

Low – temperature conditioning of surplus activated sludge

Ewelina Nowicka

Thesis advisor: dr hab. Alicja Machnicka, prof. ATH

University of Bielsko – Biała

Faculty of Materials, Civil and Environmental Engineering

e – mail: enowicka@ath.bielsko.pl

ABSTRACT

The aim of the research was to demonstrate the destructive impact of solidified carbon dioxide to surplus activated sludge by:

- the physical changes,
- chemical changes of the liquid phase of sludge,
- change in gravity properties,
- hygienisation,
- impact on the efficiency of methane fermentation.

The process of freeze/thaw surplus activated sludge by dry ice was used in the following volume ratios of sludge to the solidified carbon dioxide 1 : 0.25; 1 : 0.5; 1 : 0.75; 1 : 1. The reference was a control sample, wherein the precipitate is not subjected to thermal destruction.

Freeze/ thaw surplus activated sludge by dry ice resulted in an efficient lysis of microbial cells and the release of organic and inorganic liquid phase to precipitate.

Conducted research on the impact of low – temperature conditioning of surplus activated sludge sedimentation and its thickening showed that solidified carbon dioxide significantly effected the structure of the tested material, by improving the properties of gravity.

Infrared analysis confirmed the structure destruction of the compounds building the microbial cells by freeze/thaw surplus activated sludge solidified carbon dioxide.

Microscopic analysis demonstrated the destructive effects of the solidified carbon dioxide due to the surplus activated sludge floc breakage, thereby contributing to the significant reduction partial homogenization and destruction of microorganisms morphological structured.

The process of low temperature conditioning caused a partial hygienisation of surplus activated sludge.

