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TITLE: **Hazardous laboratory waste classification**

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1. OBJECT

Define the classification groups for hazardous laboratory waste, in accordance with current regulations, to ensure their correct identification and that they receive the appropriate type of management according to their composition.

2. SCOPE

Centres, departments and services of the University of Barcelona that generate toxic and hazardous waste, both chemical and biological, in its teaching, research and / or artistic creation activities.

Any person who generates special laboratory waste is affected by the instruction, as well as personnel with specific responsibility for the management of this type of waste (see the hazardous laboratory waste management procedure, P.MA.4.4.6/002).

3. DEFINITIONS

The definitions contained in the hazardous laboratory waste management procedure (P.MA.4.4.6/002) are valid for this work instruction.

4. REFERENCES

Hazardous laboratory waste management procedure (P.MA.4.4.6/002).

5. DEVELOPMENT

The achievement of the objectives of the management system is guaranteed by the characterization of waste, following a classification system based on regulatory, economic and safety criteria.

In accordance with Law 22/2011, on waste, all those that have one or more of the characteristics listed in Annex III are considered hazardous waste: explosive, oxidizing, easily flammable, flammable, irritating, harmful, toxic, carcinogenic, corrosive, infectious, toxic to reproduction, mutagenic, emitting toxic or very toxic gases on contact with air, water or an acid, sensitizing, ecotoxic, and waste susceptible, after disposal, to give rise to another substance which possesses any of the above characteristics by any means, for example, a leachate.

5.1. CLASSIFICATION SYSTEM

Depending on the type of waste present in the laboratories of the UB, there are two categories:

- Chemical waste.
- Sanitary waste

5.1.1. CHEMICAL WASTE

All those toxic and dangerous substances handled in the workshop or laboratory that, due to their composition, pose a risk to health and / or the environment. They are classified in the following groups:

1. Halogenated compounds Organic products that contain more than 2% of some halogen (chlorine, bromine, fluorine). Within this group, waste is differentiated between:	*Examples*
1.1. *Halogenated solvents:* Liquids with more than 2% halogens, mixtures of halogenated solvent and water, and halogenated solvents with an acid content of less than 10%.	Chloroform, methylene chloride, per-chloroethylene, etc.
1.2. *Halogenated organic solids. S*olids and organic salts with more than 2% of halogens.	Bisbenzimide, dichlorofluoromethane, methyl methacrylate, etc.
1.3. *Halogenated organic acids.* Halogenated acids, and mixtures and solutions of halogenated solvents with an acid content exceeding 10%).	Mono-, di- and trichloroacetic acids, trifluoroacetic acids, etc.
2. Non-halogenated compounds Flammable organic products with less than 2% of halogens. Within this group, waste is differentiated into different containers:	*Examples*
2.1. *Non-halogenated solvents.* Liquids with less than 2% of halogens, mixtures of non-halogenated solvent and water, and non-halogenated solvents with an acid content of less than 10%.	In general, alcohols (ethanol, ethylene glycol), aldehydes (glutaraldehyde, acetaldehyde), nitriles (acetonitrile), aliphatic hydrocarbons (hexane).
2.2. *Non-halogenated organic solids.* Solids and organic salts with less than 2% of halogens.	Potassium acetate, anthracene, diphenylamine, naphthalene, etc.
2.3. *Non-halogenated organic acids.* Non-halogenated organic mixtures and solutions with an acid content exceeding 10%).	Acetic acid, benzoic acid, EDTA, glycine, etc.
3. Organic or high COD solutions Organic or high-oxygen aqueous solutions, such as	*Examples*
— dyes	Methyl orange, phenolphthalein
— organic fixatives	
— aqueous chromatographic effluents, or	
— acidic aqueous solutions (very dilute)	Water + methanol + acetic acid
4. Inorganic compounds Solutions containing metallic and non-metallic inorganic compounds. Within this group, waste is differentiated into different containers:	*Examples* *Fasteners* from the photographic developing process are included.
4.1. *Heavy metals.* Solid or dissolved residues of these metals, and salts of these elements.	Arsenic, copper, lead, zinc, etc., except those classified as CMR (carcinogenic, mutagenic or toxic to reproduction), which go to group 14.
4.2. *Other metals.* Solid or dissolved residues of these metals, and salts of these elements.	Alkali or alkaline earth metal sulphates, phosphates and carbonates.
4.3. *Non-metallic compounds.* Solid or dissolved residues of non-metallic inorganic compounds and salts of these elements.	Sulphates, phosphates and carbonates of non-metallic inorganic compounds.

5. Inorganic acids	*Examples*
Inorganic acids and their aqueous solutions.	Hydrochloric acid, glacial acetic acid, sulfuric acid, nitric acid, etc.
Within this group, waste is differentiated between:	
5.1. *Concentrated acids.* Those with an acid concentration greater than 10%.	
5.2. *Diluted acids.* Acidic solutions with an acid concentration of less than 10%.	Developers from the photographic developing process are included.
5.3. *Acid solutions of heavy metals.* Those with an acid concentration of more than 10%, since if it is lower it corresponds to group 4.	
6. Inorganic bases	*Examples*
Bases and their solutions. Within this group, waste is differentiated between:	
6.1. Oxides and hydroxides	Sodium hydroxide, potassium hydroxide, etc.
6.2. Ammonia compounds	Ammonium carbonate, ammonium chloride, etc.
7. Mineral oils	
Mineral oils derived from maintenance operations, general service of vacuum pumps, heating baths, etc.	
8. Highly hazardous	*Examples*
Liquid or solid chemicals that, due to their hazard or toxicity, require special handling, are not included in the above groups, and must be collected separately from each other, such as	
— Oxidizers 	Peroxides, hyper peroxides, peroxyethers, chromic acid, metal nitrates, and any product bearing the corresponding pictogram on the label.
— Explosives	Ammonium nitrates, silver or copper, picric acid, acrylic acid, and any product bearing the pictogram on the left.
— Pyrophoric compounds	Metallic magnesium, phosphorus, etc.
— Highly reactive compounds	
○ to the water	Alkali metals, fuming acids, acid chlorides, phosphorus pentoxide, hydrides, etc.
○ to the air (flammable)	Phosphorus, metallic magnesium powder, etc.
○ to acids	Arsenic, cyanides, sulphides, fluorides, etc.
— Mortal compounds	All products which, in accordance with Regulation (EC) 1272/2008, are classified as deadly with the hazard phrases H300, H304, H310 or H330, such as osmium tetroxide, inorganic cyanides, mercury, PCBs, etc.

— Unidentified compounds	Any product that has not been labelled and cannot be identified.
9. Obsolete pure reagents Products in solid or liquid state that cannot be reused, and that are usually in their original packaging.	
10. Contaminated solids Materials of all kinds contaminated with chemicals. The following wastes are also included in this group:	*Examples* Fume hoods filters (separately), impregnated absorbents, masks or mask filters, gloves, filter paper, etc.
— originating from the photographic developing process, and	Photographic paper, negatives, rollers, etc.
— generated in artistic creation workshops.	Cloths and papers impregnated with solvents or paints.
11. Contaminated packaging Plastic containers and glass bottles contaminated with hazardous chemicals, not broken. They are also included in this group:	*Examples* Any container contaminated or with residues of the chemicals detailed in groups 1 to 9.
— contaminated packaging from the photographic developing process, and	Containers of fasteners, developers, turners, etc.
— the packaging of artistic products.	Containers of paints, resins, glues, pigments and inks.

5.1.2. SANITARY WASTE

All those materials and products that, having been in contact with dangerous biological agents or toxic substances in accordance with the provisions of Decree 27/1999, on health waste, may pose a risk to occupational and public health and are subject to special requirements from a hygienic and environmental point of view.

12. Unpolluted sanitary waste Inert and non-special waste, or contaminated with biological agents considered non-hazardous, and considered as municipal waste. It corresponds to group II of Decree 27/1999.	*Examples* Cultures and samples of biologically harmless tissues, and raw disposable material that has been in contact with these agents.
13. Biohazardous Liquid or solid **waste contaminated with biological agents** classified as bio-hazardous according to Annex II of RD 664/1997, waste capable of transmitting any of the infectious diseases listed in the Annex to Decree 27/1999, and genetically modified biological material (GMOs).	*Examples* Blood and hemoderivatives in liquid form, secretions of human origin, cell cultures of animal or vegetable origin, cultures of microorganisms or tissue samples, non-puncturing contaminated material (Petri dishes, vials, instrumental, etc.), live and attenuated vaccines, etc. Biosafety cabin filters (separately).

Also included in this group is any **cutting or puncturing material** contaminated with biological agents or hazardous chemicals, except for clean glass which is collected separately with the glass fraction of municipal waste according to the procedure. P.MA.4.4.6/001. It corresponds to group III of Decree 27/1999.	Pipettes, syringes, needles, scalpel blades, slides, coverslips, capillaries and glass tubes, broken glass containers for reagents, etc.
14. Cytotoxic (carcinogenic / mutagenic) Waste contaminated by a liquid or solid product or compound that is classified as a category 1 and 2 carcinogen, or as a category 1 and 2 mutagen, in Annex I of RD 363/1995 amended by Order PRE / 1244 / 2006 —see updated list in the latest version of the guide «Occupational Exposure Limits for Chemical Agents», published by the National Institute for Safety at Work, and which can be found at www.insst.es— and all those that bring in the safety data sheet one of the following sentences – H340 (can cause genetic defects), – H341 (likely to cause genetic defects), – H350 (can cause cancer), – H351 (likely to cause cancer), – H360 (it can impair fertility or damage the fetus), – H361 (likely to impair fertility or harm the fetus). It corresponds to group IV of Decree 27/1999.	*Examples* Arsenic and its inorganic components, cadmium, nickel, zinc chromates, chromium (VI) compounds, chromium mixture, vinyl chloride, ethidium bromide, acrylamide gels, carbon tetrachloride, benzene, aromatic hydrocarbons, hydrazine, tetrachloroethylene, diaminobenzidine, propidium iodide, etc., and materials that have been in contact with them (gloves, slides, vials, pipettes, etc.), cytotoxic drug residues, and contaminated cultures or samples.
15. Experimentation animals Corpses and remains of research and / or experimentation animals, whether or not inoculated with dangerous biological agents.	
16. Anatomical remains Corpses and human remains with sufficient entity from teaching practices and research and / or experimentation activities.	

5.2. EQUIVALENCE OF CLASSIFICATION CODES

For the purposes of complying with Decree 93/1999, and in order to ensure the adequate identification of the waste generated in the UB centres, the groups of this classification system present the correspondence with the codes of the European list of waste (LER) and the identifying colours presented below:

UB Group	LER Code	Identification Colour			
		Colour	Pantone	RGB	CMYK
1. Halogenated compounds	140602	Orange	165	245-102-0	0-59-96-0
2. Non-halogenated compounds	140603	Green	370	79-140-13	56-0-100-27
3. Organic or high COD solutions	160508	Sky blue	292	120-179-224	49-11-0-0
4. Inorganic compounds	160507 090104	Yellow	Yellow	247-224-23	0-1-100-0
5. Inorganic acids	0601xx 090103	Red	192	227-13-64	0-100-68-0
6. Inorganic bases	0602xx	Blue	286	0-51-171	100-66-0-2
7. Mineral oils	1302xx	Brown	725	128-61-3	0-53-100-48
8. Highly hazardous	160403, 1609xx	Pink	226	209-3-115	0-99-0-0
9. Obsolete pure reagents	160506	No identification colour required, retains original reagent label			
10. Contaminated solids	150202 090199	Purple	271	156-143-201	43-37-0-0
11. Contaminated packaging	150110				
12. Unpolluted sanitary waste	180104	It does not require identifying colour, assimilable to waste fraction			
13. Bio-hazardous	180101 180103 180201-02	Grey 29%	Cool Grey 5	184-179-173	0-0-0-29
14. Cytotoxic (carcinogenic, mutagenic, toxic to reproduction)	180108, 180207	Black	Process Black	43-41-38	0-0-0-100
15. Experimentation animals	180202-03	Identification through approved bag, does not require specific colour			
16. Anatomical remains	180102	Identification through approved bag, does not require specific colour			

5.3. OBSERVATIONS

Waste must be deposited only in the drums, containers and bags provided for each waste group, in accordance with the instructions in the Work Instruction IT/ZUB/MAM/002.

Liquid and solid waste from each group should be collected separately, without mixing.

Within each classification group, in addition to the subdivisions detailed in section 6.1 of this technical instruction, waste that is incompatible with each other will be collected separately, in accordance with the Working Instruction IT/ZUB/MAM/003.

In the event of a spill, act in accordance with the instructions in the Work Instruction IT/ZUB/MAM/004, and manage all resulting material as contaminated solid waste.

6. APPENDICES

1. Modification of documents

Appendix 1. Modification of documents

Date	Edition	Modification
18/03/2013	2	— Error correction
01/06/2020	3	— UB brand Update. — Update of the definition of hazardous waste in section *5. Description*. — Link update in section 5.1.2.14.