

Unforeseen dioxin formation in waste incineration

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Dioxins forms faster, at lower temperatures and under other conditions than previously thought. This may affect how we in the future construct sampling equipment, flue gas filtering systems for waste incineration and how to treat waste incineration fly ash. These are some of the conclusions Eva Weidemann draws in her doctoral thesis, which she defends at Umeå University on Friday the 26 of September.

Dioxins is a collective name for a specific group of chlorinated organic molecules where some exhibit hormone disrupting and carcinogenic properties. Dioxins can form in [waste incineration](#), as the flue gases cool down.

"When you incinerate waste, some dioxin formation is inevitable, but with the modern flue gas cleaning systems the emission through the stack is minimized, The [dioxins](#) are filtered from the [flue gases](#) and end up in the [fly ash](#)", says Eva Weidemann.

That dioxins form is known since the 80's but in the thesis work Eva Weidemann shows that these toxic substances can form under previously unseen conditions. Amongst other findings she describes formation of dioxins within the flue gas filters of a full scale waste incineration plant.

"The intended function of the filters is to remove the dioxins from the [flue gas](#), but I found that they actually formed instead. The dioxin emissions from the plant still falls below the legislative limits, but that the formation takes place in the first place is bad news. We have identified key parameters for the formation and approximate mechanics. My hope is that our findings can contribute to better filter design in the future," says Eva Weidemann.

Another problem addressed by the thesis is that dioxins can form within the sampling equipment used during high temperature sampling and Eva Weidemann has investigated how to carry out high temperature dioxin sampling to avoid this occurrence. The solution is more efficient cooling at a critical stage, which then prevents the formation of dioxins.

Eva Weidemann have also looked at how dioxins in waste incineration fly ash is influenced by different of hot and cold treatments to find possible methods to detoxify the ashes. The results are not entirely conclusive, but they provide puzzle pieces that can help.

"If we could find a good detoxification method for the fly ashes, it would be an environmental benefit from a dioxin perspective but also in other aspects such as recycling", says Eva Weidemann.

Waste incineration is despite the dioxins a good option to utilize the energy in waste that cannot be sorted and recycled. The waste is reduced in weight and volume, and bacteria and odor disappears. In addition, combustion a more climate friendly handling method in comparison to landfilling. The methane gas that forms as the waste decays is a worse greenhouse gas than carbon dioxide formed during combustion. The pollution problem attributed to the method in the 80's and 90's are today nearly eliminated with the help of advanced filters and purification systems, as well as periodic emission controls.

More information: The thesis is available online:
urn.kb.se/resolve?urn=urn:nbn:se:umu:diva-92765

Provided by Umea University

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