure 5 How to store SDS files

This document is regulated by law, meaning that every manufacturer follows the same rules on how to write the information. A complete SDS as **16 sections** with the following details:

- **Section 1**: Identification of the substance/mixture and of the company/undertaking
- **Section 2:** Hazards identification
- **Section 3:** Composition/information on ingredients
- **Section 4:** First aid measures
- **Section 5**: Firefighting measures
- **Section 6:** Accidental release measures
- **Section 7**: Handling and storage
- **Section 8**: Exposure controls/ personal protection
- **Section 9:** Physical and chemical properties
- **Section 10:** Stability and reactivity
- **Section 11:** Toxicological information
- **Section 12**: Ecological information
- **Section 13:** Disposal considerations
- **Section 14:** Transport information
- **Section 15:** Regulatory information
- **Section 16:** Other information

In the next two pages you can find an example of how a SDS should look .

ThermoFisher SCIENTIFIC

SAFETY DATA SHEET

Creation Date 10-May-2010 **Revision Date** 10-Jul-2020 **Revision Number** 6

1. Identification

Product Name 2-Mercaptoethanol

Cat No. : AC125470000; AC125470010; AC125470025; AC125470100; AC125472500

CAS-No 60-24-2
Synonyms 2-Hydroxy-1-ethanethiol; Thioglycol

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.
Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel. (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 4
Acute oral toxicity	Category 3
Acute dermal toxicity	Category 2
Acute Inhalation Toxicity - Vapors	Category 3
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 1
Skin Sensitization	Category 1A
Reproductive Toxicity	Category 2
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Liver, Heart.	

Label Elements

Signal Word

Danger

Hazard Statements
Combustible liquid
Fatal in contact with skin
Causes skin irritation
May cause an allergic skin reaction
Causes serious eye damage
Suspected of damaging fertility
May cause damage to organs through prolonged or repeated exposure
Toxic if swallowed or if inhaled

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not get in eyes, on skin, or on clothing
Use only outdoors or in a well-ventilated area
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Do not breathe dust/fume/gas/mist/vapors/spray
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep cool
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician
Skin
Immediately call a POISON CENTER or doctor/physician
IF ON SKIN: Gently wash with plenty of soap and water
Remove/Take off immediately all contaminated clothing
Wash contaminated clothing before reuse
If skin irritation or rash occurs: Get medical advice/attention
Eyes
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
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
Other hazards

Stench.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
2-Mercaptoethanol	60-24-2	99

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Remove to fresh air. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required. If not breathing, give artificial respiration.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects None reasonably foreseeable. Causes severe eye damage. May cause allergic skin reaction. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam. Water mist may be used to cool closed containers.

Unsuitable Extinguishing Media No information available

Flash Point 73 °C / 163.4 °F

Method - No information available

Autoignition Temperature 295 °C / 563 °F

Explosion Limits
Upper 2.7 vol %
Lower 1.1 vol %
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Combustible material. Containers may explode when heated. Keep product and empty container away from heat and sources of ignition. Thermal decomposition can lead to release of irritating gases and vapors. Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products
Sulfur oxides, Sulfides.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
4	2	1	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment as required. Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe mist/vapors/spray. Do not ingest. If swallowed then seek immediate medical assistance. Keep away from open flames, hot surfaces and sources of ignition.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks and flame.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State Liquid
Appearance Light yellow

Odor	Stench
Odor Threshold	No information available
pH	5.2 (0.1M)
Melting Point/Range	-100 °C / -148 °F
Boiling Point/Range	157 - 158 °C / 314.6 - 316.4 °F
Flash Point	73 °C / 163.4 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	2.7 vol %
Lower	1.1 vol %
Vapor Pressure	1 mmHg @ 20 °C
Vapor Density	2.5
Specific Gravity	1.110
Solubility	Soluble
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	295 °C / 563 °F
Decomposition Temperature	> 157°C
Viscosity	3.43 cP at 20 °C
Molecular Formula	C2 H6 O S
Molecular Weight	78.13

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions. heat sensitive. Water reactive.

Conditions to Avoid Incompatible products. Heat, flames and sparks. Excess heat. Exposure to moist air or water. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong acids, Metals, Heavy metal salts, Oxidizing agent

Hazardous Decomposition Products Sulfur oxides, Sulfides

Hazardous Polymerization No information available.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
2-Mercaptoethanol	LD50 = 244 mg/kg (Rat)	150 µL/kg (Rabbit) 112 - 224 mg/kg (Rabbit)	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes, respiratory system and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
2-Mercaptoethanol	60-24-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure Liver Heart

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing: Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
2-Mercaptoethanol	EC50: = 12 mg/L, 72h (Desmodesmus subspicatus)	LC50: 46 - 100 mg/L, 96h static (Leuciscus idus)	= 125 mg/L EC50 Pseudomonas putida 17 h	EC50: = 1.52 mg/L, 48h (Daphnia magna)

Persistence and Degradability Persistence is unlikely

Bioaccumulation/ Accumulation No information available.

Mobility . Will likely be mobile in the environment due to its water solubility.

Component	log Pow
2-Mercaptoethanol	-0.056

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN2966
Proper Shipping Name	THIOGLYCOL
Hazard Class	6.1
Packing Group	II

TDG

UN-No	UN2966
Proper Shipping Name	THIOGLYCOL
Hazard Class	6.1
Packing Group	II

IATA

UN-No	UN2966
Proper Shipping Name	THIOGLYCOL
Hazard Class	6.1

Packing Group	II

IMDG/IMO

UN-No	UN2966
Proper Shipping Name	THIOGLYCOL
Hazard Class	6.1
Packing Group	II

15. Regulatory information

United States of America Inventory

Component	CAS-No	TSCA	TSCA Inventory notification - Active/Inactive	TSCA - EPA Regulatory Flags
2-Mercaptoethanol	60-24-2	X	ACTIVE	-

Legend:
TSCA - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Australia (AICS), China (IECSC), Korea (ECL).

Component	CAS-No	DSL	NDSL	EINECS	PICCS	ENCS	AICS	IECSC	KECL
2-Mercaptoethanol	60-24-2	X	-	200-464-6	X	X	X	X	KE-23095

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
2-Mercaptoethanol	X	X	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date	10-May-2010
Revision Date	10-Jul-2020
Print Date	10-Jul-2020
Revision Summary	SDS sections updated. 2. 3. 16.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. 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

End of SDS

4.4 Compressed gases

The storage of compressed gases (commonly gas bottles) must follow the following rules:

- Containers must be stored in a cool, ventilated place with restricted access;
- Containers (commonly gas bottles) must be attached to the wall using chains or other means that favor their immobility;
- If the bottle is empty return to the selling company.

5. Biological Safety

During laboratory activities, users are often exposed to biological risks. When exposed to biological agents, they can cause infections, allergies and toxic effects (depending on the type of microorganisms to which you were exposed). In order to reduce the risks inherent to the exposure of biological agents, compliance with preventive measures in their handling is extremely important, such as:

• Put into practice technical measures to minimize the release of biological agents, namely handling in laminar flow chambers;

• Laminar flow chambers must have updated maintenance of their filters (**annual maintenance**);

• Always use personal protective equipment (lab coat, gloves, glasses if the experimental work requires it);

• Have quick access antiseptics whenever necessary;

• Personal protective equipment that presents a high risk of contamination must be destroyed after work;

• When using equipment and sharp objects, such as needles, they should not be disposed of in normal hospital waste, but in a special container - Sharp (see section “Waste Management”).

• The generated waste must be disposed of correctly according to its hazard (See section 6 - “Waste Management”).

6. Waste Management

Waste management must follow specific safety rules, stated in this manual, which must be known and understood by all laboratory users. Compliance with all rules related to waste management is extremely important since CIIMAR is responsible for the waste produced, until the waste is collected by licensed operators. In CIIMAR's laboratories, two types of waste are produced, chemical residues and biological residues, Figure 3 shows the rules for sorting and packaging hospital waste that must be adapted to the biological waste generated in the laboratories, as well as the images of the containers to be used.

Applicable legislation: Decreto-lei n.º 178/2006, of 5 September.

Waste cannot be stored on top of work benches. These cannot be stored on the floor under countertops either. There is a place for storing this material, the liquid waste should be in an appropriate basin. In case of lack of space, those responsible for the laboratory should be contacted in order to indicate a new storage location.

It is expressly prohibited to dispose of waste in the sanitation networks.

Special Waste (known as Chemical Waste) must be placed in containers duly identified with the stickers containing the LER (European Waste List) codes. In Figures 6, 7 and 8 are photographs that represent examples of drums for the disposal of chemical waste.

NOTE: Pipette tips, Pasteurs pipettes or other materials contaminated with solvents, must be dried in the *hotte* before being placed in the appropriate containers.

- ✓ The containers must be filled to 80% of the maximum volume;
- ✓ To request empty containers, or collect this type of waste contact Joana Azevedo and Ana Inês Nóbrega (Responsible for CIIMAR's waste management) by making a ticket at CIIMAR's helpdesk, in the option - CIIMAR Waste Disposal (https://www2.ciimar.up.pt/helpdesk/); **The transport of the filled containers from the laboratory to the waste warehouse is the responsibility of each laboratory, and must be supervised by the person responsible for waste management.**
- ✓ The respective LER code must be placed in all containers according to the type of waste to be discarded;

Table 1 shows the correspondence between the types of chemical waste generated in the laboratories, the respective LER code and the appropriate container to be used.

These rules must be strictly enforced. **Failure to comply with them may cause a mixture of residues that, depending on the chemicals involved, may lead to accidents occurring**.

Table 1 - Correspondence between the types of chemical waste generated, the respective LER code, and container to be used.

Waste type	LER Code	Container
Mixture of Halogenated Solvents	LER 14 06 02*	EGEO 25L
Other solvents and solvent mixture	LER 14 06 03*	EGEO 25L
Other Acids	LER 06 01 06*	EGEO 25L
Other Bases	LER 06 02 05*	EGEO 25L
Other Heavy Metals	LER 06 03 13*	EGEO 25L
Packaging containing or contaminated by residues of dangerous substances	LER 15 01 10*	EGEO 200L
Absorbents, filter materials and protective clothing contaminated by dangerous substances	LER 15 02 02*	EGEO 200L
Liquid or solid waste with solvents	LER 16 05 06*	EGEO 200L
Inorganic wastes containing dangerous substances (Contaminated Glass)	LER 16 03 03*	EGEO 30L ou 60L

Chemical waste containers should be placed under **containment basins**. There should also be an **absorption kit** nearby in case of chemical spills.

If you are in doubt, please ask!

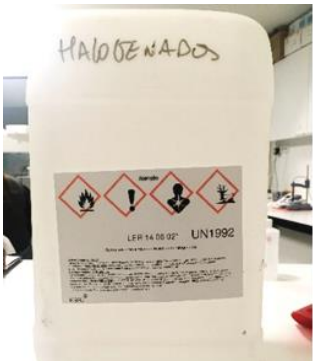

Figure 6 - Example of 25L container.

Figure 7 – Example of container for sharp objects.

Figure 8 – Example of container for contaminated glass.

Sources:

1. 121025_PT_EU-OSHA_chemical_hazard_pictograms_leaflet_lc.indd (europa.eu)
2. web_gessi_docs.download_file (up.pt)
3. https://www.apsei.org.pt/media/recursos/documentos apsei/guias_epi/Guia_EPI_Web.pdf
4. http://www1.ipq.pt/PT/Normalizacao/FerramentasPME/Documents/Guia_Quimicos_Web.pdf

Annex I

Table 2 - Incompatible Substances Source: http://nshs.tecnico.ulisboa.pt/files/sites/10/manual-de-seguranca-para-laboratorios.pdf**.**

Substance	Incompatible Products	Substance	Incompatible Products
Acetylene	Chlorine, bromine, fluorine, silver, copper, mercury and their derivatives	Phosphorus (white)	Air, oxygen, bases, reducing agents
Acetone	Nitric acid mistures and concentrated sulfuric acid	Hydrazine	Peroxides, nitric acid, all other oxidizing agents
Acetic Acid	Chromic acid, nitric acid, hydroxylated compounds, ethylene glycol, perchloric acid, peroxides, permanganates	Hydrocarbons	Fluorine, chlorine, bromine, chromic acid, peroxides
hydrocyanic Acid	nitric Acid, bases	Sodium hydroxide and potassium	Water, acids
Chromic acid and chromium trioxide	Acetic acid, camphor, glycerol, alcohols, other flammable liquids	Hypochlorite	Acids, Activated charcoal
Concentrated nitric acid	Acetic acid, acetone, alcohols, aniline, chromic acid, hydrocyanic acid, hydrogen sulphide, flammable liquids, flammable gases, copper, brass, heavy metals	Iodine	Acetylene, ammonia, ammonia, hydrogen
Oxalic Acid	Silver, mercury	Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, peroxide sodium, halogenated compounds
Perchloric Acid	Acetic anhydride, bismuth and bismuth alloys, alcohols, paper, wood, fats, oils	Mercury	Acetylene, ammoniac
Sulphuric Acid	Water, chlorates, perchlorates, permanganates, carbonates	Alkali metals	Water, carbon dioxide, carbon tetrachloride, chlorinated hydrocarbons, hydrogen
Ammoniac	Mercury, chlorine, hypochlorites, iodine, bromine, hydrogen fluoride, silver salts	Ammonium nitrate	Acids, finely divided metals, flammable liquids, nitrites, sulfur, finely divided organic substances or fuels

Aniline	Nitric acid, peroxides	Sodium nitrite	Ammonium nitrate, other ammonium salts, acids
Hydrazoic Acid	Acids	Calcium Oxide	Water
Bromo	Ammonia, acetylene, butadiene, butane, methane, propane (or other gaseous hydrocarbons), hydrogen, benzene, finely divided metals	Oxygen	Oils, fats, hydrogen, flammable materials
Activated charcoal	Hypochlorites, all oxidizing agents	Perchlorates	Acetic anhydride, bismuth and bismuth alloys, alcohols, paper, wood, fats, oils, acids, combustible materials
Hydrogen cyanide	Nitric acid, bases	Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, Sulfuric Acid
Chlorates	Ammonium salts, acids, finely divided metals, sulphur, organic substances finely divided or combustible	Hydrogen peroxide	Copper, chromium, iron, most metals and their salts, alcohols, organic matter, aniline, nitromethane, flammable liquids, combustible substances
Chlorine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, benzene, finely divided metals	Sodium peroxide	All oxidizing substances such as ethanol, methanol, glacial acetic acid, anhydride acetic, benzaldehyde, carbon sulfide, glycerol, ethylene glycol, ethyl acetate, methyl acetate, furfural
Copper	Acetylene, hydrogen peroxide	Phosphorus pentoxide	Water
Arsenic compounds	Any reducing agent	Potassium	Carbon tetrachloride, carbon dioxide, water
Fluorine	Isolate from all substances	Silver	Acetylene, oxalic acid, tartaric acid, ammonium compounds
Hydrogen fluoride	Ammonia and ammonia	Sodium	Carbon tetrachloride, carbon dioxide, water