SELF-HEATING PROPENSITY OF WASTE USING ISOTHERMAL CALORIMETRY

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Abstract

Increased recycling of waste has led to an extensive handling and temporary storage of different types during the last two decades. Self-heating is often experienced in waste storage facilities and if the heat generation is greater than the heat lost to the surroundings, it could lead to self-ignition Statistics show that 60-70 fires occur each year at Swedish facilities for waste handling and storage on an industrial scale. One of the main reasons for fires in stored waste is self-heating. Currently the level of understanding of self-heating is insufficient, and therefore, a methodology for determining the self-heating properties of waste is needed to provide the cause and to prevent incidents.

A methodology is being developed for measuring the self-heating potential of different types of waste using a sensitive and powerful technique known as micro-calorimetry. Using this approach heat release due to different process, e.g. biological or chemical reactions, can be measured.

Experiments were performed on different mixtures of a mixture of a burnable fractions of municipal solid waste and industrial waste, Heat release was measured at different temperatures between 40 °C and 80 °C. Results show that the technique can be used to differentiate heat release rate for waste obtained from different sources and potentially to determine what types of waste (and waste fractions) are mainly responsible for the production of heat. It can also be used to characterize new types of mixtures. The present study confirms that heat release can be higher in comparison to wood pellets and there is a need for further investigations and guidelines which can be used for the safe storage of waste.

Keywords: heat release rate, industrial waste, self-heating, isothermal calorimetry, storage

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