

# Tar analyses from the household chimneys to identify the possible packaging waste burning in small-scale heaters

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Keywords: tar, waste and wood combustion, PM<sub>x</sub>

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There is an urgent need to improve understanding the effects of solid waste burning on the air quality, public health and potential impact on climate change (Kawamura and Pavuluri, 2010). Household waste burning can be an important organic aerosol source. Currently, this source is not included in most emission inventories, and there are only few studies available (Mohr et al., 2009).

Plastic materials cover the biggest fraction of the composition of municipal solid waste. Major compound in smoke from burning plastics include terephthalic acid used predominantly in beverage bottles and similar containers etc. The specific key organic tracer for burning of plastics found in atmospheric particle samples also include 1,3,5-triphenylbenzene, which occurs in regions where plastic waste is burned (Simoneit et al., 2005). This suggests that waste composition is largely composite of plastic material, and such waste burning can be traced using the characteristic species detected in the smoke of plastics and refuse burnings (Kumar et al., 2015). Currently, there are only few studies related to tracers for plastic waste burning aerosols.

According to the members of Estonian Chamber of Chimney Sweepers evaluation, in addition to the wood, paper and cardboard waste, people also tend to burn Tetra Pak's, sanitary napkins, diapers, various plastic packages, shoes, textile etc. It is difficult to assess the exact number of people who still practice burning MSW since such activities are done clandestinely. PMF analysis of Aerosol Chemical Speciation Monitor (ACSM, Aerodyne Inc.) dataset showed that during the heating season, plastic burning aerosols can be identified in residential areas (Maasikmets et al., 2015).

Tar is formed during gasification in a series of complex reactions. The formation of tar is highly dependent on the reaction conditions and tend to be refractory. Furthermore, tar is difficult to remove by thermal, catalytic or physical processes, therefore it can condense or polymerize into more complex structures in exit pipes (Li and Suzuki, 2009). often tars are found in household chimneys as well.

## Methods and results

In order to identify and evaluate the possible plastic package burning in household heaters and stoves tar samples from the chimneys were collected. This was done in co-operation with local chimney sweepers who

collected tar samples during the routine chimney cleaning. In total around 25 samples (a' 100 g) were collected. Samples were packed in foil and stored in a freezer (-20°C). From the tar samples terephthalic acid, 1,3,5-triphenylbenzene, 16 PAH-s and heavy metals (Al, As, Sb, Cd, Co, Cr, Mn, Mo, Ni, Pb, Se, V, Fe, Zn, Cu) were analyzed. Tar samples were analysed according to the Tar protocol proposed by the Simell et al. (2000).

In this research we have found that the packaging waste burning in household heaters and stoves is important topic to deal with it.

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