

High Temperature Removal of Halogenated Compounds from Pyrolysis of Waste Plastic Polymers

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Pyrolysis of waste plastic polymers represents a viable option for processing the increasing amount of plastic waste to utilize it for the production of new materials and substitute the current fossil feedstock by the products of recycling with the intensions of circular economy. However, waste plastics can contain problematic components such as halogenated substances, which are used as additives or are an inherent part of the polymer itself. The main source of the halogenated substances in plastics is polyvinylchloride (PVC). Among other materials are additives containing bromine, mainly in the form of flame retardants.^{1,2}

Halogenated compounds may transfer during pyrolysis into the pyrolysis oil, which is the main output stream, and could cause problems (e.g. corrosion, catalyst poisoning) in subsequent refinery technologies. Therefore the content of halogens in this stream has to be kept at very low concentration. Halogens in pyrolysis products are mainly present in the form of inorganic volatile substances (HCl, HBr) or halogenated hydrocarbons.^{3,4}

Removal of these compounds is therefore a very important task. Using solid sorbents at high temperatures is one possible solution. The inorganic form can be removed on a solid sorbent while the organic form has to be first transferred into the inorganic form.^{2,3}

In this research the performance of selected adsorbents was tested in laboratory apparatus under model conditions with the mixture of HCl and simple non-condensing hydrocarbons. In the next phase, the removal of HCl in the presence of condensing hydrocarbon fraction will be tested as well as the removal of organically bonded chlorine. Currently we have evaluated number of sorbents out of which a few have shown promising results.



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