Journée scientifique GEPROC 2013
Procédés et Matériaux durables

Université de Liège
15 novembre 2013

Impact of sludge storage duration on its dewatering and drying ability

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Keywords: Activated sludge, sludge flocculation, dewatering, convective drying, X-ray microtomography

Abstract

Annual production of sewage sludge in Europe is estimated at more than eleven million tons of dry matter [1]. Use in agriculture and incineration are the main ways of valorization. In this context, drying of residual sludge appears as an essential step after mechanical dewatering. It reduces the costs of storage, transport and allows the sludge stabilization. However, this process is highly energy consuming and still needs to be optimized as it constitutes an important economic and environmental issue [2].

The aim of this paper is to study sludge variability during storage duration, because sludge is a living material that can rapidly change. The study was performed on activated sludge samples collected after thickening from the waste water treatment plant of the Grosses- Battes, closed to University of Liège.

The samples were stored in a vessel at fresh room temperature and under stirring. Two types of experiments were conducted, the one (A) during three weeks with one trial a week and the other (B) during five days with one trial a day.

The Zetag 7587 conditioner was used for sludge flocculation prior to mechanical dewatering. Optimum dosage was determined by Capillary Suction Time (CST) measurements, it was closed to 18 g/kg $_{DS}$ The dewatering process was made using a normalized filtration-expression cell (AFNOR 1979) under 5 bar of pressure. , the cake dryness obtain was respectively 17 .and 15 $\%_{DS}$ for experiment A and B.

Before drying, sludge samples were extruded through a cylinder die of diameter and cut at a height of 14 mm, the weight of sample being finally about 2.5 g.

The drying experiments were carried out in a specially designed convective dryer, by controlling three operating conditions: the air temperature of 130 °C, the superficial velocity of 1 m/s and the absolute humidity of the air fixed at 0.005 kg_{water}/ $kg_{DS.}$ The same set up operation was applied for trial [3].

Figure 1 shows the curves of mass loss during the drying, obtained after 1, 8 and 15 days of storage. A poor repeatability of drying curves was observed for activated sludge samples with the increase of storage time on 3 weeks. Whereas figure 2 presents the drying curves for the one week storage, a good repeatability was obtained. No significant effect of sludge variability in a week has shown. It is thus advisable to use a sludge sample during five days and to consider a weekly renewal.

References

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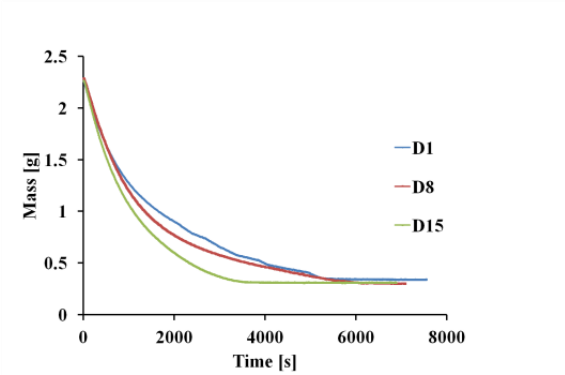

Fig. 1 - Mass loss during the drying at 1, 8 and 15 days of storage

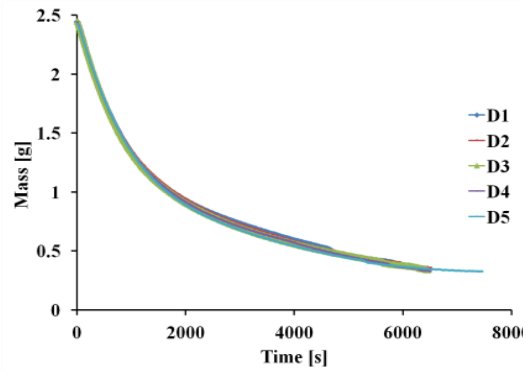

Fig.2 - Mass loss during the drying at 1, 2, 3, 4 and 5 days of storage