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## Safe Thermal Decomposition of Organochloride Pesticides by Submerged Oxidation in Molten Salts

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### Abstract

This study was motivated by the current interest in the world in the development of advanced processes for waste decomposition, category in which the process described herein is inserted. This interest stems from the need for safer processes for the decomposition of some wastes, particularly those deemed hazardous or present significant impact on the environment. The technology developed fits into this principle and it is applicable for intrinsically safe disposal of hazardous organic wastes, particularly the organochloride, whose degradation has presented problems when using the most common methods, such as incineration. Pesticides banned, obsolete or discarded constitute a serious environmental risk around the world, especially in developing countries. The HCHS, or Hexachlorocyclohexanes also called BHC or Lindane, are organochloride insecticides that have been banned in most countries in the 70s and 80s. It is one of the compounds that constitute the group of so-called POPs, or persistent organic pollutants that are regulated internationally by the Basel Convention. Among the major POPs could be cited pesticides, dioxins and PCBs that represent, according to the United Nations Industrial Development Organization - UNIDO, one of the most serious and urgent problems to be faced, because on the one hand, its wide dissemination in environment and, secondly, because of its properties and characteristics, which determine its persistence in soil and water. The United Nations Environmental Protection - UNEP, for example, launched a global action for the establishment of an international treaty to reduce and / or eliminate emissions and discharges of 12 specific POPs, also known as "dirty dozen" (Aldrin, Chlordane, Mirex, Dieldrin, DDT, Dioxins, Furans, PCBs, Endrin, Heptachlor, Toxaphene and BHC), besides the adoption of scientific criteria for the possible inclusion of others. The molten salt oxidation is a process which promotes a more complete and safer decomposition of wastes considered critical, such as POPs, obsolete chemicals, extremely energetic compounds (propellants and explosives), etc.. In this process, the waste and oxidant (air or oxygen enriched air) are mixed below the surface of a turbulent bed of molten salts. The oxidation process occurs at temperatures lower than those of conventional incineration, but associated with the liquid phase reactions that occur, they are sufficient to promote complete and safe decomposition of hazardous wastes, particularly the organochlorides. In this case, the chlorine reacts with the sodium to form sodium chloride, which is retained in the salt bath. In this paper, we describe the activities of construction and development of a molten salt reactor for decomposition of hazardous wastes, as well as present some results from the decomposition of pesticides.

**Keywords:** thermal, decomposition, pesticides, molten, salts.