

FEASIBILITY OF SOLVENT WASTE MANAGEMENT

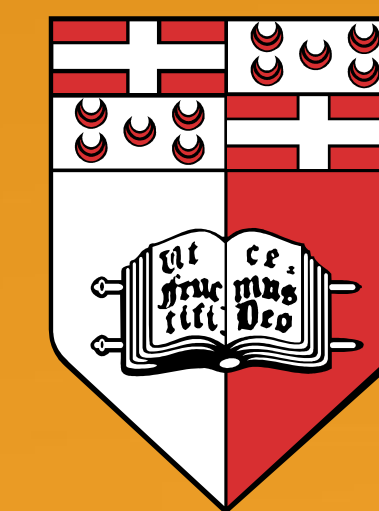
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INTRODUCTION

In Malta, the incinerator was designed to mainly treat and incinerate wastes from abattoir and some clinical waste. There are no local facilities available for the recovery of solvent waste. Solvents are sent abroad where they are recycled or incinerated.

AIMS

- To determine the local scenario with respect to pharmaceutical waste processes
- To assess which options are available to dispose of or to recycle solvents
- To check whether it is feasible to set up a solvent recovery plant locally

METHOD

• Data was collected to evaluate the current scenario and identify problems related to this issue in the Maltese Islands. Structured interviews were conducted with 2 pharmaceutical companies and 2 waste brokers. The interview questions were validated prior to conducting the interviews. Three pharmacists, a physician, an accountant, 3 students and a lay person reviewed the interview and important suggestions were implemented. Unstructured interviews were also conducted with the Malta Environment and Planning Authority (MEPA) and WasteServ Malta to assess the local situation with respect to the annual pharmaceutical solvent waste production and methods of handling.

- A cost-benefit analysis was carried out by identifying the costs involved to implement a local waste disposal system. These included the cost of equipment, electricity, labour and premises. The cost of equipment was obtained from interviews conducted with stake holders and from different solvent recovery manufacturers abroad. The cost of electricity and labour costs which include the salary of a chemist, delivery men and over heads were acquired. The average land area needed for the implementation of the solvent recovery plant was given by MEPA.
- A second cost-benefit analysis which took into consideration solvent waste generated by both pharmaceutical and non-pharmaceutical companies was conducted. This included higher costs related to equipment, freight and insurance costs, operating and maintenance costs and labour costs.

RESULTS

Twenty-one solvent, including; ethanol, methanol and ethyl acetate, were identified as being most commonly used in the manufacturing of active pharmaceutical ingredients (APIs). Methods used for the processing of solvent waste abroad include: waste solvent incineration and distillation¹. Since different types and amount of solvent waste is generated by pharmaceutical industries in Malta, vacuum distillation would be the most appropriate method for the recovery of solvents.

In 2012, the total amount of pharmaceutical solvent waste that was sent for recovery abroad was 339 tonnes. This means that the Maltese Islands would need a solvent recovery plant that would treat 1.31 tonnes per day, if calculated on 260 working days (1 year). After establishing the different types and amounts of solvents to be processed, it was inferred that the most appropriate solvent recovery plant for the local scenario is the ECOpure SR 180V batch solvent recycler.

The cost-benefit analysis which was calculated over a three year period indicated that it is not feasible and cost effective to build such a solvent recovery plant locally. This is due to the high costs involved in building such a plant. The cost to build a solvent plant in Malta is about €205,765.

The second cost-benefit analysis, which was based on a three year period, led to an increase in production and sales. Although the costs increased, the output made the project viable, resulting in a sustainable profit.

Table 1 gives the main types of solvents which were considered. It might be more feasible to export solvents in the categories 070501 and 070504 rather than incinerate them locally.

	European Waste Category Codes	Description	Yearly cost	
			Disposed abroad	Disposed locally
Waste from Pharmaceuticals	070501	Aqueous washing liquids and mother liquors	€42,808	€56,375
	070503	Organic halogenated solvents, washing liquids and mother liquors	€96,147	€71,220
	070504	Other organic solvents, washing liquids and mother liquors	€366,442	€470,980
Wastes from Non-Pharmaceuticals	070704	Other organic solvents, washing liquids and mother liquors	€134,204	€95,998

Table 1: Cost comparison of disposal of solvents. (First 2 columns adapted from: European Waste Catalogue and Hazardous Waste List. Environment Protection Agency. European Waste Catalogue and Hazardous waste list, 2002. [Cited 2016 March 15th] Available from URL: <http://www.environ.ie/en/Publications/Environment/Waste/WEEE/FileDownload,1343,en.pdf>).

CONCLUSION

Although it might be more advantageous to dispose of some solvents locally, pharmaceutical companies and waste brokers prefer to send solvents abroad. This is due to the local incinerator having a low capacity and all the pharmaceutical solvent wastes generated on the Maltese Islands cannot be incinerated. An upgrade of the incinerator needs to be carried out to dispose of solvent waste safely. This upgrade includes the use of solvent waste as fuel instead of diesel to ignite the incinerator. There are benefits which should be taken into consideration before excluding the possibility of building a solvent recovery plant on the Maltese Islands. These include; conservation of raw materials, supplying resources to industries², decline in the amount of waste disposed of in landfills and incinerators and long term positive impact on the environment³. Other benefits of conducting such a project include profit, invisible export, source of employment and if successful expansion of its market share which will result into economies of scale³.

Reference(s)

¹Capello C, Fischer U, Hungerbühler K. Environmental Assessment of Waste-Solvent Treatment Options. *Journal of Industrial Ecology* 2007; 11(4): 26–38.

²Rushton L. Health hazards and waste management. *British Medical Bulletin* 2003; 68: 183-197.

³LeRoux G. Solvent Recycling: Good for Business and the Environment. *Journal of CFCM Magazine* 2013; [Cited 2016 Mar 13]. Available from: URL: <http://www.canpaint.com/storage/Solvent.CFCM.Final.pdf>.