



# OPERATIONAL GUIDELINES FOR THE MANAGEMENT OF SPECIAL HAZARDOUS WASTE

*October 2019*

## **OPERATIONAL GUIDELINES FOR THE MANAGEMENT OF SPECIAL HAZARDOUS WASTE**

This document describes the types of waste produced by the Unicam teaching and research activities, the methods of collection and management, the procedures for the delivery of special hazardous and sanitary waste, infectious and non-infectious, to Temporary Waste Storage.

### **AIMS**

The purpose of the following Guidelines is to provide instructions on conduct, to ensure that:

- All the waste produced is not dispersed in the environment;
- The current legislation on waste is respected;
- The waste management methods are homogeneous in all Unicam structures;
- The waste is transferred in a substantially and formally correct way to the Temporary Waste Storage present in every facility in which special hazardous waste is produced, in order to protect the health of employees, with respect for the environment and compliance with the current legislation.

### **SCOPE OF APPLICATION**

These Guidelines regulate the management of hazardous waste, medical waste, waste consisting of recyclable substances, packaging and packaging waste, not including:

- radioactive waste, as it is being regulated by specific legislation;
- liquids free of dangerous chemical and / or biological substances, introduced into the sewer system;
- management of special waste deriving from interventions on the technological systems present in the University buildings and areas, since it is the responsibility of the company in charge of running and managing those systems, as well as carrying out ordinary maintenance and extraordinary maintenance.

### **COMPLIANCE**

All University staff, including students and their equivalents, are required to comply with and apply the provisions of the following Guidelines.

Heads of Schools and Persons in Charge of various departments are required to prepare the necessary tools so that these provisions can be brought to the attention and applied by all employees, both permanent and temporary, involved in the waste disposal process.

## CLASSIFICATION AND CODING OF WASTE

**Waste:** any substance or object deriving from human activity or from natural cycles, which the holder disposes of, or has the intention or obligation to dispose of (Art. 183, Legislative Decree No. 152/2006).

Waste is classified (Art. 184, Paragraph 1, Legislative Decree No. 152/2006) by source, in the following categories:

- Municipal waste
- Special waste

and by hazardous properties, in the following categories:

- Non-hazardous waste
- Hazardous waste

**Municipal waste** (Art. 184, Paragraph 2, del Legislative Decree No. 152/2006):

- a) Household waste, including bulky items, from premises and spaces used for residential purposes;
- b) Non-hazardous waste from premises and spaces used for purposes other than those referred to in Letter a), regarded as equivalent to municipal waste in terms of quality and quantity, pursuant to Article 198, Paragraph 2, Letter g);
- c) Street sweeping debris;
- d) Waste of any nature and origin, found on or public roads or areas, or on private roads and areas intended for public use, or on sea and lake beaches and along banks of waterways;
- e) Vegetable waste deriving from green areas, such as gardens, parks and cemetery areas;
- f) Waste resulting from exhumations and disinterment, as well as other waste from cemetery activities other than those referred to in Letters b), c) and e).

**Special waste** (Art. 184, Paragraph 3, del Legislative Decree No. 152/2006):

- a) Waste resulting from agricultural and agro-industrial activities;;
- b) Waste resulting from demolition and construction activities, as well as waste resulting from excavation activities, without prejudice to the provisions of Art. 186;
- c) Waste resulting from industrial processes;
- d) Waste resulting from handicraft;
- e) Waste resulting from commercial activities;
- f) Waste resulting from service activities;
- g) Waste resulting from waste recovery and disposal operations, sludges resulting from water purification and other water treatments, and from wastewater treatment, and from scrubber systems;
- h) Waste resulting from healthcare activities;
- i) Deteriorated and obsolete machinery and equipment;
- j) End-of-life motor vehicles, trailers and the like, and parts thereof;
- k) Engine fuel derived from waste;

- l) Waste resulting from mechanical sorting of solid municipal waste.

**Hazardous waste** is defined as:

- special waste and non-household municipal waste, expressly marked as such by a specific asterisk in the EWC code (see definition below), said waste is classified as hazardous from the outset pursuant to Directive 2008/98/EC;
- waste the hazard of which depends on the concentration of hazardous substances and/or on the intrinsic hazardous properties, as described in the provisions of the Annex to Decision 2014/955/EU.

**Waste producer:** (Legislative Decree No. 152/2006, Art. 183) anyone whose activities produce waste or anyone who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of this waste. The waste producer is always the one who physically implements a specific activity from which waste is generated.

**Temporary storage:** facility intended for the temporary grouping of waste, pending their final disposal, at the place of the production (Art. 183, Paragraph 1, Letter m), Legislative Decree No. 152/2006.

**European Waste Catalogue (EWC):** a list of waste, subject to periodic review, which includes municipal waste, special hazardous and special non-hazardous waste, whether they are destined for disposal or for recovery operations. The European Union list of waste was incorporated in Italy starting from 01 January 2002, and transposed in Italy with two Measures reorganising the legislation on waste (Legislative Decree No. 152/2006 and Ministerial Decree of Ministry of the Environment dated 02 May 2006).

**EWC Codes:** six-digit numerical sequences, formatted as three pairs of numbers, used to identify waste as listed in the European Waste Catalogue.

- the first two digits identify the industrial category or type of business activity that produced the waste;
- the second two digits identify the individual processes within the industrial categories or activities that produced the waste;
- the last two digits identify the single type of waste produced. The EWC codes are divided into non-hazardous and hazardous, the latter are identified graphically with an asterisk \*, inserted after the digits.

## **MUNICIPAL WASTE - COLLECTION AND MANAGEMENT METHODS**

The waste produced in the research and teaching laboratories is always classified as special waste and therefore yellow and blue bags for the separate collection of municipal waste must not be present in these spaces. The same will be provided only in the offices, in the corridors, in the

refreshment areas and in toilets; in particular, in these areas special containers will be provided for them separate municipal waste collection, as described below:

- yellow bag, unsorted waste;
- blue bag, plastic and aluminium waste items;
- glass waste container;
- paper waste container;
- wet/organic waste container;
- in toilets, containers for the collection of sanitary towels.

## SPECIAL HAZARDOUS WASTE

Special hazardous waste produced by research and teaching activities must be classified with an EWC code, which is representative of the origin, the type of activity that generated it, hazardous and toxic properties, as can be deduced from Annex D, Part 4 of Legislative Decree No. 152 of 03 April 2006, which includes the list of hazardous waste in accordance with Article 1, letter a) of Directive 75/442/EEC on waste, and Article 1, paragraph 4 of Directive 91/689/EEC on hazardous waste, referred to in Commission Decision 2000/532/EEC of 03 May 2000 (Directive of the Ministry of the Environment and Territorial Protection of 09 April 2002).

Below is a non-definitive list of the main special hazardous waste generated in Unicam facilities, and the related EWC code (the asterisk indicates hazardous waste):

| TABLE 1   |                                                   |                                                                                   |                              |
|-----------|---------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------|
| EWC       | TYPE OF WASTE (EWC)                               | DESCRIPTION                                                                       | CONTAINERS                   |
| 06 01 06* | Other acids                                       | <i>mixtures or aqueous solutions of acids not attributable to a specific acid</i> | 15 l tanks                   |
| 06 02 05* | Other bases                                       | <i>mixtures or aqueous solutions of bases not attributable to a specific base</i> | 15 l tanks                   |
| 06 03 11* | Solid salts and solutions containing cyanides     |                                                                                   | White or recycling container |
| 06 03 13* | Solid salts and solutions containing heavy metals |                                                                                   | White or recycling container |
| 06 04 03* | Wastes containing arsenic                         |                                                                                   | White or recycling container |

|           |                                                                           |                                                                                                                                                                                                                                                                                                                                          |                                |
|-----------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| 06 04 04* | Wastes containing mercury                                                 |                                                                                                                                                                                                                                                                                                                                          | White or recycling container   |
| 06 04 05* | Wastes containing other heavy metals                                      |                                                                                                                                                                                                                                                                                                                                          | White or recycling container   |
| 07 07 03* | Organic halogenated solvents, washing liquids and mother liquors          | <i>halogenated and NOT halogenated solvents or mixtures</i>                                                                                                                                                                                                                                                                              | 15 l tanks                     |
| 07 07 09* | Halogenated filter cakes and spent absorbents                             | <i>spent GC and HPLC chromatography columns, TLC plates, various dehydrating agents, Celite, silica</i>                                                                                                                                                                                                                                  | 30 l barrel with a tie closure |
| 13 02 05* | Mineral-based non-chlorinated engine, gear and lubricating oils           | <i>spent mineral oils (pump lubricants, etc.)</i>                                                                                                                                                                                                                                                                                        | Recycled bottle                |
| 13 02 08* | Other engine, gear and lubricating oils                                   | <i>specify</i>                                                                                                                                                                                                                                                                                                                           | Recycled bottle                |
| 13 03 07* | Mineral-based non-chlorinated insulating and heat transmission oils       | <i>spent vaseline oil</i>                                                                                                                                                                                                                                                                                                                | Recycled bottle                |
| 13 03 10* | Other insulating and heat transmission oils                               | <i>spent silicone oils</i>                                                                                                                                                                                                                                                                                                               | Recycled bottle                |
| 15 01 10* | Packaging containing residues of or contaminated by hazardous substances. | <i>plastic, glass, and metal bottles or jars</i>                                                                                                                                                                                                                                                                                         | At the storage                 |
| 15 01 10* | Packaging containing residues of or contaminated by hazardous substances. | <i>Pasteur pipettes, glass test tubes, plastic test tubes and cuvettes, various vials, jars (empty plastic, glass or metal jars with reactive contents), capillaries for TLC and melting points, tips for micropipettes, glass or plastic syringes with needles, pieces of not recoverable broken glass, various dehydrating agents,</i> | 20 l plastic bucket            |

|           |                                                                                                                                                       |                                                                                                                                                          |                                                       |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| 15 02 02* | Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by hazardous substances | <i>used filter paper, disposable scrubs, gloves, dirty paper, paper used for cleaning glassware or work surfaces, various dehydrating agents</i>         | 60 l black plastic bucket or 60 l cardboard container |
| 16 03 07* | Metallic mercury                                                                                                                                      | <i>t h e r m o m e t e r s , s p h y g m o m a n o m e t e r s , c o n t a i n e r s w i t h m e t a l l i c m e r c u r y r e s i d u e s , e t c .</i> | White or recycling container                          |
| 16 05 04* | Gases in pressure containers (including halons) containing hazardous substances                                                                       | <i>gas cylinders not managed by the internal storage</i>                                                                                                 | At the storage                                        |
| 18 02 02* | Wastes whose collection and disposal is subject to special requirements in order to prevent infection.                                                | <i>also needle containers</i>                                                                                                                            | 60 l cardboard container                              |
| 19 09 05  | Saturated or spent ion exchange resins                                                                                                                |                                                                                                                                                          | At the storage                                        |
| 16 05 06* | Discarded reagents, inorganic substances, metal-organic compounds, solid organic substances, inorganic salts in general                               | <i>fill-in Attachment 1</i>                                                                                                                              | At the storage                                        |

## SPECIAL HAZARDOUS WASTE - COLLECTION AND DISPOSAL PROCEDURES

The research and teaching laboratories that produce special hazardous waste must be equipped with special, approved containers, suitable for receiving waste resulting from normal teaching or research activities (one for each type of waste with different EWC code). These containers must be correctly identified as waste containers, in particular they must bear a label bearing a black letter "R" on a yellow background, and one with the EWC code of the waste (as per table 1), the description of the specific type and the indication of hazard. These containers must be kept in a suitable place, closet, or hood, or work surface, having the safety characteristics suited to the hazardous nature of the waste, preferably in anti-spill trays of suitable capacity necessary to contain accidental spillage of the contents. These custody areas must be well identified and appropriately marked, by means of appropriate signs and signage (*see examples at the bottom of the document*).

Once the waste container has been filled and closed, the Laboratory Manager / Activity Manager shall send it to the Waste Management Coordinator, attaching the Waste Disposal Form (available in electronic format, see *compilation instructions*), duly completed and signed. The Waste Management Coordinator shall affix a unique code both on the container delivered, and on the

form, so as to guarantee the traceability of the waste, and shall return a copy of the countersigned form.

**Attention!!** Bulging, overfilled containers, containers with spills or leaks, or dirty on the outside, shall not be accepted.

*Note: The various types of approved containers required for the various types of waste that can be placed in Unicam Temporary Waste Storages, as well as labels with indications of waste and hazard to be affixed to these containers are available in the various Temporary Waste Storages.*

## DISPOSAL OF REAGENTS - SOLID OR LIQUID CHEMICALS IN THE ORIGINAL PACKAGING

In the case of **disposal of discarded or no-longer-used reagents** (EWC code 16 05 06\* - Discarded reagents, inorganic substances, metal-organic compounds, solid organic substances, inorganic salts in general), the disposal procedure must be as follows: the products must be in the original, clean and well-closed packaging, the label of which shows at least the name of the product or the CAS registry number. These products must be put in an open cardboard and delivered to the Waste Management Coordinator.

In this case, ***the Waste Disposal Form must be accompanied by a list, exclusively in electronic format (attachment 1), containing the names and characteristics of the products disposed of, compiled as per instructions.***

**Unknown products of any kind may not be disposed of.** In the event that the product is not identifiable because the label is deteriorated or non-existent, the owner of the product must necessarily identify the unknown substance through appropriate analyses.

The disposal shall be carried out, in accordance with the provisions of the legislation in force, following the procedures and times agreed with the company appointed by Unicam for collection, transport and disposal of waste.

**Note:** ***Material safety data sheets (MSDS) of all products held and used must be present in the laboratories. This information is essential not only for the safe use of the substances, but also for the correct management of laboratory residues and their subsequent classification as waste. From the sheet, it is possible to obtain information regarding the level of hazard related to the products (SECTION 2: Hazards identification), information on disposal (SECTION 13: Disposal considerations), and information on transport (SECTION 14: Transport information).***

## CORRECT DISPOSAL OF PLASTIC, GLASS OR METAL BOTTLES OR JARS USED IN LABORATORIES

The containers that contained hazardous substances are, by law, assimilated to the content and may not be sent for recycling (municipal separate collection of glass and plastic).

Once emptied of their contents, these containers can be sent to the Temporary Waste Storage, closed with the original cap. Check that the containers are always tightly closed and not contaminated externally. In the Waste Disposal Form, it will be sufficient to indicate the number of containers disposed of and not the weight.

**Attention!!** Containers with an evident liquid or solid residue inside shall not be accepted.

## **SCHEDULES FOR THE DISPOSAL OF WASTE AT TEMPORARY WASTE STORAGEES**

The Waste Management Coordinator shall establish, in agreement with the Director of the School / Head of the Production Structure, a schedule for the disposal of waste and the delivery of empty containers. Wastes may only be disposed of in the presence of the Waste Management Coordinator or his/her delegate.

## **TONER AND CARTRIDGES FOR PRINTERS**

Methods of collection and management

- toners and cartridges must be removed from the cardboard containers, and closed with adhesive tape in appropriate plastic bags;
- bags containing the used toner must be stored in the special plastic-coated cardboard boxes available in the facilities (ask for the various locations at the concierge offices);
- the cardboard packaging (box) of the used toner or the new toner that has replaced it, must never be placed in the container for the collection of used toner ,but must be placed in the container for the collection of paper and cardboard.

## **WARNING**

**The Waste Management Coordinator is required to report to the School Directors any formal or substantial errors, as well as behaviours that are not in line with the national legislation on the matter and with these Guidelines.**

## **MAIN RISKS ASSOCIATED WITH THE HANDLING AND STORAGE OF CHEMICAL WASTE – INCOMPATIBILITIES**

In the chemical waste collection operations, all the precautions that normally take place in the handling and storage of dangerous chemical agents must be adopted: in particular, it is important to pay attention to compliance with the criteria of “compatibility” between the various substances. Remember that the definition "incompatible chemicals" refers to those substances that can:

- produce violent reactions;
- result in chemical reactions producing a significant amount of heat;
- result in chemical reactions causing the formation of flammable products;
- result in chemical reactions causing the formation of toxic products.

It is therefore essential that all necessary measures are taken so that these agents **cannot** inadvertently **come into contact**, both during normal laboratory activities, and at the time of disposal.

Avoid placing in the same container different types of waste for which the absence of “incompatibility” between the chemical agents they contain has not been verified.

Some of the main measures to be taken are summarized below.

In principle, you should:

- dispose of strong acids and bases separately, avoiding mixing them with other substances or with each other. Do not attempt dilution with water or other solvents.
- handle with care and dispose of the picric acid solutions separately.
- do not let the solutions dry.
- not mix oxidizing substances with combustible substances.

In any case, NEVER MIX:

- activated carbon with hypochlorites or other strong oxidants.
- alkaline metals with water, CCl<sub>4</sub>, CO<sub>2</sub>, halogens.
- aluminium compounds (alkyls) with water.
- ammonia with mercury, chlorine, hypochlorite, iodine, hydrofluoric acid.
- chlorates with ammonium salts, acids, metals, sulphur, fuels.
- chromium and manganese or their compounds with acetic acid, naphthalene, camphor, glycerol, ethers, alcohols, fuels.
- copper and its compounds with hydrogen peroxide.
- cyanides with acids.
- hydrogen peroxide with copper, chromium, iron, metals and metal salts, alcohols, acetone, organic materials, aniline, nitro methane, with other flammable substances.

Some of the most important risks associated with Temporary Waste Storage are the following:

- improper storage of formaldehyde, in environments without natural ventilation and in containers that are not perfectly sealed.
- mercury stored in porous containers, which continues to evaporate.
- improper storage of perchloric or picric acid, with risk of explosion.
- combination of azide with metals (Cu, Pb) or ammonium, which can form explosive residues in the dry state.
- organic solvents that vaporize.
- storage in unsealed containers of substances that release gas in contact with moisture (risk phrase R15 - H260-H261).
- storage of aggressive substances (e.g. fuming acids, strong alkalis, solvents) in containers that do not offer adequate resistance properties to the substances (check the safety data sheet before changing the container).

| <b>Incompatible chemicals</b><br><b>(main incompatibilities - non-exhaustive list of examples)</b> |                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Acetaldehyde</b>                                                                                | with acids, bases, halogens, strong oxidants, amines, hydrogen cyanide, alcohols, ketones, anhydrides. In contact with air it can form explosive peroxides.                                                                                                                           |
| <b>Acetylene</b>                                                                                   | with copper, chlorine, bromine, iodine, silver, fluorine, mercury and its salts, ammonia, halogenated solvents and strong oxidants.                                                                                                                                                   |
| <b>Acetone</b>                                                                                     | with chloroform, chromic anhydride, nitric acid, sulfuric acid, chlorates, peroxides, permanganates.                                                                                                                                                                                  |
| <b>Acetonitrile</b>                                                                                | with strong oxidants such as chlorine, bromine, fluorine, sulfuric and chlorosulphuric acid, perchlorates, alkaline metals, nitric acid.                                                                                                                                              |
| <b>Acetic acid</b>                                                                                 | with chromic acid, nitric acid, ethylene glycol, perchloric acid, peroxides and permanganates, ammonia, acetaldehyde.                                                                                                                                                                 |
| <b>Hydrogen cyanide</b>                                                                            | with strong oxidants, hydrochloric acid in an alcoholic mixture, acetaldehyde, sodium and calcium hydroxide, sodium carbonate.                                                                                                                                                        |
| <b>Hydrochloric acid</b>                                                                           | with bases, oxidants, alkaline metals, acetic anhydride, amines, aldehydes, halogenated, potassium permanganate, fluorine.                                                                                                                                                            |
| <b>Chromic acid</b>                                                                                | with acetic acid, acetic anhydride, acetone, alcohol, camphor, flammable liquids.                                                                                                                                                                                                     |
| <b>Nitric acid (concentrate)</b>                                                                   | reacts violently with fuels and reducing agents, hydrogen sulphide, turpentine, amines and ammonia, bases, alkaline metals, peroxides.                                                                                                                                                |
| <b>Oxalic acid</b>                                                                                 | with strong oxidants, silver and its compounds, alkaline metals, alkalis, sodium hypochlorite, chlorates.                                                                                                                                                                             |
| <b>Perchloric acid</b>                                                                             | with acetic acid, acetic anhydride, bismuth and its alloys, alcohol, paper, wood, fats, strong bases, metals, acetonitrile, sulfoxides, trichlorethylene. It can cause an explosion if heated. Contact with alcohols, glycols or polyhydroxy compounds generates explosive compounds. |
| <b>Picric acid</b>                                                                                 | with copper, lead, zinc, violent reaction with oxidants (chlorates, nitrates) and reducing materials. May explode if heated.                                                                                                                                                          |
| <b>Hydrogen sulphide</b>                                                                           | with acetaldehyde, barium pentafluoride, chromic anhydride, copper, lead oxide, chlorine monoxide, sodium peroxide                                                                                                                                                                    |
| <b>Sulfuric acid</b>                                                                               | with chlorates, chlorides, iodides, perchlorates, permanganates, peroxides and water, picrates, metal powder, fuels, phosphorus (III) oxides, anilines.                                                                                                                               |
| <b>Alcohols and Polyols</b>                                                                        | with nitric, perchloric, chromic, sulfuric acid, and amines.                                                                                                                                                                                                                          |

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|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Anhydrous ammonia</b>                 | with chloronitrobenzene, mercury, halogens, hypochlorites, iodine, bromine, fluorine and halides. Attacks copper, aluminium, zinc, silver, cadmium, iron and their alloys.                        |
| <b>Ammonium chloride</b>                 | with acids, alkalis, silver and its salts.                                                                                                                                                        |
| <b>Ammonium hydroxide</b>                | with strong oxidants, acids, halogens, mercury, silver, hypochlorites, ethyl alcohol. Attacks copper, aluminium, zinc and their alloys.                                                           |
| <b>Ammonium nitrate</b>                  | with acids, metal powders, sulphur, chlorates, nitrates, finely pulverized organic compounds, fuels, flammable liquids.                                                                           |
| <b>Acetic anhydride</b>                  | with alcohols, chromic acid, amines, strong acids and bases, water, hydrogen peroxide, powdered metals, potassium permanganate, aniline.                                                          |
| <b>Aniline</b>                           | with halogens, strong acids, acetic anhydride, sodium peroxide, alkaline and alkaline earth metals, iron salts, zinc.                                                                             |
| <b>Silver and salts</b>                  | with acetylene, oxalic acid, tartaric acid, ammonia, hydrogen peroxide, bromine azide.                                                                                                            |
| <b>Nitrate silver</b>                    | with acetylene, alkalis, ammonia, hydrogen peroxide, antimony, halides, alcohols.                                                                                                                 |
| <b>Arsenic (materials containing it)</b> | with acids, oxidizing agents (chlorates, bichromates, permanganates), silver nitrate, azides.                                                                                                     |
| <b>Azides</b>                            | with water, acids, copper, lead, silver, magnesium, halogenated solvents. Do not heat up.                                                                                                         |
| <b>Bromine</b>                           | with ammonia, acetylene, acetaldehyde, acrylonitrile, finely pulverized metals (aluminium, mercury, titanium, iron, copper), alcohols.                                                            |
| <b>Calcium</b>                           | with water, halogenated hydrocarbons, acids, alkali hydroxides (lithium, sodium, potassium), lead chloride.                                                                                       |
| <b>Activated carbon</b>                  | with all oxidizing agents, calcium hypochlorite.                                                                                                                                                  |
| <b>Carbon disulphide</b>                 | with sodium, potassium, zinc, azides, amines, halogens.                                                                                                                                           |
| <b>Cyanides</b>                          | with acids, alkalis, amines, alcohols, strong oxidants, glycols, phenols, cresols, chloral hydrate, metal salts, iodine, peroxides.                                                               |
| <b>Chlorates</b>                         | with ammonium salts, acids, metal powders, sulphur, finely pulverized combustible substances.                                                                                                     |
| <b>Chlorine</b>                          | with ammonia, acetylene, ether, butadiene, butane, benzene, petrol and other petroleum derivatives (methane, propane, ethane), hydrogen, sodium carbide, turpentine and finely pulverized metals. |
| <b>Chloroform</b>                        | with sodium, potassium, magnesium, aluminium, zinc, lithium, strong bases and strong oxidants.                                                                                                    |

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| <b>Aluminium chloride</b>             | with water, alcohol, nitrobenzene, alkenes.                                                                                                                                                                                                  |
| <b>Dichloromethane</b>                | with aluminium and magnesium powders, strong bases and strong oxidants.                                                                                                                                                                      |
| <b>Chlorine dioxide</b>               | with mercury, phosphorus, sulphur, potassium hydroxide.                                                                                                                                                                                      |
| <b>Hexane</b>                         | with strong oxidants, nitrogen tetroxide.                                                                                                                                                                                                    |
| <b>Fluorine</b>                       | with organic compounds, water, nitric acid, reducing agents, ammonia.                                                                                                                                                                        |
| <b>Hydrogen fluoride</b>              | with ammonia (anhydrous or in aqueous solution), bases, acetic anhydride, aliphatic amines, alcohol.                                                                                                                                         |
| <b>Phosphorus (white / yellow)</b>    | with air, alkalis, oxidizing agents, sulphur, halogens, aldehydes.                                                                                                                                                                           |
| <b>Hydrazine</b>                      | with hydrogen peroxide, acids, halogens, metal oxides and porous materials.                                                                                                                                                                  |
| <b>Hydrocarbons</b>                   | with fluorine, chlorine, bromine, formic acid, chromic acid, sodium peroxide, peroxides, benzene, butane, propane, petrol, turpentine.                                                                                                       |
| <b>Iodine</b>                         | with acetylene and ammonia (anhydrous or in aqueous solution), other strong bases, acetaldehyde, antimony, lithium, potassium, metal powders, halides, oils. Quickly corrodes rubber and plastics.                                           |
| <b>Calcium hypochlorite</b>           | with acids, amines, acetylene, carbon tetrachloride, iron oxide, methanol, formic acid, ammonium salts. Reacts violently with ammonia, amines, nitrogen compounds, causing explosion hazard. Attacks many metals forming explosive mixtures. |
| <b>Sodium hypochlorite</b>            | with acids, ammonia, ethanol.                                                                                                                                                                                                                |
| <b>Flammable liquids</b>              | with ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide and halogens.                                                                                                                                           |
| <b>Mercury</b>                        | with acetylene, azides, chlorine, chlorine dioxide, hydrogen, ammonia, alkaline metals, ethylene oxide.                                                                                                                                      |
| <b>Nitrates and nitrites</b>          | with combustible and reducing materials.                                                                                                                                                                                                     |
| <b>Nitrocellulose / Nitroparaffin</b> | with alkaline materials, strong acids and strong oxidants, amines, metals.                                                                                                                                                                   |
| <b>Calcium dioxide</b>                | with reducing agents.                                                                                                                                                                                                                        |
| <b>Oxygen</b>                         | with various organic, combustible and reducing materials.                                                                                                                                                                                    |
| <b>Phosphorus pentoxide</b>           | with water, strong bases, perchloric acid, hydrofluoric acid, formic acid, potassium, sodium, ammonia, peroxides, magnesium.                                                                                                                 |
| <b>Potassium perchlorate</b>          | with sulfuric acid and other acids, acetic anhydride, bismuth and its derivatives, alcohol, paper, wood, fats and organic oils.                                                                                                              |

|                                          |                                                                                                                                                                                   |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Potassium permanganate</b>            | with glycerine, ethylene glycol, propylene glycol, sulfuric acid, hydroxylamine, combustible materials, powdered metals, peroxides, zinc and copper.                              |
| <b>Organic peroxides</b>                 | with acids (organic or mineral), most metals and fuels (avoid chafing and high temperatures).                                                                                     |
| <b>Hydrogen peroxide</b>                 | with chromium, copper, iron, most other metals and their salts, flammable liquids and other combustible products, aniline, nitromethane, some strong acids such as sulfuric acid. |
| <b>Sodium peroxide</b>                   | with water, acids, powdered metals, organic compounds, (combustible and reducing materials).                                                                                      |
| <b>Potassium</b>                         | with water, carbon tetrachloride, carbon dioxide, chloroform, dichloromethane.                                                                                                    |
| <b>Copper</b>                            | with acetylene, azide, ethylene oxide, chlorates, bromates, iodates.                                                                                                              |
| <b>Copper sulphate</b>                   | with acetylene, nitromethane, strong bases, magnesium, sodium, zirconium, hydrazine, hydroxylamine, powdered metals, strong reducing agents.                                      |
| <b>Sodium</b>                            | with water, halogenated hydrocarbons, phosphorus and its compounds, sulphur and its compounds.                                                                                    |
| <b>Sodium azide</b>                      | with lead, copper, silver and other metals, potassium hydroxide, benzoyl chloride, acids, carbon disulphide, bromine. May explode when heated.                                    |
| <b>Sodium nitrate</b>                    | with reducing agents, metal powders, carbon, aluminium oxide, phenol. It can cause ignition of combustible materials. Do not heat solutions with other substances.                |
| <b>Sodium nitrite</b>                    | with aluminium, ammonium compounds, amines, metal powders. It can cause ignition of combustible materials.                                                                        |
| <b>Selenium and selenium fluorides</b>   | with oxidizing agents, strong acids, cadmium, chromic acid, phosphorus, some metals (nickel, zinc, sodium, potassium, platinum).                                                  |
| <b>Sulphides</b>                         | with acids.                                                                                                                                                                       |
| <b>Tellurium and tellurium fluorides</b> | with halogens, acids, zinc, cadmium.                                                                                                                                              |
| <b>Carbon tetrachloride</b>              | with sodium, potassium, aluminium, magnesium, barium, allyl alcohol, oxidizing agents in general.                                                                                 |
| <b>Sulphur</b>                           | with halogens, phosphorus, sodium, tin, ammonium nitrate, ammonia.                                                                                                                |

Sources: Pohanish R.P. *"Toxic and Hazardous Chemicals and Carcinogens"* William Andrew, the 2008 edition

Merck Chemicals Italy, *material safety data sheets (MSDS)*

Sigma-Aldrich, *material safety data sheets (MSDS)*

## HAZARDOUS WASTE DISPOSAL FORM

|                                               |                   |                                        |                                                   |                                      |                                |                    |          |  |
|-----------------------------------------------|-------------------|----------------------------------------|---------------------------------------------------|--------------------------------------|--------------------------------|--------------------|----------|--|
| SCHOOL OF .....                               |                   |                                        |                                                   | STORAGE NO. ....                     |                                |                    |          |  |
| BUILDING .....                                |                   | ROOM NO. ....                          |                                                   | WASTE DISPOSAL FORM NO. ....         |                                |                    | .....    |  |
| PRODUCER                                      |                   |                                        |                                                   | LABORATORY MANAGER                   |                                |                    |          |  |
| .....                                         |                   |                                        |                                                   | .....                                |                                |                    |          |  |
| S/N                                           | WASTE DESCRIPTION | EWC                                    | CONT. ID NO.                                      | Physical State                       | QTY in kg, or<br>no. of pieces | STORAGE BIN<br>NO. | INT. NO. |  |
|                                               |                   |                                        |                                                   |                                      |                                |                    |          |  |
|                                               |                   |                                        |                                                   |                                      |                                |                    |          |  |
|                                               |                   |                                        |                                                   |                                      |                                |                    |          |  |
|                                               |                   |                                        |                                                   |                                      |                                |                    |          |  |
|                                               |                   |                                        |                                                   |                                      |                                |                    |          |  |
|                                               |                   |                                        |                                                   |                                      |                                |                    |          |  |
|                                               |                   |                                        |                                                   |                                      |                                |                    |          |  |
|                                               |                   | 16 05 06*                              | FOR THIS TYPE OF WASTE, ALSO FILL-IN ATTACHMENT 1 |                                      |                                |                    |          |  |
| <b>SCHEDULE FOR DISPOSAL OF SPECIAL WASTE</b> |                   |                                        |                                                   |                                      |                                |                    |          |  |
| Days: .....                                   |                   |                                        |                                                   | Time: from ..... to .....            |                                |                    |          |  |
| DATE .....                                    |                   | SIGNATURE OF PERSON<br>IN CHARGE ..... |                                                   | SIGNATURE OF STORAGE<br>WORKER ..... |                                |                    |          |  |
|                                               |                   |                                        |                                                   |                                      |                                |                    |          |  |

The waste disposal form will be made available in electronic format (Excel), it must be completed as per the following instructions, printed and delivered together with the waste. A copy of the form shall constitute a receipt!

To make the service as efficient as possible, the following rules must be observed:

- a signed waste disposal form must accompany the waste delivered to the storage (waste will not be accepted without the form filled in and signed by the person in charge).
- all fields, except those indicated in point 8, must be filled-in electronically.
- schedules for waste disposal indicated on the form must be respected.



## Hazardous waste disposal form compilation instructions

SELECT BUILDING NAME  
FROM THE DROP-DOWN LIST

ENTER ROOM NO. OF THE  
PLACE OF WASTE  
PRODUCTION

WRITE OR SELECT FROM THE DROP-  
DOWN LIST THE NAME OF THE PERSON  
IN CHARGE OF WASTE PRODUCTION

WRITE OR SELECT FROM  
THE DROP-DOWN LIST THE  
WASTE PRODUCER GRUPPO

|                                        |                   |                                                   |                           |                  |                                |                    |          |
|----------------------------------------|-------------------|---------------------------------------------------|---------------------------|------------------|--------------------------------|--------------------|----------|
| SCHOOL OF .....                        |                   |                                                   |                           | STORAGE NO. .... |                                |                    |          |
| BUILDING                               | ROOM NO.          | WASTE DISPOSAL FORM NO.                           |                           | .....            |                                |                    |          |
| PRODUCER                               |                   |                                                   | LABORATORY MANAGER        |                  |                                |                    |          |
| .....                                  |                   |                                                   | .....                     |                  |                                |                    |          |
| S/N                                    | WASTE DESCRIPTION | EWC                                               | CONT. ID NO.              | Physical State   | QTY in kg, or<br>no. of pieces | STORAGE BIN<br>NO. | INT. NO. |
|                                        |                   |                                                   |                           |                  |                                |                    |          |
|                                        |                   |                                                   |                           |                  |                                |                    |          |
|                                        |                   |                                                   |                           |                  |                                |                    |          |
|                                        |                   |                                                   |                           |                  |                                |                    |          |
|                                        |                   |                                                   |                           |                  |                                |                    |          |
|                                        |                   |                                                   |                           |                  |                                |                    |          |
|                                        |                   |                                                   |                           |                  |                                |                    |          |
|                                        |                   |                                                   |                           |                  |                                |                    |          |
| 16 05 06*                              |                   | FOR THIS TYPE OF WASTE, ALSO FILL-IN ATTACHMENT 1 |                           |                  |                                |                    |          |
| SCHEDULE FOR DISPOSAL OF SPECIAL WASTE |                   |                                                   |                           |                  |                                |                    |          |
| Days: .....                            |                   |                                                   | Time: from ..... to ..... |                  |                                |                    |          |
| DATE                                   |                   | SIGNATURE OF PERSON<br>IN CHARGE                  |                           |                  | SIGNATURE OF STORAGE<br>WORKER |                    |          |
|                                        |                   |                                                   |                           |                  |                                |                    |          |

SELECT FROM THE DROP-DOWN  
LIST THE EWC CODE INDICATED  
ON THE CONTAINER

WRITE THE BIN  
CODE

SELECT FROM THE DROP-  
DOWN LIST THE PHYSICAL  
STATE OF THE WASTE

TO BE FILLED-IN AT THE  
STORAGE

IN THIS RECORD THE SINGLE VALUE  
AVAILABLE IN THE DROP-DOWN LIST  
MUST BE ENTERED

In the waste disposal form in Excel format, some boxes contain a drop-down list with several denominations proposed, the drop-down list is activated by an arrow located at the bottom right

of the box. If the denomination to be written in the box is present, select it, otherwise write a different denomination.

1. Select from the drop-down list the name of the building in the field **"BUILDING"**;
2. Write the room no. of the place of waste production in the field **"ROOM NO."**;
3. Write or select from the drop-down list the name of the waste producer in the field **"PRODUCER"**;
4. Write or select from the drop-down list the name of the person in charge of waste production in the field **"LABORATORY MANAGER"**;
5. Select from the drop-down list the EWC code indicated on the container, in the field **"EWC"**, the fields **"WASTE DESCRIPTION"** and **"S/N"** shall be automatically filled, and the null writings shall be deleted from the fields: **"Q. TY or pcs ..."**, **"STORAGE BIN NO."** and **"INT. NO."**;

In the **"EWC"** field, only elements present in the drop-down list can be entered, 6 rows are available to insert 6 different containers; if more than 6 containers are to be disposed of, another form must be filled in;

6. Select from the drop-down list the physical state of the waste in the field **"Physical state"**;
7. Write the bin code in the field **"CONT. ID NO."**;
8. The 4 remaining fields: **"Q. TY. or pcs ..."**, **"STORAGE BIN NO."**, **"INT. NO."** and **"WASTE DISPOSAL FORM NO."** shall be filled-in by hand (using a pen) at the storage;
9. In the last row of the **"EWC"** field, only the value proposed from the drop-down list can be entered and if the value is entered, ATTACHMENT 1 must be filled-in.

The form in Excel format is made up of two identical sections, filling in the first section automatically fills-in the second section.

### EXAMPLE OF CORRECT COMPILATION OF THE FORM

| SCHOOL OF SCIENCES AND TECHNOLOGY STORAGE NO. 5                                                                         |                                                             |                                                                                     |                                              |                                                                                       |                 |           |   |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|-----------------|-----------|---|
| BUILDING<br>HISTORICAL                                                                                                  |                                                             | ROOM NO.<br>0                                                                       | WASTE DISPOSAL FORM NO.                      |                                                                                       | 215065          |           |   |
| PRODUCER<br>John                                                                                                        |                                                             |                                                                                     |                                              | LABORATORY MANAGER<br>Doe                                                             |                 |           |   |
| S/N                                                                                                                     | WASTE DESCRIPTION                                           | EWC.                                                                                | CONT. ID NO.                                 | Ph. st. of pcs.                                                                       | STORAGE BIN NO. | INT. NO.  |   |
| X                                                                                                                       | Metallic mercury EWC 16 03 07*                              | 16 03 07*                                                                           | xxxxx                                        | L                                                                                     | 1               | Ris. dep. | 1 |
| X                                                                                                                       | Gas cylinders not managed by the int. storage EWC 16 05 04* | 16 05 04*                                                                           | yyyyy                                        | G                                                                                     | 2               | Ris. dep. | 1 |
| X                                                                                                                       | Spent ion exchange resins EWC 19 09 05                      | 19 09 05                                                                            | zzzzz                                        | S                                                                                     | 3               | Ris. dep. | 2 |
| X                                                                                                                       | Spent Vaseline oil EWC 13 03 07*                            | 13 03 07*                                                                           | kkkkk                                        | L                                                                                     | 5               | Ris. dep. | 5 |
| X                                                                                                                       | Spent silicone oils EWC 13 03 10*                           | 13 03 10*                                                                           | jjjjj                                        | L                                                                                     | 8               | Ris. dep. | 1 |
| X                                                                                                                       | Spent mineral oils (pump lubricants, etc.) EWC 13 02 05*    | 13 02 05*                                                                           | wwwww                                        | L                                                                                     | 7               | Ris. dep. | 6 |
| Discarded reagents, inorganic substances, metal-organic compounds, solid organic substances, inorganic salts in general |                                                             | 16 05 06*                                                                           | FOR THIS TYPE OF WASTE, FILL-IN ATTACHMENT 1 |                                                                                       |                 |           |   |
| <b>(SCHEDULE FOR DISPOSAL OF SPECIAL WASTE)</b>                                                                         |                                                             |                                                                                     |                                              |                                                                                       |                 |           |   |
| MONDAYS AND FRIDAYS                                                                                                     |                                                             |                                                                                     |                                              | FROM 11:00 A.M. TO 12:00 P.M.                                                         |                 |           |   |
| DATE                                                                                                                    |                                                             | SIGNATURE OF PERSON IN CHARGE                                                       |                                              | SIGNATURE OF STORAGE WORKER                                                           |                 |           |   |
| martedì 3 ottobre 2017                                                                                                  |                                                             |  |                                              |  |                 |           |   |

Note: The EWC codes marked in the list with an asterisk (\*) are hazardous waste. Attention!! Bulging, overfilled containers, containers with spills or leaks, or dirty on the outside, shall not be accepted. If bulging or spilling of the container occur after the disposal at the storage, the producer shall be liable for the damage caused.







## Examples of signage for waste collection

### SPECIAL HAZARDOUS WASTE CHEMICAL WASTE

**EWC 070703\*** HALOGENATED organic solvents, ...  
liquid waste

#### Allowed waste:

halogenated organic solvents, mixtures of halogenated organic solvents (chloroform, dichloromethane, trichloroacetic acid, ...)

Put the liquid substances in 20 l white tank, using the special funnel in order not to spill even small quantities of waste outside the tank.



### SPECIAL HAZARDOUS WASTE CHEMICAL WASTE

**EWC 070709\*** HALOGENATED filter cakes and spent  
absorbents – solid waste

Put the contaminated material in the bag placed in the specific 60 l drum, taking care not to contaminate the edges of the drum, or other objects.



contaminated tips



contaminated paper



cloths



syringe filters



filters



gloves

### SPECIAL HAZARDOUS WASTE SANITARY WASTE WITH INFECTION RISK

human



animal



Contaminated material from potentially hazardous biological sources

Unique **EWC** code **180202\***

Once autoclaved, put the contaminated material in the autoclave bag placed in the specific drum marked with the Biohazard symbol