

**VALORIZATION VIA PYROLYSIS OF END-OF-LIFE PLASTICS FROM WEEE****M.A. Charitopoulou<sup>1\*</sup>, A.A. Lappas<sup>2</sup>, D.S. Achilias<sup>1</sup>**<sup>1</sup>Department of Chemistry, Aristotle University of Thessaloniki, Thessaloniki, Greece<sup>2</sup>Centre for Research & Technology, Themi, Greece(\*[cmariaa@chem.auth.gr](mailto:cmariaa@chem.auth.gr))**ABSTRACT**

The rapid economic and technological advances, over the last decades, led to a rise in the consumption of electric and electronic devices; resulting in large amounts of waste electric and electronic equipment (WEEE). Recycling of WEEE is a challenge because of the presence of different materials including glass, metals and plastics; plastics account for almost 30% of WEEE. Pyrolysis is an environmentally friendly recycling method, during which the plastic waste can be valorized and transformed into useful products, such as secondary valuable materials or monomers <sup>[1,2]</sup>. In this work various plastic samples gathered from WEEE, including televisions, computers, printers, remote controls and a calculator were collected from a recycling plant and from household appliances. All samples were initially reduced in size and then analyzed by various techniques. The valorization of the plastic waste took place via pyrolysis. The plastic samples were subjected to TGA analysis in order to estimate their degradation behavior and DSC for the evaluation of their glass transition temperature. Pyrolysis was held at 440 °C, using a bench-scale fixed bed reactor. From the results obtained it was found that the maximum degradation temperature was above 400°C in all cases tested. According to the DSC results, in all cases there was received only one glass transition temperature (T<sub>g</sub>), regardless of the type of the polymer present in each sample. Pyrolysis results showed that the degradation products fell under three main categories: total liquid product, gas and solid. The products distribution seemed to be affected by the type of the polymer(s) present in each sample. For instance, in case of a television sample which was a blend of PC/ABS the liquid pyrolysis fraction was ~41% and the solid fraction was ~43%. On the other hand, in case of a television sample that consisted of HIPS, the liquid fraction prevailed (~90%); whereas the solid fraction was almost negligible (2.5%). In all cases tested the liquid fraction was analyzed in detail; and it was found to comprise aromatic compounds mainly and, in some cases, phenolic compounds.

**KEYWORDS:** WEEE, Valorization, Pyrolysis, Recycling, Plastic waste**REFERENCES**

- [1] Charitopoulou MA, Kalogiannis KG, Lappas AA, Achilias DS. (2021). *Environ. Sci. Pollut. Res.*, 28, 59190–59213.
- [2] Ma C, Yu J, Wang B, Song Z, Xiang J, Hu S, Su S, Sun L. (2020). *Renew. Sust. Energ. Rev.*, 61, 433–450.