

A Review on Benzo(a)pyrene Emission Factors from Biomass Combustion

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Abstract : Benzo(a)pyrene (BaP) is the most widely investigated representative of Polycyclic Aromatic Hydrocarbons (PAH) as well as one of the most toxic compounds in this group. Since 2013 in the European Union a limit value for BaP concentration in the ambient air is applied, which was set to a yearly average value of 1 ng m⁻³. Several reports show that in some regions, even where industry and traffic are of minor impact this threshold is regularly exceeded. This is taken as proof that biomass combustion for heating purposes contributes significantly to BaP pollution. Several investigations have been already carried out on the BaP emission behavior of biomass combustion furnaces, mostly focusing on a certain aspect like the influences from wood type, of operation type or of technology type. However, a superior view on emission patterns of BaP from biomass combustion and the aggregation of determined values also from recent studies is not presented so far. The combination of determined values allows a better understanding of the BaP emission behavior from biomass combustion. In this work the review conclusions are driven from the combination of outcomes from different publication. In two examples it was shown that technical progress leads to 10 to 100 fold lower BaP emission from modern furnaces compared to old technologies of equivalent type. It was also indicated that the operation with pellets or wood chips exhibits clearly lower BaP emission factors compared to operation with log wood. Although, the BaP emission level from automatic furnaces is strongly impacted by the kind of operation. This work delivers an overview on BaP emission factors from different biomass combustion appliances, from different operation modes and from the combustion of different fuel and wood types. The main impact factors are depicted, and suggestions for low BaP emission biomass combustion are derived. As one result possible investigation fields concerning BaP emissions from biomass combustion that seem to be most important to be clarified are suggested.

Keywords : benzo(a)pyrene, biomass, combustion, emission, pollution

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