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Hydrothermal Liquefaction of Mixed Food and Plastic Waste From Supermarkets

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Abstract

Every year in Sweden, more than 70 000 tonnes of expired food with the packaging from the supermarkets are discarded without passing through proper sorting (Food waste volumes in Sweden Reports). Separating plastic packaging and food waste from retailers requires a lot of effort, is time consuming and thus costly. Therefore, in most of the cases the waste is not separated and plastic packaging together with the expired food ends up on the same waste fraction. The hydrothermal liquefaction (HTL) is a promising technology that can be applied into such heterogeneous waste fractions. This mild temperature thermal treatment process can be used for treating food waste together with the plastic packaging without sorting. The proposed recycling route of HTL is aiming to introduce a new alternative recycling towards the concept of circular economy. Thermochemical processes are the foundation for recirculation of secondary raw materials, decomposes organic matter into lower molecular weight compounds. The products of HTL are hydrocarbon rich bio-oil that can be used for production of secondary raw materials and combustible gas that can supply the process with the energy needs. The Hydrothermal Liquification (HTL) has been tested for several applications in the past with positive results. The main advantage of this process is that it can tolerate high moisture content of the feedstock, so no time and energy consuming drying of the feedstock prior to the process is needed (Dimitriadis and Bezergianni, 2017). In the case of mixed food waste with plastic packaging, the moisture content of the waste fraction is expected to be high, which makes HTL an attractive option. Another advantage is rather low temperature of the process, which results in lower energy consumption compared to other thermochemical processes. Using these processes, the part of waste that goes to energy recovery can be minimised, leading to lower CO_2 emissions. The plastics PS, PP, PC and PET were experimentally investigated, since they constitute the most common plastics in waste from the supermarkets. Results indicate that the PC plastic can be recovered with high efficiency as its monomer, bisphenol (93% yield), while the experiments conducted on the mixture of plastics generates compounds that are difficult to purify. The food materials introduced on the simulated waste fraction

were according to the data acquired from the nutrient label for every product was thrown away during this researcher was conducted. The compounds generated from food could be used mostly for energy recovery since their applications even if purified are limited.

References

Food waste volumes in Sweden Reports, (n.d.).

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Keywords: Hydrothermal liquification, HTL, supermarkets waste, food waste, feedstock recycling

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