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Mechanical drying of plastic films

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Plastic films (e.g., shopping bags, flexible packaging, wraps) show different behaviour compared with rigid materials mainly due to its flexibility. During recycling, an efficient drying or dewatering of these materials is required to ensure the high quality of the recovered products. Despite the importance of good drying, this operation has not been studied at laboratory or pilot plant scale. In this work, the mechanical drying of high density polyethylene films by centrifugation has been assessed. A number of experiments were performed by using a laboratory centrifuge. The experimental results have been used to describe the process of water removal from the plastic flexible mass. Furthermore, the possibility of plastic cake formation, similar to the sludge cake, is suggested. The water is retained within the plastic cake due to three phenomenon: free water within the cake pores and voids, water maintained by capillarity (superficial and pendular) and the water trapped due to the tortuosity of the plastic mass. The experimental results showed that an optimum side length exists. The moisture content is minimized when the flake side lies between 1 and 2 cm. Finally, it has been found that the moisture content is a function of the plastic surface. Hence, the specific moisture content (the mass of water per total plastic surface) should be calculated to compare films with uneven thickness or made of different materials. In sum, the outcomes of this study could represent the fundaments of the further and more extensive research into the plastic films drying processes.

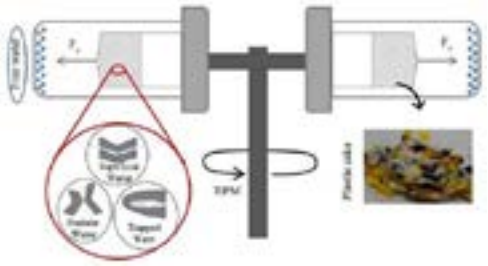

Figure 1: Mechanical drying of flexible plastic films by centrifugation at laboratory scale.

Recent Publications

1. Lazarevic D, Aoustin E, Buclet N and Brandt N (2010) Plastic waste management in the context of a European recycling society: Comparing results and uncertainties in a life cycle perspective. Resources, Conservation and Recycling 55(2):246-259.
2. Bos U, Makishi C and Fischer M (2008) Life cycle assessment of common used agricultural plastic products in the EU. Acta Horticulturae 801:341-349.
3. Wakeman R J (2007) Separation technologies for sludge dewatering. Journal of Hazardous Materials 144:614-619.
4. Svarovsky L (2001) Introduction to solid-liquid separation in: anonymous solid-liquid separation (Fourth Edition) Elsevier, ISBN: 9780750645683.

Biography

Oksana Horodytska is a PhD candidate in Chemical Engineering within the research group: Waste, Energy, Environment and Nanotechnology (WEEN) at the University of Alicante. She has been interested in waste management from her early days at the University where she started to work on the recovery of the waste ink from the printing industry. This experience helped her to develop a full awareness of the global waste generation issue and, thus, encourage her to embark on a research project based on the plastic films waste recycling. She believes that the plastic materials perfectly meet the customer´s requirements and supports their use for a large variety of applications. However, she also believes that high efficient recycling technologies are required to ensure the sustainable development of this industry.

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