

Tom 57(71), Fascicola 1, 2012

## Collection of Dangerous Urban Wastes

Stăniloiu Cristian<sup>1</sup> Dubău Alexandra<sup>2</sup>

**Abstract:** The authors of this memoir propose to make a general presentation of the dangerous waste that can be generated in a household. This waste represents a source of pollution, but it can be easily eliminated by the separate waste collection. The most frequent wastes in this category are those deriving from chemical substances, such as: varnishes and paints, pesticides, chemical solvents or pharmaceutical substances. Usually, they are neglected and disposed together with the other solid household wastes, as their quantity is small. The case study conducted refers to pharmaceutical wastes, (expired medicines), that we have in our homes. We chose these wastes because in most European countries the law stipulates the correct way to collect and neutralize them.

**Keywords:** Hazardous Waste, expired medicines

### 1. INTRODUCTION

Household waste represents a complex mixture of wastes coming from households or from similar consumers. Waste is deposited in recipients, bins or containers, and they are subsequently collected by a specialized service provider (operator). In most of the European countries waste collection is made separately, precisely by the consumer, [9]. Thus, the cleansing department will collect separately the recipients with recyclable waste and the recipients with mixed waste. A good functioning of this system, (in Timișoara it is called the dry dustbin/ wet dustbin collection system), involves an effort of the operator, but particularly of the beneficiary. Local authorities are now making efforts to inform the population of the importance of the recovery of recyclable waste, in order to protect the raw resources and to reduce the quantities disposed in the waste deposits, [3], and [6].

### 2. HAZARDOUS WASTE

There is a large quantity of hazardous waste used in households, public institutions or work places. After being used, these materials become toxic. Due to this fact, they can interfere with the natural biologic processes that take place on the lands where they are deposited (in a controlled manner or randomly). Afterwards, the soil, surface and ground water are contaminated, and the health of people and of all creatures that come into contact with the polluted environment is affected. If these waste uncontrolled

waste deposits – waste landfills – are set to fire, and air is polluted by the gases exhaled through the burning the toxic waste, [1], [2].

The hazardous waste of the urban waste needs to be collected separately, in collection points different from the ones generally used for solid wastes. Also, they need to be selected in order to apply the specific treatment/neutralization solutions.

Hazardous waste includes oxidant substances or mixtures, highly flammable, explosive, corrosive, infectious, irritant, carcinogenic, mutagenic, ecotoxic, and so on. A large part of the household waste is composed of substances with these properties. The most common are the chemicals used in households, such as detergents cleaning fluids, medicines, pesticides, paints, mineral oils and others. Concerning the European Waste Catalogue, a list including the most common hazardous household wastes is presented in table 1. (The European Waste Catalogue is transposed in the Romanian legislation by GD 856/2002).

Table 1 Hazardous urban wastes, according to the Waste List of GD 856/2002

Waste code	Type of waste
20 01 13	Solvents
20 01 15	Bases
20 01 19	Pesticides
20 01 23	Equipments containing CFCs
20 01 14	Acids
20 01 17	Photographic chemicals
20 01 21	Fluorescent tubes and other mercury containing waste
20 01 26	Oils and greases
20 01 27	Paints, inks, adhesives and raisins containing hazardous substances
20 01 29	Detergents containing hazardous substances
20 01 31	Cytotoxic and cytostatic medicines
20 01 33	Batteries and accumulators
20 01 35	Discarded electrical and electronic equipments
20 01 37	Wood containing hazardous substances

<sup>1,2</sup> "Politehnica" University of Timișoara, Department of Hydrotechnical Engineering, George Enescu Street, no.1A, Zip code 300022, Timișoara, Romania, e-mail: [c\\_staniloiu@yahoo.com](mailto:c_staniloiu@yahoo.com)

### 3. THE CURRENT SITUATION

Presently, in Romania, only small quantities of the hazardous household waste are collected separately. Most of them are used mineral oils, (collected in workshops and gas stations), used accumulators, coming from the population or from the car repair centers or construction wastes. The largest quantity of the above mentioned wastes is eliminated together with the other solid waste, and, that is why, as we have described, significant disposal problems arise. Also, it is very hard to estimate the quantity of hazardous household waste. Most of the consumers are not even aware of the danger presented by certain wastes generated in their own household or they do not know how to properly eliminate this waste, [4].

### 4. TREATMENT METHODS FOR HAZARDOUS WASTE

The treatment of hazardous waste is complex and applies specifically for each waste category. First, collection companies must separate hazardous household wastes by components.

The separated wastes will be deposited in adequate recipients or containers and stored temporarily, (usually up to 30 days), in specially designed buildings, (dry, covered, aerated, with waste water collection facilities).

Currently, the treatment of hazardous household waste follows two main ways, [4], [5], and [6]:

- heat incineration, for organic fractions, according to the EU directives;
- physical – chemical treatment, for acids and bases.

Presently, in Timișoara city, an incinerator for hazardous waste is operating and it has a capacity of 98 t/day. This equipment will be extended.

### 5. CASE STUDY – COLLECTION AND NEUTRALIZATION OF EXPIRED MEDICINES

There is probably no household that does not use medicines, either for treating a disease, either “preventively”. According to law, the expiration date of a pharmaceutical product is marked on its package, and the contraindications and side effects produced by this document are mentioned in its leaflet. It is not recommended to use the medicines after their expiry date, even if they did not lose their properties. What happens with the expired medicines that were bought but remained unused? In many European countries, they can be returned to the pharmacy or to the family doctor, from where they are collected by specialized companies and then neutralized, usually by incineration, (figure 1). Presently, in Europe, a person

buys annually medicines amounting to 450 Euros. In Romania, medicine expenses are much more reduced, amounting to approximately 100 Euros per person per year, [7], [8], and [10]. However, we must take into account the fact that in our country medicines are much cheaper than in most of the European countries. These statistics do not include the products declared “dietary supplements”.

The French authorities supported the establishment of a specialized organization called “Cyclamed”, intended for the collection and recycling or destruction of medicinal products and of their packaging. Consumers are invited to return the unused products to the pharmacies, from where they are subsequently collected, [10].

In Germany, the problem is solved more categorically: it has become obligatory to hand over the expired medicines to pharmacies or family doctors that take care to hand them over for destruction to specialized units. Also, in other EU countries inside pharmacies there are special containers installed for the collection of waste and expired medicines, [10].

In our country, this system is not yet functional; therefore, we only have available two options: to throw the expired medicines in the garbage or down the sewage, (toilet or sink). The first option involves the danger of the accidental consumption by unsupervised children or by animals, (as medicines are usually vividly coloured, easily remarkable). In order to avoid this, expired medicines must be carefully packaged before being disposed. However, these medicines eventually get to the waste landfill.

The option of throwing the medicines down the toilet, (obviously, without packages), eliminates the danger of accidental ingestion, but is equally polluting. Presently, wastewater treatment plants do not dispose of the necessary technology for retaining the medicinal substances. Thus, they finally get to pollute surface waters, (presently, wastewater treatment plants have great difficulties in separating the medicine residues eliminated through urine).

What are the risks we expose to by using expired medicines, [10]:

- generally, expired medicines are no longer efficient;
- allergic reactions, stomach pains, headaches can occur;
- in the worst cases, expired medicines can cause intoxications.

According to the discussions we had with the Ambulance Service of Timis county, drug intoxications were usually due to the excessive consumption of medicines or the consumption of inadequate medicines, less of expired medicines.



Fig. 1 Collection of expired medicines (<http://www.agenda.ro>)

In February– April 2011, the authors conducted a survey on the expired medicines. The questions to which 100 interviewed persons answered are:

1) What do you do with the expired medicines?

I throw them down the sink, (toilet);

I throw them in the trash bin;

I don't have any;

I don't know.

2) Do you consider it advisable for the medicines to be taken over by pharmacies?

Yes, because they can be harmful;

No, I can throw them away by myself.

3) Do you protect your family members from the expired medicines? Are you aware of the fact that they are toxic?

Yes;

No;

I don't know.

4) Do you currently have any expired medicines in your house?

No;

Yes, and I know about them;

Maybe, but I don't know.

Following the survey, it was determined that:

For question 1:

42.8% throw their medicines down the sink;

21.3% throw their medicines in the garbage;

19.28% do not have any expired drugs;

16.62% do not know what happens with them.

At question 2:

78.9% consider it advisable for the medicines to be taken over by pharmacies;

21.1% can throw them away by themselves.

At question 3:

59.3% are aware of the fact that expired medicines can be toxic;

19.8% did not know that expired medicines are dangerous;

20.9% are not aware of the toxicity of expired medicines.

At question 4:

3.52% did not have any expired medicines in their house;

40.56% know about the expired medicines in their house;

55.92% may have expired medicines but are not aware of this aspect.

Although most of the interviewed persons consider it advisable for the expired medicines to be taken over by pharmacies, for now, in Romania there are clear regulations only for producers and pharmacists, not for the natural persons. The producers and pharmacists are obliged to hand over the expired or damaged medicines to specialized companies, in order to have them destroyed (by incineration). The chief pharmacist is responsible for organizing within the pharmacy the storage space for pharmaceutical waste, (waste including the sera and the vaccines with an exceeded term of validity, the expired medicines, reagents and substances used in the laboratory, and others).

Medicines are, with few exceptions, biodegradable, meaning they do not present any problem from this point of view. However, the question is what happens with the other medicines, which are not in the form of tablets, (ampoules, flacons and others)? Even if most of the medicines are biodegradable, their disposal into the trash bin/container can be considered a risky solution. Their disposal into the sewage is preferred by 43% of the respondents.

## 6. RECOMMENDATIONS

Informing the consumers on the danger that certain hazardous wastes presents, especially on the action of these pollutants over time. It is surprising that 56% of the persons who participated in the survey did not know if they had expired medicines at home.

Organizing permanent or temporary collection points for hazardous waste. For example, some stores have installed collection points for small batteries and accumulators (necessary for household equipments). In Timișoara city there are also some construction waste collection points. Here, one can hand over varnishes, paints and other chemicals deriving from small repairs and maintenance works.

When buying a new product, that by its use will generate a hazardous waste, the handover of the used product should be required (if possible). This has

already been applied for several years to the purchase of car accumulators. The encouragement of consumers consists of the fact that when handing over the used accumulator, they obtain a discount for the new ones.

Some repairs or maintenance works should only be made in workshops and by specialized personnel. The purpose of this is to immediately collect the resulting waste. A good example also comes from the car service activity. When changing the oil, brake fluid or coolant, in specialized workshops, the used product is collected in a controlled manner and it is subsequently handed over for neutralization and recycling.

The withdrawal of certain general use products that can generate hazardous wastes and their replacement with less polluting products.

The taking over by pharmacies of the expired medicines and other medical devices and instruments that are damaged or no longer useful (thermometers, blood pressure monitors, syringes, ointment boxes and others). The collection and neutralization of these products in an organized manner is the optimum solution. It basically does not involve high expenses, being more an effort of will of both consumers and distributors.

The obligation in our country, by an adequate legislation, of the collection by the producer and distributor of certain used or expired products, that can become dangerous (upon the preparation of this material, the implementation of such legislative measures was in progress).

## REFERENCES

- [1] Gh., *Bulandra și colectivul*, 1992, „Reziduuri menajere, stradale și industriale. Colectarea, depozitarea și valorificarea materialelor re folosibile”, Editura Tehică București;
- [2] C., *Căpățînă*, 2006, „Depozitarea, tratarea și reciclarea deșeurilor”, Îndrumător de proiectare, Editura Politehnica, Timișoara;
- [3] A., *Dubău*, 2011, Lucrare de disertație: „Studiul compoziției deșeurilor municipale din municipiul Timișoara și a posibilităților de reciclare”, Universitatea Politehnica Timișoara, Facultatea de Hidrotehnică;
- [4] C. Ungureanu, P. Dan Opiș-Stănescu, I. Ionel, V. Gruescu, 2006, „Gestionarea integrată a deșeurilor municipale”, Editura Politehnica, Timișoara;
- [5] V., *Chiriac*, 1968, „Tratarea și valorificarea reziduurilor”, Editura Agro – Silvică, București;
- [6] \*\*\* Consiliul Județean Olt, 2009, Plan Județean de gestionare a deșeurilor;
- [7] \*\*\* Consiliul Județean Timiș, 2008, Plan Local de gestionare a deșeurilor;
- [8] <http://gesundheit-und-praevention.blogspot.com>
- [9] <http://www.ziare.com/articole>
- [10] <http://de.wikipedia.org>
- [11] <http://www.agenda.ro>