



## Safe Methods of Disposal of Chemical Waste

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**Abstract:** *This article discusses the safety and disposal methods of chemical waste. Chemical waste is one of the most dangerous for humans and the environment. Therefore, the disposal of chemical waste must be done very carefully in strict compliance with all safety requirements.*

**Keywords:** *Waste, disposal, chemical waste, thermal, neutralization, alcoholysis, biological way, transportation, toxic waste, chlorination with oxidation, thermal device, combustion, liquid fuel.*

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**Introduction.** Currently, the world is facing serious environmental problems related to the formation of waste, transportation, treatment and destruction of chemical waste. Industrial waste at chemical industry enterprises is one of the polluting elements for the environment. Many countries of the world cannot cope with the destruction of chemical and toxic waste, therefore, due to the many types of chemical products, it is impossible to single out one alternative way to dispose of chemical waste. In this regard, there are 6 ways of waste disposal: neutralization, thermal method, chlorination with oxidation, alcoholism, biological method.

Of these methods, the safest, simplest and most cost-effective disposal of chemical industry waste is the thermal method. Because it allows you to almost completely destroy substances with subsequent purification of gases and occurs as a result of the combustion of chemicals in a mixture with liquid fuel. The thermal device consists of 4 elements: the combustion chamber, the furnace itself, the combustion gas control system, the substance supply system.

The issues of neutralization, purification and disposal of chemical waste are a serious problem all over the world. Therefore, all over the world there is an active search for technologies and equipment for waste processing and disposal in compliance with modern environmental requirements.

Chemical and industrial wastes in liquid aggregate state are usually difficult to dispose of, and often pose a serious threat to the environment due to high toxicity. Liquid waste, compared with solid waste, is technologically much more difficult to remove from production, transport[1].

If the disposal of chemical industry waste was not carried out on time, then they will pose a danger to the ecosystem of the planet. The soil, water, and atmosphere suffer from their polluting components, and they turn into a problem for humans and the plant world.

There are many sources of hazardous chemical waste, including: batteries, construction debris, natural gas, fossil fuel combustion, industrial waste, pesticides, herbicides, medicines, raw and processed oil. Greenhouse gases such as carbon dioxide and methane are also chemical wastes. Hazardous wastes of chemical and other industries in order to reduce their volumes in specially designated burial grounds and landfills, it is necessary to gradually expediently send them for processing, based on their chemical composition, in order to obtain useful substances and materials from them for use in economic sectors. This will provide opportunities to improve the state of the environment, to save primary raw materials, to obtain additional profits through the use of cheap raw materials.

To dispose of hazardous chemical components, you must always follow special instructions and safety rules in order to preserve the health of others. Before disposal, the degree of toxicity of emissions is determined, since different storage and destruction conditions are created for each waste. Transportation and storage should be carried out in special containers, the inner coating of which is not affected by alkalis and acids[3].

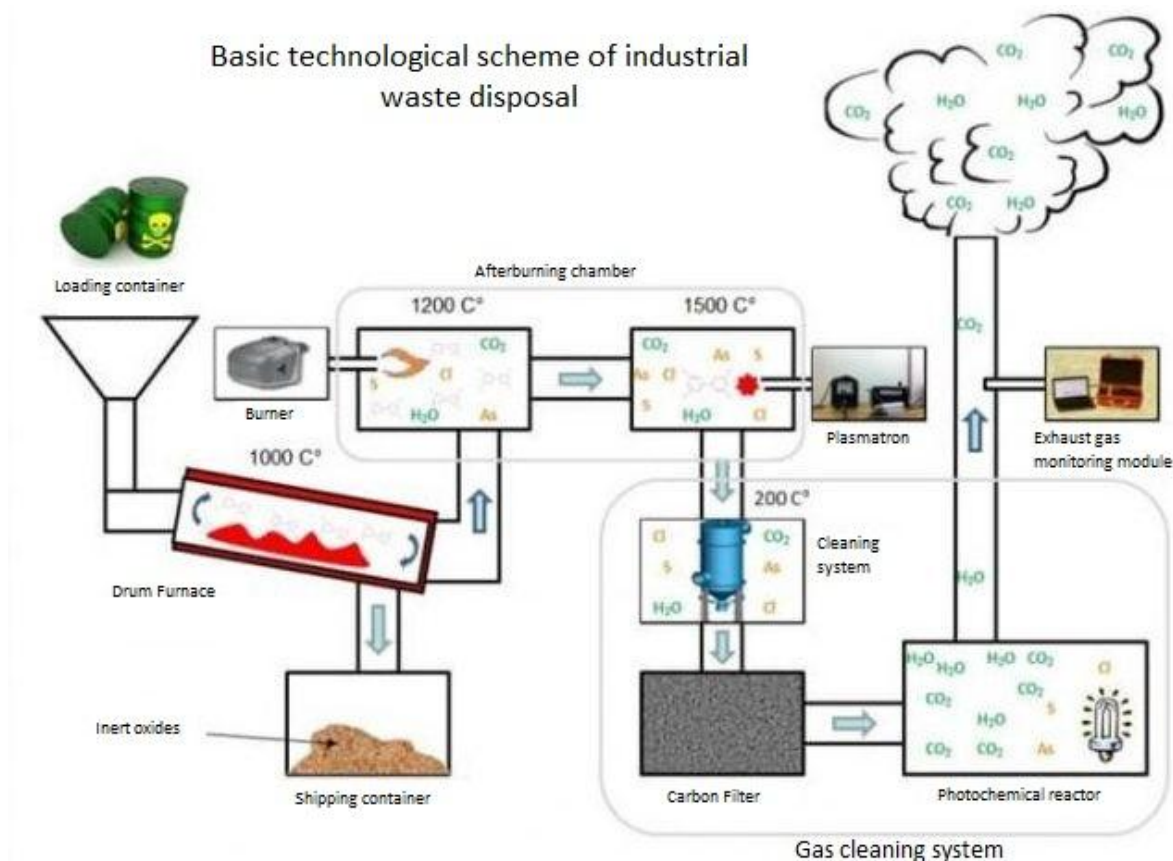
Disposal of chemical waste requires a special approach and consideration of its physical and technical condition and properties. Disposal of chemical waste is considered a complex technological process that requires extensive experience with hazardous waste. Chemical production waste can react with various chemicals, forming new compounds with unknown toxic properties and characteristics that are even more difficult to dispose of. Therefore, proper disposal of chemical production waste is an important task. The disposal of chemical waste involves their further processing and the production of new chemical compounds that are safe for the environment.

As you know, chemical waste is one of the most dangerous types of industrial waste. Due to the lack of appropriate processing technology of these types of waste, they are stored for many years in warehouses, landfills and in numerous burial grounds. Toxic wastes that are related to chemical enterprises are chemicals or their various mixtures. When disposing of waste of chemical origin, it is necessary to be extremely careful because of their toxic effects on the human body. The first requirement for chemical waste is a sealed packaging installed in accordance with and a specially designated place where chemical toxic waste will be temporarily stored until they are transferred for neutralization, disposal or processing. Toxic emissions are considered not only products of industrial activity, but also household items that a person encounters every day. For example, mercury light bulbs, thermometers, as well as dishes in which detergents were stored. No wonder these products cannot be thrown into a common dumpster. It is necessary to process this type of garbage separately, for which it is necessary to create installations with special equipment that are resistant to various aggressive chemical compounds. For this purpose, temporary landfills are being built at enterprises to store these wastes in special designated areas [2].

The safe methods also include the thermal method. In contrast to the published technologies, we have proposed a new technology by which the resulting gaseous products of thermal destruction of pesticides are neutralized before being released into the atmosphere, which eliminates the possibility of contamination with compounds such as furan, dioxide, chlorides, polynuclear aromatic hydrocarbons, etc.

In Fig. 1. which consists of a pyrolysis furnace equipped with a filtration unit for the generated exhaust gases. In this case, the flue, placed perpendicular to the wall of the afterburning chamber, is made in the form of a slit recuperator "pipe type". One end of the inner pipe, which freely enters the afterburning chamber of the furnace in the upper part of its wall, the other is connected to the neutralization chamber of harmful and chemical components of the outgoing pyrogas mixture. The

placement of the afterburning chamber of incomplete combustion products carried out with gas from the combustion chamber provides optimal conditions for afterburning. Gorenje The gas coming out of the combustion chamber passes through the hole and enters the afterburning chamber, the diameter of which is much larger than the diameter of the hole. At the same time, the gas velocity decreases, and the products of incomplete gorenje fall into the zone of action of the torch of the burner placed in the wall of the afterburning chamber, and are burned to oxides of higher valence and water vapor.



**Fig.1 Technological scheme for the disposal of chemical waste for the thermal processing of toxic waste.**

The flue is installed perpendicular to the wall of the afterburning chamber, which reduces the speed of the gas flow, and its execution in the form of a recuperator allows you to heat the air used further as an oxidizer to the temperature of the exhaust gas; 700-750C. The supply of alkaline earth reagents to the neutralization chamber will allow the conversion of sulfur oxides, phosphorus, nitrogen and hydrochloric acid vapors into harmless mineral salts  $\text{CaSO}_4$ ,  $\text{Ca}(\text{PO}_4)_3$ ,  $\text{Ca}(\text{NO}_3)_2$ ,  $\text{CaCO}_3$ ,  $\text{CaCl}_2$ .

Thermal destruction at 800C for 6 hours gives positive results. In order to avoid sintering of organic substances, toxic chemicals were loaded into a pyrolytic reactor in an amount of 200 g in a mixture of 200 g of neutral, porcelain balls pre-calcined in a muffle furnace at 600C for 2 hours.

The aim of the work was to achieve complete destruction of organic molecules. Due to the lack of oxygen in the decomposition products, soot was formed. The yield of the solid part was determined by the condensate weighing method. The mass of the formed gaseous part was determined by the condensate weighing method. The mass of the formed gaseous part was determined by weighing the neutralizer – absorber of acidic components.

Thus, as a result of pyrolytic decomposition, pyrogas, pyrocondensate and pyrocarbon are formed, which can be used pyrogas, pyrocondensate and pyrocarbon, which can be used in the future,

depending on the chemical composition of these decomposition products. This technology has been used for pyrolytic decomposition of unclaimed agricultural chemicals.

As you know, all chemicals – under the general name of pesticides, have a complex chemical organic composition. Therefore, when selecting methods for neutralization, processing and destruction, it is necessary to approach from the point of view of obtaining valuable chemicals by using not only all accumulated chemical waste, but also other industrial waste[4].

Currently, we are conducting and have obtained preliminary positive results on ensuring safety in the process of neutralization and disposal of chemical waste with the development of recommendations for the practical use of decomposition products.

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