



Manual de residus del Parc de Recerca Biomèdica de Barcelona



Manual de residuos del Parque de Investigación Biomédica de Barcelona



Guide to waste management at Barcelona Biomedical Research Park



Parc
Recerca
Biomèdica
Barcelona

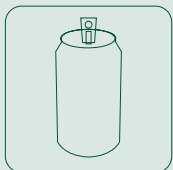




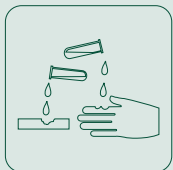
Manual de residus
del Parc de Recerca Biomèdica
de Barcelona



Manual de residuos
del Parque de Investigación Biomédica
de Barcelona



*Guide to waste
management
at Barcelona Biomedical Research Park*



Document realitzat per:

Comissió de residus del Parc de
Recerca Biomèdica de Barcelona

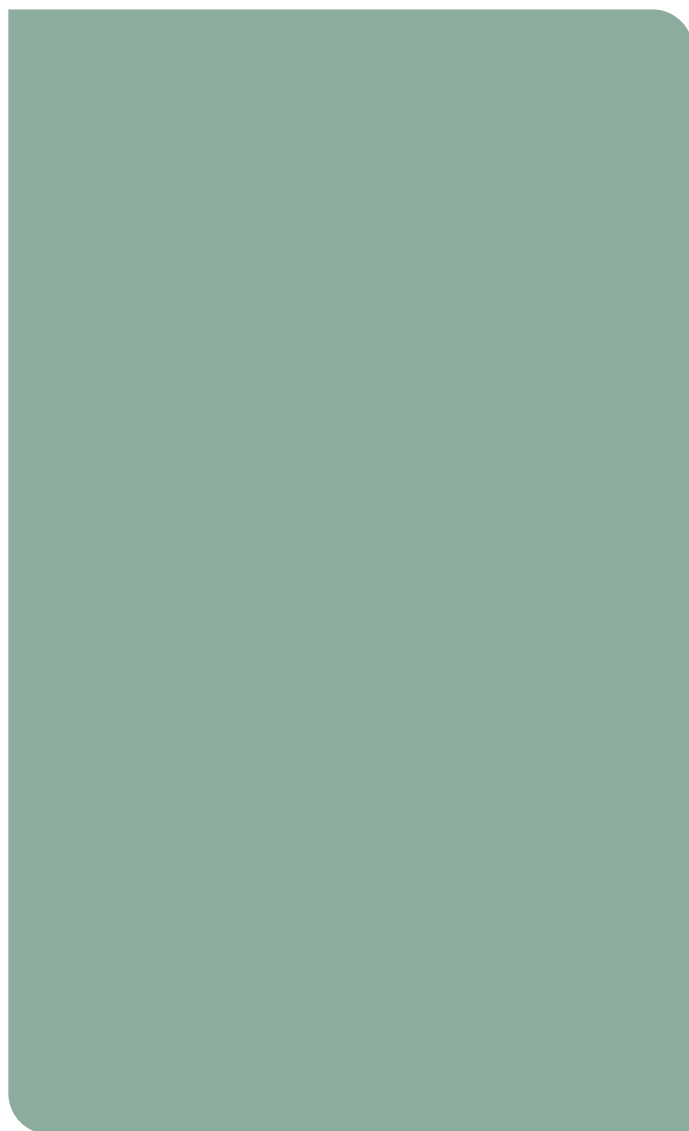
Documento realizado por:

Comisión de residuos del Parque de
Investigación Biomédica de Barcelona

Document realized by:

*Waste commission at the Barcelona
Biomedical Research Park*

english



*Guide to waste
management
at Barcelona Biomedical Research Park*

english

77

PRBB waste management comission:

In alphabetical order

Sonia Alcázar García

Preventative Labour Risks Manager Center for Genomic Regulation Private Foundation.

Iván Auñón García

Facility Technician at PRBB.

Gemma Esparó Toldrà

General Services Technician of Pompeu Fabra University.

Patxi Fernández Navarro

General Services Manager at Fundació IMIM and Fundació CREAL.

Rosabel Marrugat Lacosta

Technical and Prevention Coordinator at Center of Regenerative Medicine in Barcelona.

Juan Carlos Pascual Arcos

Facility Manager at PRBB.

Josep Queralt Creus

General Services Manager Center for Genomic Regulation Private Foundation.

Jordi Ruiz i Rull

Preventative Labour Risks Manager at Fundació IAT and CRC CIM.

Index	81	Introduction
		CHAPTER 1
	83	What type of waste is generated at the PRBB?
	84	1.1 Non-specific or hazard-free waste.
	84	1.1.1 Group I.
	84	1.1.2 Group II.
	85	1.2 Specific or hazardous waste.
	85	1.2.1 Group III.
	86	1.2.2 Group IV.
		Cytotoxic waste.
		Radioactive waste.
		Remains of chemical substances.
		CHAPTER 2
	93	How should the waste be separated? Where should the waste be disposed of?
	94	2.1 Non-specific or hazard-free waste.
	94	2.1.1 Group I.
	96	2.1.2 Other containers.
	97	2.1.3 Group II.
	98	2.2 Specific or hazardous waste.
	98	2.2.1 Group III and IV.
	98	2.2.2 Temporary waste holding area.
		CHAPTER 3
	101	Which hazards should employees be aware of? What precautions are necessary?
	102	3.1 The labelling of specific or hazardous waste.
	102	3.1.1 Physicochemical properties.
	103	3.1.2 Toxicological properties.
	103	3.1.3 Specific effects on health.
	104	3.1.4 Effects on the environment.
	104	3.2 Storage.
	105	3.3 Hazardous reactions between waste products.
	106	3.3.1 Table of chemical product incompatibility.
	107	3.3.2 Compounds that react violently with water.
	107	3.3.3 Hazardous reactions of acids.
	108	3.3.4 Easily peroxidable substances.
	108	3.4 What to do in the event of a hazardous spillage.
	108	3.4.1 Basic guidelines.
	109	3.5 Personal protective equipment.
	109	3.6 Health and safety guidelines.
	110	Who can I ask if I am not sure how to proceed?
		ANNEX I
	111	Bibliography and legal framework.

Introduction

The waste generated in laboratories is generally highly varied in nature, highly hazardous and toxic, and small in volume.

The proper treatment of such waste depends, to a great extent, on the work method and routines established by each individual laboratory how it is organised, and on compliance with the steps established in order to ensure suitable protection health and the environment. Inappropriate identification and storage constitute an added hazard that should be avoided.

This document has been drafted in order to help those using the laboratories to treat waste properly when carrying out their tasks, always taking the following into account:

- generation, identification and labelling,
- separation and storage,
- basic health and safety measures to be taken in each case.

Due to environmental, safety and economic reasons, the amount of waste generated should also be kept to a minimum, always seeking to reduce, reuse or recycle products whenever possible, and take this into account when it comes to stock management in order not to generate waste in the form of unusable or expired products.



Neither should we overlook the importance of separating and recycling other types of every day waste, which, despite not sharing the (potentially hazardous) characteristics of the ones above, are of great importance to people's health and, especially, to the environment.

What type of waste
is generated at the PRBB?

CHAPTER 1

1.1 Non-specific or hazard-free waste.

1.1.1 Group I.

1.1.2 Group II.

1.2 Specific or hazardous waste.

1.2.1 Group III.

1.2.2 Group IV.

Cytotoxic waste.

Radioactive waste.

Remains of chemical substances.

By definition, we can distinguish 2 main types of waste:

- Non-specific, or hazard-free.
- Specific or hazardous.

1.1 Non-specific, or hazard-free waste

Non-specific or hazard-free waste is broken down into 2 groups:

1.1.1 Group I

The waste whose nature and inert composition does not require special handling. It is collected selectively for later recycling. At the PRBB, we separate:



1.1.2 Group II

The waste whose nature and inert composition does not require special handling. But inside the centre there may be a risk for ill people with a low defense system and it may also cause a feeling of disgust.

Such waste is mainly generated in laboratories, it is by nature not a pollutant and does not present a biological or a chemical hazard, and is, in the main, composed of disposable personal protective equipment, such as: gloves, masks, disposable shoe covers, headwear, paper lab coats,...and other materials used to heal, casts and materials for one use only which have blood stains, secretions and other wastes not included in group III.



1.2 Specific or hazardous waste

Specific or hazardous waste constitutes special waste which, may pose a hazard to occupational public health and or the environment, requires preventive measures in handling, collection, storage, transport, treatment and elimination, both inside and outside the centre.

It is broken down into two different groups:

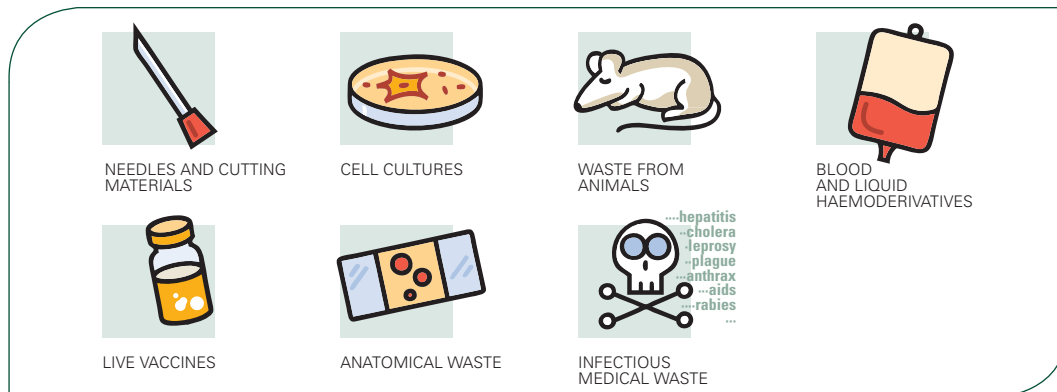
- Group III.
- Group IV.

1.2.1 Group III

Concerns special waste that requires preventive measures in its collection, storage, transport, treatment and disposal, both inside and outside the place where such waste is generated, since it may constitute a hazard to occupational and public health.

The following fall into this group:

- a. Needles and sharp or cutting materials.
- b. Cell cultures.
- c. Waste from animals for research and/or experimentation inoculated with biological agents.
- d. Blood and liquid haemoderivatives.
- e. Live and attenuated vaccines.
- f. Anatomical waste (barring corpses and human remains coming from terminations, mutilations and surgical operations).



g. Infectious medical waste capable of transmitting any of the following infectious diseases: cholera, viral haemorrhagic fevers, brucellosis, diphtheria, meningitis and encephalitis, Q fever, active tuberculosis, distemper, viral hepatitis, tularaemia, abdominal typhoid, leprosy, anthrax, paratyphoid fever A, B and C, plague, poliomyelitis, bacterial dysentery, rabies and aids.

1.2.2 Group IV

Concerns the special waste that is not included in group III is concerned cytotoxic waste, that is to say, waste composed of the remains of cytotoxic medicines and all material which has been in contact with substances which possess carcinogenic, mutagenic or teratogenic properties. In addition the remains of chemical substances, expired medicines, mineral oils, waste from radiological laboratories and radioactive waste are also included.

Therefore, such waste can be divided into:

a. **Cytotoxic waste**, basically the remains of cytotoxic medicines and all materials that have been in contact with the medicine. They have carcinogenic, mutagenic and teratogenic properties. The main sources of such waste are the following:

- remains of cytotoxic medicines that are no longer suitable for therapeutic use such as: vials with remains or that have expired, and bottles of serum that have normally been generated as a result of changes to or interruptions in the prescriptions of the medicine, or due to incorrect preparation, etc.
- sharp or cutting materials used in preparing or administering medicines.
- disposable health material that has been in contact with medicines and contains traces of the cytotoxic substances such as: tubing, bottles of serum, gases, syringes, empty vials, etc.
- remains of cytotoxic chemical products.

The remains of cytotoxic products may be in liquid or in solid state. Below are a few examples: ethidium bromide, silica, crystal violet, cyanides, magnesium sulphate, acrylamide, sulphides, active carbon.

b. **Radioactive waste** contains radioactive chemical elements:

It is stored at the centre itself and once declassified as radioactive, it must be handled in accordance with its typology.

A specific procedure exists for the handling of this type of waste.

c. The remains of chemical substances include a large amount of products that are generated in the laboratories, and are classified according to their chemical and physical properties:

- Halogenated solvents.
- Non-halogenated solvents.
- Aqueous solutions.
- Oils.
- Halogenated organic solids and pastes.
- Non-halogenated organic solids and pastes.
- Toxic inorganic solids.
- Absorbents.
- Disposable pollutant material (pollutant packaging).
- Special products.
- Other labels.

DENOMINACIÓN DEL RESIDUO		UN 2810
LÍQUIDO ORGÁNICO TÓXICO, N.E.P. (DISOLVENTE HALOGENADO)		Nº SERIE 7701
 TÓXICO	PRODUCTOR EMPRESA: Dirección: Teléfono:	
	<small>PELIGRO POR INHALACIÓN, INGESTIÓN Y CONTACTO CON LA PIEL. LEER LA DOCUMENTACIÓN Y QUARTER ADECUADOS Y PROTECCIÓN PARA LOS OJOS Y LA CARA.</small>	
RESIDUO TÓXICO Y PELIGROSO		
Q _ # D _ # _ # C _ # H _ # A _ # B _ <small>código CER. Fecha del etiquetado</small>		
Razón social destino		OBSERVACIONES
EMPRESA: Dirección:		

HALOGENATED SOLVENTS (toxic organic liquid)

Organic liquid products that contain more than 2% of a halogenic compound: fluorine, chlorine, bromine, Iodine and also mixtures of halogenated and non-halogenated solvents when the resultant mixture contains a halogen content exceeding 2%.

They are highly toxic and irritants and in many cases carcinogenic.

Dichloromethane (methylene chloride), trichloromethane (chloroform), carbon tetrachloride, tetrachlorethylene, bromoform.

DENOMINACIÓN DEL RESIDUO		UN 1133
LÍQUIDO INFLAMABLE, N.E.P. (DISOLVENTE NO HALOGENADO)		Nº SERIE 7701
 INFLAMABLE	PRODUCTOR EMPRESA: Dirección: Teléfono:	
	<small>PELIGRO POR INHALACIÓN, INGESTIÓN Y CONTACTO CON LA PIEL. LEER LA DOCUMENTACIÓN Y QUARTER ADECUADOS Y PROTECCIÓN PARA LOS OJOS Y LA CARA.</small>	
RESIDUO TÓXICO Y PELIGROSO		
Q _ # D _ # _ # C _ # H _ # A _ # B _ <small>código CER. Fecha del etiquetado</small>		
Razón social destino		OBSERVACIONES
EMPRESA: Dirección:		

NON-HALOGENATED SOLVENTS

Inflammable organic liquids containing less than 2% in halogens.

They are inflammable and toxic products.

Alcohols: methanol, ethanol, isopropyl alcohol | **Aldehydes:** formaldehyde, acetaldehyde | **Amides:** dimethylformamide | **Amines:** dimethylamine, aniline, pyridine | **Ketones:** acetone, cyclohexanone | **Esters:** ethyl acetate, ethyl formate | **Glycols:** ethylene glycol, mono ethylene glycol | **Aliphatic hydrocarbons:** pentane, hexane, cyclohexane | **Aromatic hydrocarbons:** benzene, toluene, xylenes | **Nitriles:** acetonitrile.

AQUEOUS SOLUTIONS:

Aqueous solutions of organic and inorganic products.

This is a very broad group of solutions which requires dividing and subdividing. The subsequent subdivisions are necessary in order to avoid reactions of incompatibility or for their later treatment.

DENOMINACIÓN DEL RESIDUO LÍQUIDO INORGÁNICO CORROSIVO BÁSICO N.R.R.		UN 3136 7ª SERIE (7.1)
CORROSIVO	PRODUCTOR EMPRESA: Dirección: Teléfono:	
	PELIGRO: IRRITACIÓN OJOS. TOXICO POR INHALACIÓN, INGESTIÓN Y CONTACTO CON LA PIEL. USAR SU SUAVIZANTE Y GUANTES ADECUADOS Y PROTECCIÓN PARA LOS OJOS Y LA CARA.	
RESIDUO TÓXICO Y PELIGROSO O / # D / # / # C / # H / # A / # B CÓDIGO CER: Fecha del etiquetado: / /		
Razón social destino EMPRESA: Dirección:		OBSERVACIONES

BASIC AQUEOUS SOLUTIONS (corrosive liquid, basic, inorganic)

Basic inorganic aqueous solutions.

Sodium hydroxide, potassium hydroxide.

DENOMINACIÓN DEL RESIDUO LÍQUIDO INORGÁNICO TÓXICO		UN 3207 7ª SERIE (7.1)
TOXICO	PRODUCTOR EMPRESA: Dirección: Teléfono:	
	PELIGRO: IRRITACIÓN, INGESTIÓN Y CONTACTO CON LA PIEL. USAR SU SUAVIZANTE Y GUANTES ADECUADOS Y PROTECCIÓN PARA LOS OJOS Y LA CARA.	
RESIDUO TÓXICO Y PELIGROSO O / # D / # / # C / # H / # A / # B CÓDIGO CER: Fecha del etiquetado: / /		
Razón social destino EMPRESA: Dirección:		OBSERVACIONES

TOXIC INORGANIC LIQUIDS

Inorganic aqueous solutions.

Aqueous solutions of heavy metals: nickel, silver, cadmium, selenium, fixatives.

Aqueous chromium (VI).

Other inorganic aqueous solutions: sulphates, phosphates, chlorides, developing reagents.

Aqueous organic dissolutions: NON-HALOGENATED SOLVENT label, indicating that they are aqueous organic dissolutions.

Dissolutions of COD: TOXIC INORGANIC LIQUID label, indicating that they are COD solutions.

Organic or high COD (Chemical Oxygen Demand) aqueous solutions:

Aqueous indicator solutions: phenolphthalein.

Organic fixative solutions: formol, phenol, glutaraldehyde, formaldehyde.

Water mixtures/solvent: chromatographic eluents, methanol/water.

DENOMINACIÓN DEL RESIDUO LÍQUIDO INORGÁNICO CORROSIVO ACIDO N.E.P.		UN 2264 (7 SERIE F.S.)
 COROSIVO	PRODUCTOR: EMPRESA: Dirección:	Teléfono:
	TÓXICO POR INHALACIÓN, INGESTIÓN Y CONTACTO CON LA PIEL. USAR GUANTES Y GAFAS DE PROTECCIÓN PARA LOS OJOS Y LA CARA.	
RESIDUO TÓXICO Y PELIGROSO		
O...#D...#...#C...#H...#A...#B... CÓDIGO CER: Fecha del documento: / /		
Razón social destino		OBSERVACIONES
EMPRESA: Dirección:		

ACID AQUEOUS SOLUTIONS

Inorganic acids and their concentrated aqueous solutions (more than 10% in volume).

Nitric acid, chlorhydric acid, sulphuric acids...

PREVENTIVE NOTE: Mixing some of these acids, depending on their concentration, may result in a hazardous chemical reaction that could give off toxic gases, as well as bring about an increase in temperature. In order to avoid such a hazard, prior to mixing concentrated acids in a container, a test should be performed with a small amount. In the event that a reaction is produced, the acids shall be collected separately.

DENOMINACIÓN DEL RESIDUO ACEITE Y RESIDUOS CONTAMINADOS CON ACEITE		UN NO APLICAR (7 SERIE F.S.)
 NOCIVO	PRODUCTOR: EMPRESA: Dirección:	Teléfono:
	TÓXICO POR INGESTIÓN. IDENTIFICAR EL TIPO DE ALIMENTOS, BEBIDAS Y FUMOS.	
RESIDUO TÓXICO Y PELIGROSO		
O...#D...#...#C...#H...#A...#B... CÓDIGO CER: Fecha del documento: / /		
Razón social destino		OBSERVACIONES
EMPRESA: Dirección:		

OILS

Mineral oils resulting from maintenance operations and, when applicable, heating baths.

DENOMINACIÓN DEL RESIDUO PASTOSO / SÓLIDO ORGÁNICO HALOGENADO		UN 2811 (7 SERIE F.S.)
 TÓXICO	PRODUCTOR: EMPRESA: Dirección:	Teléfono:
	TÓXICO POR INHALACIÓN, INGESTIÓN Y CONTACTO CON LA PIEL. USAR GUANTES Y GAFAS DE PROTECCIÓN PARA LOS OJOS Y LA CARA.	
RESIDUO TÓXICO Y PELIGROSO		
O...#D...#...#C...#H...#A...#B... CÓDIGO CER: Fecha del documento: / /		
Razón social destino		OBSERVACIONES
EMPRESA: Dirección:		

HALOGENATED ORGANIC SOLIDS AND PASTES

Pollutant organic chemical solids and pastes with a halogenic content of exceeding 2% such as paints that contain a halogen or pollutant pigments.

DENOMINACIÓN DEL RESIDUO SÓLIDO ORGÁNICO TÓXICO, N.E.P. (PASTOSO / SÓLIDO ORGANICO HALOGENADO)		UN 2811 (7 SERIE F.S.)
 TÓXICO	PRODUCTOR: EMPRESA: Dirección:	Teléfono:
	TÓXICO POR INHALACIÓN, INGESTIÓN Y CONTACTO CON LA PIEL. USAR GUANTES Y GAFAS DE PROTECCIÓN PARA LOS OJOS Y LA CARA.	
RESIDUO TÓXICO Y PELIGROSO		
O...#D...#...#C...#H...#A...#B... CÓDIGO CER: Fecha del documento: / /		
Razón social destino		OBSERVACIONES
EMPRESA: Dirección:		

NON-HALOGENATED ORGANIC SOLIDS AND PASTES

Pollutant organic chemical solids and pastes with a halogenic content of less than 2%. Chemical products of this nature include; active carbon, silica gel, pigments, paints, and varnishes...

DENOMINACIÓN DEL RESIDUO SÓLIDO INORGÁNICO TÓXICO, N.E.P.		UN 2258 Nº SERIE (F.S.)
 TOXICO	PRODUCTOR EMPRESA: Dirección: Teléfono:	
	TOXICO POR INHALACION, ABSORCIÓN Y CONTACTO CON LA PIEL. USAR VESTIMENTA Y GUANTES ADECUADOS Y PROTECCIÓN PARA LOS OJOS Y LA GARGANTA.	
RESIDUO TÓXICO Y PELIGROSO		
O...#D...#...#C...#H...#A...#B... CÓDIGO CER: _____ Fecha de empaquetado: _____		
Razón social destino		OBSERVACIONES
EMPRESA: Dirección:		

TOXIC INORGANIC SOLIDS

Solid inorganic chemical products such as the salts of heavy metals (cyanides, chromates, hydroxides, chlorides...).

DENOMINACIÓN DEL RESIDUO ABSORBENTES		UN 2811 Nº SERIE (F.S.)
 TOXICO	PRODUCTOR EMPRESA: Dirección: Teléfono:	
	TOXICO POR INHALACION, ABSORCIÓN Y CONTACTO CON LA PIEL. USAR VESTIMENTA Y GUANTES ADECUADOS Y PROTECCIÓN PARA LOS OJOS Y LA GARGANTA.	
RESIDUO TÓXICO Y PELIGROSO		
O...#D...#...#C...#H...#A...#B... CÓDIGO CER: _____ Fecha de empaquetado: _____		
Razón social destino		OBSERVACIONES
EMPRESA: Dirección:		

ABSORBENTS

Pollutant absorbents containing general chemical products; cloths, filters, gloves, clothing...

DENOMINACIÓN DEL RESIDUO ENVASES VACÍOS CONTAMINADOS		UN Nº SERIE (F.S.)
PRODUCTOR EMPRESA: Dirección: Teléfono:		
EXENCIÓN PARCIAL SEGÚN 1.1.3.6		
RESIDUO TÓXICO Y PELIGROSO		
O...#D...#...#C...#H...#A...#B... CÓDIGO CER: 198110 Fecha de empaquetado: _____		
Razón social destino		OBSERVACIONES
EMPRESA: Dirección:		

DISPOSABLE POLLUTANT MATERIAL (pollutant packaging)

Pollutant materials with several chemical products. Some subgroups can be established for classification purposes taking into account both the nature of the pollutant material and the requirements set out by the authorised handler.

Packaging (glass, plastic and metal) contains less than 1% of its contents.

DENOMINACIÓN DEL RESIDUO		UN
n.e.p. (reactivos de laboratorio)		Nº SERIE (F.S.)
		
PRODUCTOR EMPRESA: Dirección: Teléfono:		
<small>PELIGROSO INFLAMABLE TOXICO POR INHALACION, INGESTION Y CONTACTO CON LA PIEL. PROTECCION DE FUBRTE DE GAVION, NO FUMAR. USAR GUANTES Y CASQUETA ANTICAPAZ Y PROTECCION PARA LOS OJOS Y LA CARA.</small>		
RESIDUO TOXICO Y PELIGROSO Q _ # D _ # _ # C _ # H _ # A _ # B _ <small>CODIGO CEN: Fecha de almacenamiento: / /</small>		
Razón social destino		OBSERVACIONES
EMPRESA:		
Dirección:		

SPECIAL PRODUCTS

Solid or liquid chemical products whose high degree of toxicity or hazar-dousness means that they cannot be included in any other group, also pure, obsolete and expired reagents.

They cannot be mixed between themselves or with other groups.

Oxidisers (peroxides).

Pyrophorics (powdered metallic magnesium).

Highly reactive products: fuming acids, acid chlorides (acetyl chlori-de), alkali metals (sodium, potassium), hydrides (sodium borohydride, lithium hydride), products containing active halogens (benzyl bromide), polymerisables (isocyanates, epoxides), peroxidables (ethers), residue of reactions, unlabelled products.

Highly toxic products: osmium tetroxide, phenol, cleaning mixture, cyanides, sulphides and other unidentified products.

OTHER LABELS

DENOMINACIÓN DEL RESIDUO		UN
		Nº SERIE (F.S.)
	PRODUCTOR EMPRESA: Dirección: Teléfono:	
<small>TOXICO POR INHALACION, INGESTION Y CONTACTO CON LA PIEL. USAR GUANTES Y CASQUETA ANTICAPAZ Y PROTECCION PARA LOS OJOS Y LA CARA.</small>		
RESIDUO TOXICO Y PELIGROSO Q _ # D _ # _ # C _ # H _ # A _ # B _ <small>CODIGO CEN: Fecha de almacenamiento: / /</small>		
Razón social destino		OBSERVACIONES
EMPRESA:		
Dirección:		

DENOMINACIÓN DEL RESIDUO		UN
		Nº SERIE (F.S.)
	PRODUCTOR EMPRESA: Dirección: Teléfono:	
<small>PELIGROSO INFLAMABLE TOXICO POR INHALACION, INGESTION Y CONTACTO CON LA PIEL. USAR GUANTES Y CASQUETA ANTICAPAZ Y PROTECCION PARA LOS OJOS Y LA CARA.</small>		
RESIDUO TOXICO Y PELIGROSO Q _ # D _ # _ # C _ # H _ # A _ # B _ <small>CODIGO CEN: Fecha de almacenamiento: / /</small>		
Razón social destino		OBSERVACIONES
EMPRESA:		
Dirección:		

DENOMINACIÓN DEL RESIDUO		UN
		Nº SERIE (F.S.)
	PRODUCTOR EMPRESA: Dirección: Teléfono:	
<small>PELIGROSO INFLAMABLE TOXICO POR INHALACION, INGESTION Y CONTACTO CON LA PIEL. USAR GUANTES Y CASQUETA ANTICAPAZ Y PROTECCION PARA LOS OJOS Y LA CARA.</small>		
RESIDUO TOXICO Y PELIGROSO Q _ # D _ # _ # C _ # H _ # A _ # B _ <small>CODIGO CEN: Fecha de almacenamiento: / /</small>		
Razón social destino		OBSERVACIONES
EMPRESA:		
Dirección:		

DENOMINACIÓN DEL RESIDUO		UN
		Nº SERIE (F.S.)
	PRODUCTOR EMPRESA: Dirección: Teléfono:	
<small>PELIGROSO INFLAMABLE TOXICO POR INHALACION, INGESTION Y CONTACTO CON LA PIEL. PROTECCION DE FUBRTE DE GAVION, NO FUMAR. USAR GUANTES Y CASQUETA ANTICAPAZ Y PROTECCION PARA LOS OJOS Y LA CARA.</small>		
RESIDUO TOXICO Y PELIGROSO Q _ # D _ # _ # C _ # H _ # A _ # B _ <small>CODIGO CEN: Fecha de almacenamiento: / /</small>		
Razón social destino		OBSERVACIONES
EMPRESA:		
Dirección:		

How should the waste be separated? Where should the waste be disposed of?

CHAPTER
2

2.1 Non-specific or hazard-free waste.

2.1.1 Group I.

2.1.2 Other selective waste containers.

2.1.3 Group II.

2.2 Specific or hazardous waste.

2.2.1 Groups III and IV.

2.2.2 Temporary waste holding area.

2.1 Non-specific or hazard-free waste








2.1.1 Group I

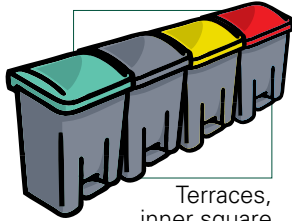
In the building you will find selective waste collection for recycling, marked as a “punt verd”.



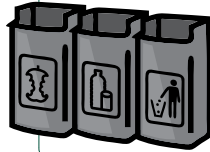
Recycling at the PRBB is divided into the different fractions that you can identify by means of:

1. The type of container.
2. The pictogram.
3. Its colour (bag and bin).
4. Location.

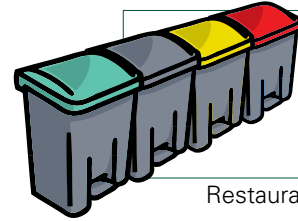
Group I waste	Container	Pictogram	Colour	Location
Refuse	Waste paper bin with no special markings or bearing the pictogram		Bag: black Bin: depends on the centre and the space	Offices, terraces, toilets, vending machines, restaurant, inner square and seminar rooms.
Paper	Cardboard container			Offices and laboratories
Organic	Plastic or stainless steel bin		Bag: white Bin: gray with red top	Terraces, toilets, restaurant, inner square and seminar rooms.
Light packaging	Plastic or stainless steel bin		Bag: yellow Bin: gray with yellow top	Terraces, toilets, vending machines, restaurant, inner square and seminar rooms
“Clean” glass	Plastic or stainless steel bin		Bag: black Bin: gray with green top	Restaurant and wash areas (kitchens), terraces, inner square and seminar rooms
Cardboard				Goods lift vestibule on hospital side
“Bulky” items				Goods lift vestibule on hospital side



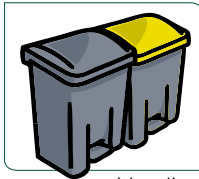
Terraces,
inner square
and seminar rooms



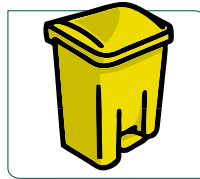
Main toilets
vestibule



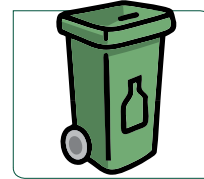
Restaurant



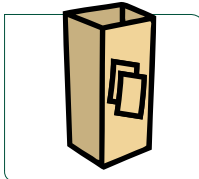
Vending
machines



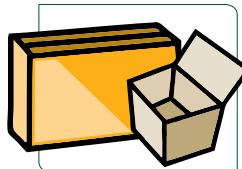
Plastic container:
laboratories



Glass container: wash
areas (kitchens)



Paper container:
offices



Collection point for cardboard
and "bulky" items.
Goods lift vestibule on hospital
side

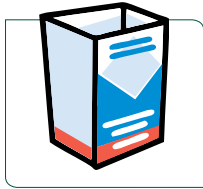
NOTE: Care must be taken not to
leave anything that may prevent the
fire door from closing.

Other common waste in Group I:

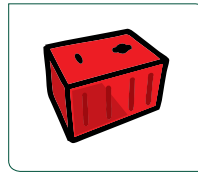
	Refuse	Organic	Light packaging	"Clean" glass
Plastic cups			✓	
Sweet wrappings (plastic or aluminium)			✓	
Aluminium paper			✓	
Tetrabrick			✓	
Corks		✓		
Plastic or metal cap			✓	
Used paper towels		✓		

2.1.2 Other selective waste containers that do not belong to Group I, but to Group IV

- Toner bin: ask your immediate supervisor where the nearest collection point is located.
- Batteries container: ask your immediate supervisor where the nearest collection point is located.





















Toner bin



Batteries container

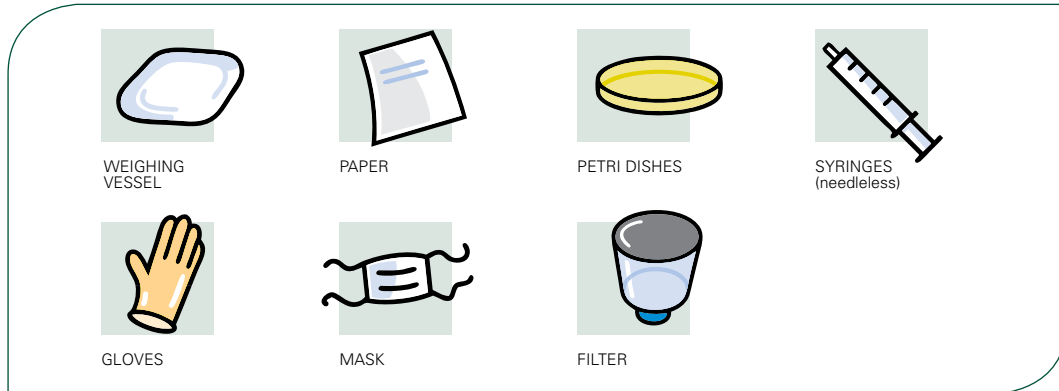
NOTE: There is a collection point at the entrance of the restaurant.

Waste containers location:

	Terraces, inner square and seminar rooms	Toilets	Vending machines	Goods lift vestibule hospital side	Every floor	Restaurant: sink area	Wash areas (kitchens)
Paper							
Light packaging							
Organic							
Refuse							
Glass							
Toner							
Cardboard							
Batteries							

2.1.3 Group II

This waste is mainly generated by the laboratories and is neither chemically or biologically pollutant.



GII bins are identified by the following sign:

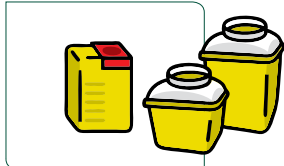


GII bins in the laboratories

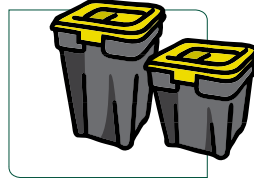
How should be separated? Where should be disposed of?

2.2 Specific or hazardous waste

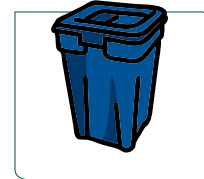
2.2.1 Group III and Group IV



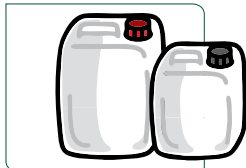
Sharps containers:
only GIII



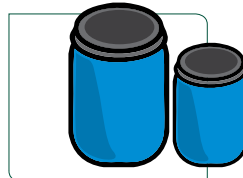
Black containers with
yellow lids: only GIII



Blue containers
with blue lids:
only GIV



Drums for liquids:
only GIV



Open-head containers:
only GIV

2.2.2 Temporary waste holding area

These are rooms in the vestibules of the staircases halfway along the corridors of each floor on each side. The area is used to store the containers full of GIII and GIV solids, empty containers and their corresponding labels.

Containers full of GIII and GIV solids are to be brought to this room such as:

- GIII: 1, 30, and 60 litre containers holding (bio-hazardous) pointed objects.
- GIV: 30 and 60 litre containers holding cytotoxics.

Bottles containing GIII and GIV liquid (Chemical) waste are to be deposited at the point designated by the centre. Ask your immediate supervisor.

The door of the temporary waste holding area has the following signage:

Basic regulations governing the temporary waste holding area

- Keep the area clean and tidy: zones set apart for full and empty containers.
- Deposit the full container in the area delimited as a zone for full containers.
- Remember to properly identify and label the full containers. Containers that are not properly identified shall not be collected.
- Make sure that you have properly closed each package so as to avoid unnecessary hazards.
- For the safety of all, do not accumulate waste in the laboratory.
- Remember that collection days are Mondays, Wednesdays and Fridays.
- In the event of an incidence, inform your immediate supervisor.

What hazards should employees be aware of?
What precautions are necessary?

CHAPTER
3

- 3.1 The labelling of specific or hazardous waste.
 - 3.1.1 Physicochemical properties.
 - 3.1.2 Toxicological properties.
 - 3.1.3 Specific effects on health.
 - 3.1.4 Effects on the environment.
- 3.2 Storage.
- 3.3 Hazardous reactions between waste products.
 - 3.3.1 Table of chemical product incompatibility.
 - 3.3.2 Compounds that react violently with water.
 - 3.3.3 Hazardous reactions of acids.
 - 3.3.4 Easily peroxidable substances.
- 3.4 What to do in the event of a hazardous spillage.
 - 3.4.1 Basic guidelines.
- 3.5 Personal protective equipment.
- 3.6 Health and safety guidelines.

Who can I ask if I am not sure how to proceed?

3.1 The labelling of specific or hazardous waste

Containers that contain hazardous waste must be clearly labelled, easy to read and marked indelibly, at least in Spanish.

The label shall include:

- Waste identification code including, depending on the system of identification described in annex I of Royal decree 833/1988 amended by Royal decree 952/1997.
- Name, address and telephone number of the holder of the waste.
- Packaging start and end dates.
- The nature of the hazards associated with the waste as indicated by the corresponding pictograms.
- It is recommended to indicate the specific hazards (R phrases) and precautionary advice (S phrases).

A product's labelling implies the designation of defined, pre-established categories of hazards based on the physicochemical and toxicological properties, and on the specific effects on human health and/or the environment, identified by means of pictograms and hazard symbols (I, O, F+, F, T+, T, Xn, Xi, C, N).

Below is a list of the associated R phrases according to physicochemical, toxicological properties, the specific effects on human health and/or the environment. The definitions, the different categories, the pictograms and the most common hazard phrases can be seen below:

3.1.1 Physicochemical properties



E Explosives (E): Substances and preparations that, even without oxygen being present, may react exothermically, rapidly and have the potential to explode.



O Oxidisers (O): Substances and preparations that, in contact with other substances, especially with flammables, produce a highly exothermic reaction.



F+ Extremely flammable (F+): Substances that ignite very easily due to the action of an energy source, even below 0 °C.



F **Highly flammable (F):** Substances that ignite in the presence of a flame, a heat source or a spark. They correspond to substances that are highly flammable.

Flammable: Liquid substances and preparations, whose flash point is low.

3.1.2 Toxicological properties



**T+
T** **Highly toxic (T+) and toxic (T):** Substances and preparations that, by inhalation, swallowing or cutaneous penetration in small quantities may cause acute or chronic damage and even death. They are toxic, highly toxic, carcinogenic, mutagenic and toxic for reproductive purposes.



Xn **Harmful (Xn):** Substances and preparations that, by inhalation, swallowing or cutaneous penetration, may cause acute or chronic damage and even death. They are harmful, sensitising, carcinogenic, mutagenic and toxic for reproductive purposes.



C **Corrosive (C):** Substances and preparations that, in contact with living tissues, may destroy them. By inhalation, swallowing or cutaneous penetration in small quantities may cause acute or chronic damage and even death.



Xi **Irritant (Xi):** Non-corrosive substances and preparations that, by contact with the skin or mucous membranes, may cause an inflammatory reaction. By inhalation, swallowing or cutaneous penetration in small quantities may cause acute or chronic damage and even death. They are irritants and sensitisers.

Sensitisers: Substances and preparations that by inhalation or cutaneous penetration may produce a hypersensitive reaction, in such a way that later exposure to the same substance or preparation may give rise to characteristic negative effects.

By inhalation: R42 Harmful (Xn)

By skin contact: R43 Irritant (Xi)

3.1.3 Specific effects on health

Carcinogenics: Substances and preparations that by inhalation, swallowing or cutaneous penetration may cause cancer or increase the frequency of cancer.

Categories 1 and 2: R45 and R49 Toxic (T)

Categorie 3: R40 Harmful (Xn)

Mutagenics: Substances and preparations that by inhalation, swallowing or cutaneous penetration may cause hereditary alterations in the genetic material of cells or increase their frequency.

Categories 1 and 2: R46 Toxic (T)

Categorie 3: R68 Harmful (Xn)

Toxic for reproductive purposes: Substances and preparations that by inhalation, swallowing or cutaneous penetration may cause negative non-hereditary effects in descendents or increase the frequency of such, or negatively affect reproductive functionality or capacity.

Categories 1 and 2: R60 and R61 Toxic

Categorie 3: R62 and R63 Xn Harmful

3.1.4 Effects on the environment



N Hazardous for the environment: Substances or preparations that present or may present an immediate or a future danger for one or more components of the environment.

When waste in a container is assigned more than one hazard sign, the following criteria shall be taken into account:

- It is compulsory to affix the **toxic waste hazard sign**. The inclusion of harmful and corrosive waste hazard signs is optional.
- It is compulsory to affix the **explosive waste hazard sign**. The inclusion of the flammable waste hazard and oxidiser sign is optional.

The label shall be firmly affixed to the container. All previous indications or labels shall be cancelled out so that it is not possible to confuse the origin and contents of the container in any subsequent handling of the waste product.

The label shall be at least 10 x 10 cm depending on the size of the container.

3.2 Storage

Waste, until the time it is stored at the temporary waste holding area, shall remain in the laboratories, preferably on the floor, and in certain cases in suitable recipients (spill tanks, trays, etc.) in order to avoid possible spillages. It must be kept in places that are not subject to great passage in order to avoid stumbling over it, and away from all sources of heat.

Products that may give rise to hazardous reactions cannot be stored at the temporary waste holding area.

Combustible liquids shall not be stored together with oxidisers or with toxic or highly toxic substances that are not combustible. They must be kept as far apart as possible. Non-flammable, non-combustible products may be used as separators, provided that such products are not incompatible with the inflammable products stored.

3.3 Hazardous reactions between waste products

In order to avoid any possible hazardous chemical reactions, special attention must be paid to incompatibilities between substances, in order to avoid mixing them.

Incompatibilities include:

1. Strong acids with strong bases.
2. Strong acids with weak acids that give off toxic gases.
3. Oxidisers and reducers.
4. Water with amides, boranes, anhydrides, carbides, trichlorosilanes, halides, acid halides, hydrides, isocyanates, alkali metals, phosphorus peroxide and Grignard reagents.

Below you can find the tables outlining physical, chemical and toxicological incompatibilities:

		Flammable	Explosives	Toxic	Radioactive	Oxidisers	Harmful	Corrosive
								
Flammable		✓	X	X	X	X	✓	X
Explosives		X	✓	X	X	X	X	X
Toxic		X	X	✓	X	X	✓	X
Radioactive		X	X	X	✓	X	X	X
Oxidisers		X	X	X	X	✓	○	X
Harmful		✓	X	✓	X	○	✓	X
Corrosive		X	X	X	X	X	X	✓

✓ Can be stored together

○ Can only be stored together if certain preventive measures are taken

X Cannot be stored together

3.3.1 Table of chemical product incompatibility

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	I	II	III	IV	V	VI
1 Non-oxidant mineral acids																																						
2 Oxidant mineral acids																																						
3 Organic acids																																						
4 Alcohols and glycols																																						
5 Aldehydes																																						
6 Amides																																						
7 Aliphatic and aromatic amides																																						
8 Ketones																																						
9 Cyanides and derivatives																																						
10 Caustic alkaline compounds																																						
11 Azo, Diazo and hydrazine compounds																																						
12 Halogenated organic compounds																																						
13 Organic nitrate compounds																																						
14 Epoxides																																						
15 Esters																																						
16 Ethers																																						
17 Phenols and Ciesols																																						
18 Inorganic fluorides																																						
19 Unsaturated aliphatic hydrocarbons																																						
20 Saturated aliphatic hydrocarbons																																						
21 Aromatic hydrocarbon																																						
22 Isocyanates																																						
23 Mercaptans, other organic sulphides																																						
24 Alkaline and alkaline earth metals																																						
25 Diverse forms of metals and alloys																																						
26 Powdered metals and alloys																																						
27 Nitriles																																						
28 Nitrides																																						
29 Organic peroxides and hydroperoxides																																						
30 Pesticides: carbamates and thiocarbamates																																						
31 Pesticides: organophosphates																																						
32 Inorganic sulphides																																						
I Waters and aqueous mixtures																																						
II Polymerisable compounds																																						
III Explosives																																						
IV Strong oxidants																																						
V Strong reducers																																						
VI Substances which react with water																																						

REACTIVITY CODES

- Heat release
- Fire, exothermic reaction
- Toxic gas generation
- Violent polymerisation
- Non-flammable toxic gas generation
- Flammable gas generation
- Explosion
- Possibly hazardous, but there is no reference

3.3.2 Compounds that react violently with water

Strong anhydride acids	Acyl halogenides	Alkali oxides
Alkali-metals and metalloids	Inorganic anhydride halides	Inorganic peroxides
Amides	(except alkalis)	Phosphides
Anhydrides	Alkali hydroxides	Silicides
Carbides	Hydrides	Calcium
Fluorides	Imides	Magnesium
Acid halogenides	Alkali metals	

3.3.3 Hazardous reactions of acids

Reagent	Reagent	Gas given off
Sulphuric acid	Formic acid	Carbon monoxide
	Oxalic acid	Carbon monoxide
	Ethyl alcohol	Ethane
	Sodium bromide	Bromine and sulphur dioxide
	Sodium cyanide	Carbon monoxide
	Sodium sulphocyanide	Carbon sulphide
	Hydrogen iodide	Hydrogen sulphide
	Some metals	Sulphur dioxide
Nitric acid	Some metals	Nitrogen dioxide
Chlorhydric acid	Sulphides	Hydrogen sulphide
	Hypochlorites	Chlorine
	Cyanides	Hydrogen cyanide

High affinity incompatible substances

Oxidisers	with	Nitrates, halogenates, oxides, peroxides, fluorine.
Reducers	with	Inflammable materials, carbides, nitrides, hydrides, sulphides, alkali metals, aluminium, magnesium and powdered zirconium.
Strong acids	with	Strong bases.
Sulphuric acid	with	Sugar, cellulose, perchloric acid, potassium permanganate, chlorides, sulphocyanides.

3.3.4 Easily peroxidable substances

This group of substances may undergo changes, for example; the formation of peroxides in some cases may explode violently.

Substances included:

Ethers	Haloalkanes	Vinylacetylene compounds
Isopropyl compounds	Vinyl compounds	Cumene, ureas, lactams
Allyl compounds	Dienic compounds	Butanol, methyl isobutyl ketone-2

3.4 What to do in the event of a hazardous spillage: general procedures

As a general rule, always proceed as follows:

1. Follow the instructions that your centre has established for such cases.
2. Immediately inform your immediate supervisor.
3. Then call PRBB Security on 1020.
4. Do not start to clear up or neutralise a product unless you know the product that has been spilt and the appropriate clearing up procedure (the use of chemical spillage kits should be kept in mind).
5. Insofar as possible, open external windows and doors and close the laboratory door, in the event of large volumes or the spillage of a hazardous product.
6. In the event that the spillage has occurred on a person, remember you can use the emergency showers and eyebaths.
7. Remember that, depending on its characteristics, the product for cleaning up may need to be handled equally as waste.

3.4.1 Basic guidelines

Inflammable liquids:

Inflammable liquids must be absorbed by active carbon or other specific adsorbents that are available on the market. Never use sawdust due to its inflammability.

Acids:

Acids must always be cleaned up as quickly as possible since direct contact as well as the vapours they give off may cause harm to people, the facilities and equipment. The best way to neutralise acids is to use the adsorbents-neutralisers available on the market that perform both functions. If you have none available, sodium bicarbonate can be used instead. Once neutralised, the surface must be washed with plenty of water and detergent.

Bases:

To neutralise and clean up bases, use the specific products available on the market. If you have none available, they can be neutralised using plenty of water with a dilution of chlorhydric acid (0.1 M) or of sulphuric acid (0.1 M). Once neutralisation has been carried out, the surface must be washed with plenty of water and detergent.

Mercury (specific procedure):

Collect mercury using a calcium polysulfide amalgamator (commercially available in the form of sponges) or sulphur. If it has got into grooves, you can try to seal it using a lacquer; it can also be aspirated using a Pasteur pipette, putting aside the metal collected in an airtight receptacle. Mercury recovery or the neutralisation of a spillage is important since in this way, a permanent source of pollution can be avoided. It should be taken into account that if mercury becomes divided into small drops, in the vicinity of a heat source or if exposed to sunlight, its ability to evaporate is increased.

Other non-inflammable, non-toxic, non-corrosive liquids:

Sawdust can be used for other liquids that are not inflammable, toxic or corrosive.

3.5 Personal protective equipment

Mainly goggles, gloves and masks, suitable for each use.

Contact your immediate supervisor in order to find out what equipment you should use.

3.6 Health and safety guidelines

Below are some general guidelines to handling waste:

- Before adding any kind of waste to a container, make sure the container is the correct one for the purpose and is duly labelled.
- Containers should remain closed at all times, only opening them for the necessary time to insert the waste.

- If you have any doubts as to the classification of waste, or as to any possible reactions, put it into a container of its own. Do not mix.
- Disposal of the waste and corresponding containers shall be done slowly and carefully. This manoeuvre should be stopped if any abnormal phenomenon is observed, such as the production of gases or an increase in temperature. Once the operation is completed, the container should be closed until the next time it is used. In this way, exposure to the waste generated is reduced as well as the risk of possible spillage.
- Containers shall not be filled to more than approximately 80% capacity in order to avoid splashing, spillage or excess pressure. Once filled to 80% and a weight of under 18 kg, close the container and take it to the temporary waste holding area.
- Inside the laboratory, containers shall be deposited on the floor to prevent them from falling to a lower level. Containers in use shall never be left in areas of passage or in places where they may be stumbled over, and shall always be kept away from heat sources.
- Direct contact with waste should always be avoided, making use of suitable personal protective equipment according to hazardousness.
- Waste whose properties are unknown shall be considered as hazardous, taking the maximum precautions.
- All laboratories must make available to personnel the safety data sheets of the chemical compounds used for consultation at any time.
- You are recommended not to handle waste alone.
- Immiscible liquid waste shall not be mixed. The existence of several phases hinders its later treatment.
- Solid waste shall never be compacted.
- Stacking shall be to a maximum of two units in height.

Who can I ask if I am not sure how to proceed?

If you are not sure how to proceed, contact your immediate supervisor.

Annex I

BIBLIOGRAPHY AND LEGAL FRAMEWORK

Community regulations:

- European Council Directive, of 15 July 1975, concerning waste (75/442/CEE).
- Council Directive, of 18 March 1991 (91/156/CEE), previous amendment.
- European Commission decision of 20 December 1991, concerning hazardous waste (91/689/CEE).

State regulations:

- Law 10/1998, of 21 April, on waste.
- Law 11/1997, of 24 April, on packaging/containers and packaging waste.
- Royal decree 782/1998, of 30 April, approving the Regulation for the development and implementation of Law 11/1997, of 24 April, on packaging/containers and packaging waste.
- Royal decree 952/1997, of 20 June, amending the Regulation for the implementation of Basic Law 20/1986, of 14 May, on toxic and hazardous waste, approved via Royal decree 833/1988, of 20 July.
- Royal decree 363/95, of 10 March, approving the Regulations on the notification of new substances and the classification, packaging and labelling of hazardous substances.
- Royal decree 668/1980 amended by 3485/1983, of 14 December, approving the Regulation governing the storage of chemical products (RAQ).
- Royal decree 2070/95, of 22 December, establishing quality criteria in radiodiagnosis.
- Royal decree 849/1986, of 11 April, approving the Regulation on the public water supply and developing preliminary titles I, IV, V, VI, and VII of Law 29/1985, of 2 August, on water.

Autonomous region regulations:

- Legislative Decree 1/2009, of 21 July, approving the consolidated text of the Law regulating Waste, published in the DOGC of 28/7/09.
- Decree 92/99, of 6 April, amending Decree 34/96, of 9 January, approving the Catalogue of Waste in Catalonia.
- Decree 93/99, of 6 April, on waste handling procedures.
- Decree 27/99, of 9 February, on medical waste management.

Municipal regulations:

- Regulations that affect the management of municipal and assimilable waste in the municipalities of Catalonia.
- Regulations governing the dumping of waste in the Metropolitan Area of Barcelona.
- Regulations governing wastewater of the Consortium for the Defence of the Besòs River Basin.

Others:

- NTP 276: Laboratory waste disposal: general procedures.
- NTP 480: Hazardous waste management in university and research laboratories.
- NTP 359: Laboratory safety: small quantities toxic and dangerous wastes management.

Manual de residus del Parc de Recerca Biomèdica de Barcelona
Manual de residuos del Parque de Investigación Biomédica de Barcelona
Guide to waste management at Barcelona Biomedical Research Park

Primera edició: 2010

© Parc de Recerca Biomèdica de Barcelona

Disseny i maquetació:

Estudi La Maquineta SCP
www.maquineta.com

Impressió:

Reproducciones Barcelona S.L.

Imprès en paper fet amb pasta de paper ECF
i seguint normes ISO 9001 i ISO 14001 de gestió ambiental.

Dipòsit Legal:

D.L. B-26816-2010



Parc
Recerca
Biomèdica
Barcelona



Parc de Recerca Biomèdica de Barcelona PRBB
c/ Doctor Aiguader, 88
08003 Barcelona
Tel. 93 316 00 00
prbb@prbb.org

www.prbb.org

