



Basel Convention Coordinating Centre
Stockholm Convention Regional Centre

URUGUAY



Ministerio de Vivienda
Ordenamiento Territorial
y Medio Ambiente

MVOTMA

Special Solid Waste

Regional Training in Hazardous Waste
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RED de CENTROS

Convenio de Basilea
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Basel Convention
Latin America & the Caribbean

Stockholm Convention

Special Solid Waste

Lead-acid batteries

Main components:

1. Plastic casings and PP separators: non-hazardous
2. Components with lead: hazardous
3. Sulfuric acid as dielectric fluid: hazardous

Lead-acid batteries

Consequences of poor management:

- Non-neutralized acids (electrolyte) are corrosive and cause problems in water courses.
- Risks to human health posed by lead or lead slag: lead poisoning.
- Lead emissions from foundries and factories working with lead if they lack an emission treatment system.

Lead-acid batteries

Alternatives:

- Separation and smelting of lead to make lead ingots, for their subsequent direct use to manufacture new grids and paste.

Special care with foundry gases.

- Separation and subsequent commercialization without smelting: disassembly of batteries and separation of their components; separation of lead components, acid and polypropylene casing.
- Electrolyte: the lead must be removed and then it can be reused.
- The plastic can be disposed of, recycled for new batteries or used as alternative fuel.

Lead-acid batteries

In general, the principle of Extended Producer/Importer Responsibility applies, whereby batteries return to the point of sale or fitting to be replaced with new ones.

However, it is necessary to have a formal management system in place because the informal recovery of batteries to sell the lead poses serious environmental and health risks.

Tires

- Three main components: rubber, carbon black and steel.
- Environmental problems associated with poor tire management:
 1. Favorable habitat for insects, vectors (dengue fever and yellow fever).
 2. Burning generates SO₂ and HCl emissions. It might also generate dioxins and furans.
 3. It complicates operation in sanitary landfills due to compaction issues.
 4. Visual pollution.
- They have high calorific value.

Tires

Alternatives:

- Direct uses: agriculture, coastal protection, docks, reefs, homes and communities.
- Retreading: recapping.
- Cut and recovery of rubber: carpets, acoustic insulating materials, bumpers, pavement sublayers.
- Cut and pyrolysis: recovery of raw material by means of reaction, which reverts the process at high temperatures and pressures. Synthetic crude oil (liquid hydrocarbons), coal (soot) and gas (methane) are obtained.
- Cut and co-processing in cement kilns: first as fuel, and then the ashes as part of the clinker matrix.
- Cut and incineration in industrial plants: electricity generation.

Tires

In Brazil:

- In the late nineties, regulation regarding the concept of Producer/Importer responsibility was adopted.
- First alternative: incineration in cement kilns, but as the kilns were unsuitable, the cement obtained was of low quality and gas emissions exceeded the limits established.
- Ongoing search for alternatives.
- Experience in Rio de Janeiro – Ecotires.
- When a tire is bought, two must be returned.

In the U.S.: they are burned in thermoelectric plants, but at a high operating cost. Only 5% of used tires.

Used oils

Mineral-based oils or lubricants that have become unfit for their originally intended use

Content	Class A	Class B
Halogens (chlorine)	< 1 %	≥ 1 %
PCB	< 50 ppm	≥ 50 ppm
Lead	< 300 ppm (< 1,500 ppm)*	≥ 300 ppm (≥ 1,500 ppm)
Calorific value	> 3,000 kcal/kg	=

- 95% of used oils are class A
- Class B oils come from transformers, condensers and hydraulic systems

Used oils

Their poor management impacts the environment:

- Improper burning of oil pollutes the air as toxic gases are released.
- As they are discharged into water courses, a superficial film is formed and prevents oxygen from entering the water, and the toxic substances poured reach the trophic chain and affect living beings.
- In the soil, they pollute groundwater and surface water. They render soils infertile, limiting biological and chemical activity.

Used oils

Alternatives:

- Refining: large amounts improve profitability for plants.
- Reuse in industrial boilers.
- Reuse in cement kilns.
- Plants for thermal treatment of hazardous waste.

Solvents

Organic solvents are liquid compounds that can dissolve, suspend or extract another substance without chemically reacting with it and remaining inert.

USE of SOLVENTS: paints, cleaning of machines, oil and fat extraction in the food industry, glue solvent, etc.

Solvents

- Considered hazardous as they are flammable, volatile, toxic and explosive.
- Given their rapid volatility, they can be absorbed in confined spaces through the skin and inhalation, affecting human health.
- In the presence of NO_x and sunlight, some contribute to the formation of environmental ozone.

Solvents

Alternatives:

- If in good condition, they can be recovered through a **DISTILLATION** process and used in the same industry as recovered solvents.
- Alternative fuel in **AUTHORIZED** cement kilns or high-efficiency boilers and with emission control.
- Incineration in special hazardous waste kilns.

Medical Waste

It includes waste from:

Health care centres (any public or private facility where any type of health services are provided), generated on account of prevention, diagnosis, treatment, rehabilitation, research or teaching activities.

They should have a medical solid waste management plan, covering intra-institutional management, transport, treatment and final disposal of waste, preserving human health and the environment.

Medical Waste

Two types of medical waste:

Common: defined by exclusion from the other category. It can be categorized as "similar to urban waste":

- waste generated from administrative and assistance activities,
- kitchen and food scraps from general rooms,
- waste from sweeping, vacuuming and cleaning of common circulation and waiting areas,
- paper, cardboard, boxes, plastic and medication packaging, except those from oncological treatment.

Medical Waste

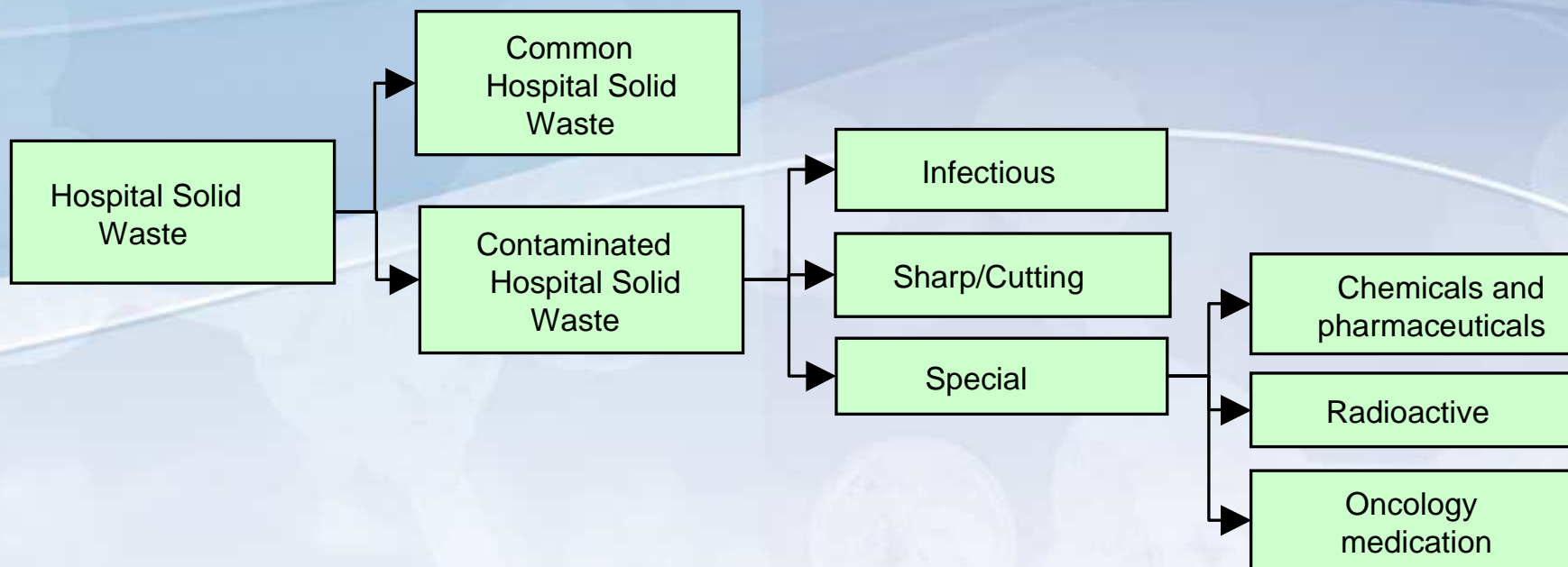
Two types of medical waste:

Contaminated: any hospital solid waste that is or could be infectious, corrosive, reactive, toxic, explosive, flammable, irritant and/or radioactive, and which may thus pose a risk to human health or the environment.

There are three categories:

- Infectious: waste from patient treatment, tests, anatomical waste, animal waste, etc.
- Sharp or cutting waste: needles, syringes, scalpels.
- Special waste: chemicals and pharmaceuticals, oncological and radioactive medication.

Medical Waste





Medical Waste

Generation of contaminated medical waste:

	kg/bed/day
Bandung Master Plan (Indonesia)	0.17
Germany	0.035-0.11
Bogotá Master Plan (Colombia) 2000	1.20
Hospital Arzobispo Loayza – Lima**	0.88
Hospital Daniel Alcides Carrión del Callao – Lima**	1.12
Costa Rican Social Welfare Fund	0.91
General Office for the Integrated Management of Pollutants (DGMIC) Mexico	1.50
Diagnosis of municipal solid waste management in Latin America and the Caribbean***	0.50

Medical Waste

Generation of medical waste:

	kg/bed/day
North America*	7 – 10
Western Europe*	3 – 6
Eastern Asia*	
- high-income countries	2.5 – 4
- middle-income countries	1.8 – 2.2
Eastern Europe*	1.4 – 2
Hospital Arzobispo Loayza – Lima**	1.55
Hospital Daniel Alcides Carrión del Callao – Lima**	1.97
Costa Rican Social Welfare Fund	2.99
Diagnosis of municipal solid waste management in Latin America and the Caribbean ***	3

Medical Waste

Alternatives:

- Incineration: reduces 90% of the volume and 75% of the weight. Special gas treatment (combustion chamber and gas treatment chamber). Three technological options: rotary, fixed-bed and pyrolytic processes.
- Chemical disinfection: adding chemical products to the chemical mass to partially remove or inactivate contaminants. Usually waste is previously ground to increase the efficiency of disinfectants in the process.
- Autoclave: treatment at a certain pressure and temperature for a given period to ensure the efficiency of the system. WHO: 121°C, 1 bar of pressure for 1 hour.

Medical Waste

Alternatives:

- **Microwaves:** ground waste and waste generally dampened with steam. It is then heated using microwave irradiation for a specific time. In this way the temperature of hospital solid waste increases to 90°C.
- **Encapsulation:** waste conditioning before its final disposal. It is placed in containers where an immobilization material such as cement is added. This process is done only when there is no other alternative, and only for sharp and cutting waste and some pharmaceutical waste.



Expired Drugs

Different ways to classify them, but usually done according to their pharmacological properties or therapeutic uses:

- Antibiotics, cytostatic drugs, painkillers, vasodilators, tranquilizers, disinfectants, psychotropic and narcotic drugs, etc.
- **SPECIAL MONITORING:**
 - cytostatic drugs: control of tumor cells; they affect the person handling them, the patient and the ecosystem because they are designed to cause cell death, whether healthy or cancer-ridden.
 - antibiotics: control of bacterial infections; misuse of these drugs can cause allergies, the elimination of good bacteria, resistant bacteria.
 - psychotropic drugs: they stimulate the central nervous system; monitored as they can cause drug dependence, drowsiness, etc.

Expired Drugs

Generation sources:

- By expiration
- Unsuitable storage conditions
- Container in poor conditions
- Remains of medicines / excess preparations
- Others: incidents during handling and transportation, market launch of new active substances, etc.

CONSEQUENCES if poorly HANDLED and MANAGED:

- Pollution of water and ecosystems
- Bio-accumulation in tissues of living beings
- Resistance of pathogenic microorganisms
- Entering the informal system and the market in bad conditions

Expired Drugs

Classification and treatment:

- **Special Waste:** it does not exhibit any hazardous characteristics, but should be rendered unusable to prevent further use.

Disposal in sanitary landfills, after compaction and destruction.

- **Biological – infectious:** vaccines, serums.

Physical, chemical or thermal treatment to deactivate and destroy waste. After being treated, it can be disposed of in sanitary landfills.

- **Hazardous:** it can affect human health and the environment.

Incineration is recommended.

Expired Drugs

Classification and treatment:

- **Psychotropic drugs:** incineration is recommended.
- **Cytostatic drugs:** they must be placed in sealed and labeled bags, in leak-proof plastic containers with an airtight cap. They must be incinerated at temperatures higher than 1200°C. If incineration is not possible, chemical destruction must be implemented.
- **Antibiotics:** evidence of their presence in the environment; consequences of their presence in ecosystem are unknown. They must be chemically or thermally treated.

Expired Drugs

Special programs for the recovery of drugs:

- URUGUAY: www.plesem.com.uy
- SPAIN: www.sigre.es

Pesticides and Pesticide Containers

Waste from pesticides and pesticide containers is generated for several reasons:

- Expired pesticides
- Banned or restricted pesticides
- Damaged products
- Unidentified products
- Manufacture and fractionation waste
- Pesticide containers

Pesticides and Pesticide Containers

Means that favor contamination:

- Infiltration into the soil
- Wind transport
- Runoff transport
- Groundwater transport

The risk involved is usually the same as pesticides in use, but it can be higher given poor storage conditions and higher risk of exposure.

Pesticides and Pesticide Containers

Final disposal alternatives:

- Use as pesticide: evaluate the possibility of reuse as pesticide or of reformulating it.
- System for the integrated management of pesticide waste, if available.
- System for the treatment and final disposal of hazardous waste.

Pesticides and Pesticide Containers

Final disposal alternatives:

- Incineration in hazardous waste kilns.
- Incineration in clinker kilns.
- Physicochemical treatment.
- Treatment in secure landfill.
- Exporting if no local alternative is available.

Regarding Pesticide Containers

- Plastic (HDPE, PP, LDPE, PVC), Metal, Glass, Cardboard and Paper
- Washable and non-washable containers

