**Abstract**

This thesis describes the process of thermal utilization of meat and bone meal (MBM) and physical and chemical properties of this kind of wastes. The using of animal meal as the animal feed is currently a ban, because of the risk of recurrence of mad cow disease. The amount of the meat and bone meal in the European Union is estimated at millions tons, while in the Poland the amount is about 1,2 million tones. Currently this animal wastes as the MBM are stored, therefore there is a need for an utilization. Combustion of meat and bone meal allows to get rid of this type of wastes, completely eliminating the risk of prion disease and allow the use of the energy potential what is contained in the MBM.

In this paper a run was conducted to characterize an animal meal as a energy fuel derived from waste classified as renewable energy sources (OZE). It was found that the meal is an entirely different fuel than traditional fossil fuels or alternative solid fuels. The main differences concern the chemical composition, the content and composition of ash, the quantity of volatiles, the quantity of char and microstructural properties.

Examined and described the various stages of the process of thermal utilization which includes processes of drying, pyrolysis, combustion of volatiles and burning of char. The results and methodology of the research allow to better understand the mechanisms of the whole process. The researches allowed to determine the kinetic parameters that characterize the various stages of thermal decomposition. In the drop tube furnace has been experimentally determined of the times of various stages of combustion and their progress speed. The research a combustion of single grain determined a critical temperature of ignition and the temperatures of various stage of combustion. Studied the impact of the morphological types of MBM, grain sizes and the temperature of the process (ambient temperature) on the kinetic characteristics. Then, on the basis of experimental data and at the simple mathematical analysis of processes rated the importance of basic physical and chemical phenomena occurring during the thermal decomposition.

The overall objective of this study was a comprehensive characterize the animal meal in Poland and the development of guidelines for the design the system of combustion, which combusts a meat and bone with high efficiency and minimal emissions of pollutants into the atmosphere.

In addition, it was developed the technology for thermal treatment of waste including the animal meals and it was performed the verification tests for the pilot power plant with a capacity of 12MW which was built on the basis of this technology. The measurements fully confirm that the offer of technology is universal and can burns a various wastes, and a various types of biomass in any combinations (any mixtures), and the process of thermal decomposition and combustion of waste, using of this technology, provides the thermal conversion of chemical energy, contained in the waste and biomass, into heat and electricity, while maintaining the optimum thermodynamic efficiency of the technological system. The system efficiency varied in the range 88.36÷84.84%, depending on the load. The emission of sulfur dioxide is relatively low, at the range from 115 to 233 mg/nm3, the emission of carbon monoxide is 0,15% and the nitrogen oxide emission is at the level of 180÷221 mg/nm3.

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