

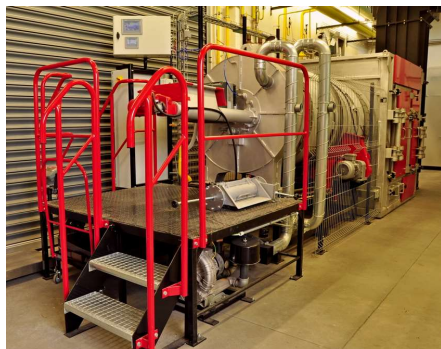
Technology for energy utilization of used polymeric parts from discarded cars

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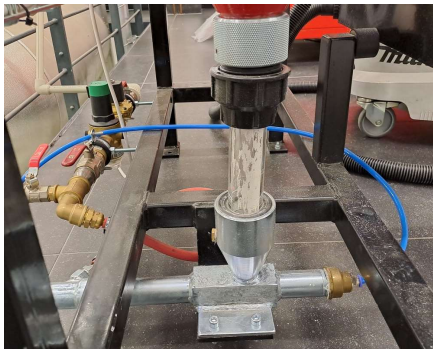
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Motivation

Despite the high level of material processability of parts of used cars, it is possible to find a number of its components that are advantageous to use energetically. The presented result specifies the conditions for burning used polymer-based car parts with regard to ensuring maximum energy gain and minimizing negative environmental burden. The obtainable result is solving mainly the regulation of acid parts of emissions that arise during the combustion process of used polymeric parts from end-of-life vehicles.



Waste incinerator



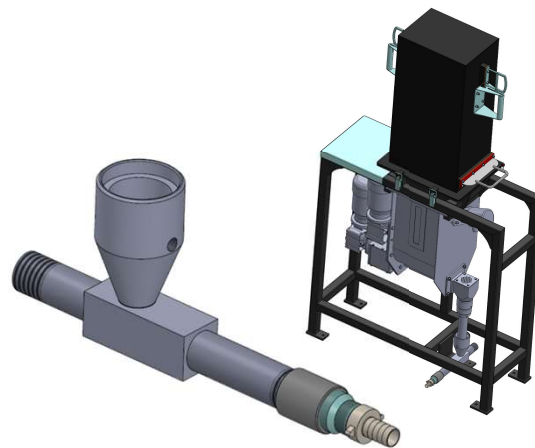
Sorbent dosing device

Technical parameters

- Two types of alkaline sorbent containing calcium hydroxide with a surface area of $70 \text{ m}^2 \cdot \text{g}^{-1}$ (+/-20 %) are dosed into the flue gas behind the flue gas cooler at a temperature of around $130 \text{ }^\circ\text{C}$ (+/-10 %).
- The amount of dosed sorbent is min. 1.5 wt% relative to the amount of incinerated waste.
- Significant decrease of concentration of HCl, HF and SO_2 can be achieved.

Treated waste material

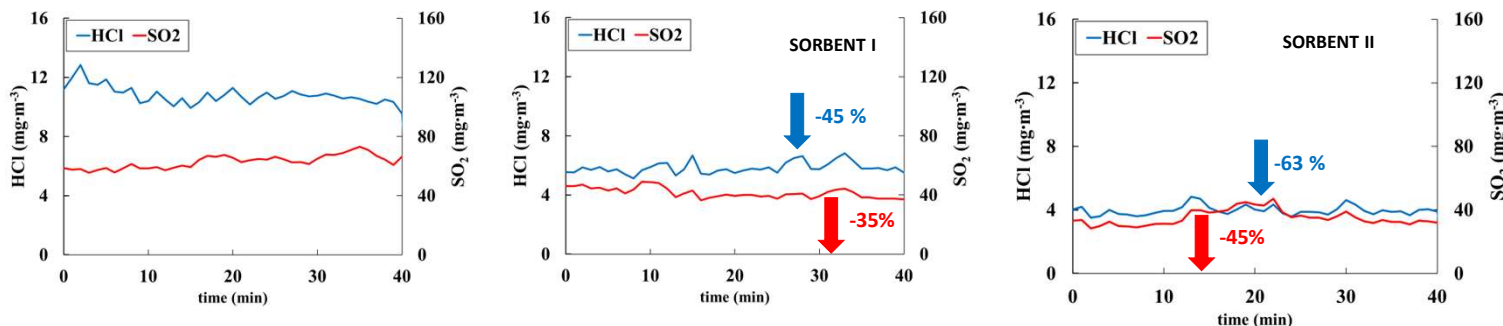
- Automotive waste of a polymeric nature with a calorific value of $25 \text{ MJ} \cdot \text{kg}^{-1}$ (+/-10%) and with a chlorine content of up to 1%.
- The moisture content of car waste is up to 2 wt%. The carbon content exceeds 50 wt%.
- Car waste is crushed into fragments of an elongated nature (dimensions in the longitudinal direction are up to 5 cm).
- The combustion process took place in a rotary kiln equipped with a secondary chamber. The temperature in the reaction chamber was $770 \text{ }^\circ\text{C}$ and the flue gas temperature at the outlet of the secondary chamber reached $890 \text{ }^\circ\text{C}$.
- By optimizing the residence time of the waste in the rotary kiln, the carbon content in the bed ash can be reached at a level lower than 2 wt%. The total production of bed ash is lower than 15 wt%.



3D model of sorbent dosing device with ejector

Results and Conclusion

The concentration of HCl can be reduced by more than 45%, the concentration of HF by more than 15% and the concentration of SO_2 by more than 35%. All the values of the drop in concentration are valid for comparison with the state when the sorbent is not dosed. The values of emission concentrations of monitored components - solid pollutants, SO_2 , CO, TOC, HCl and HF (cSNR) are lower than the limit values established by legal regulations. Dry filtration on a fabric polyamide filter is sufficient to reach acceptable values of the listed emission concentrations.



Intellectual property rights

Technology for the thermal treatment of waste from car wrecks from the point of view of maximum energy yields and minimum emissions ; Verified technology; Internal result identification code 011/08-12-2022_OT; Registration date 8. 12. 2022



Acknowledgement

The presented verified technology was developed within the project EG19_262/0019993 Technology for optimal thermal treatment of automotive waste and LM2018098 Energy Waste Recovery and Gas Treatment.