

Removal of Mercury from Crematoria

English Summary

During cremation, mercury stored in body tissues and the teeth is released. Calculations have shown that about 200 kg mercury are released annually in Sweden in the flue gases from crematoria. Work has been in progress over the past 15 years on methods to reduce this emission.

The most common method, and that which is advocated by the major filter manufacturers, is to remove the mercury by adsorption onto textile filters with an absorbent coating, such as carbon, lime or sulphur. This can be referred to as the adsorption technique, as it is based on the adsorption of mercury onto the filter. It also illustrates the disadvantage of the method, as adsorption does not provide stable bonding.

Inspection of 14 reports from various crematoria equipped with adsorbent filters has revealed that, on average, 60 % of the mercury does not reach the filters, but diffuses out of the plant. The material recovered from the filters, the so-called residual, contains only modest amounts of mercury which do not reflect the amount entering the furnaces. This residual must then be treated by chemical binding to selenium or sulphur.

It is difficult to calculate the amount of mercury entering crematoria. Naturvårdsverket (The Swedish Environment Protection Board) recommends a value of 3 g per cadaver be assumed, but our tests show that this is probably an underestimate. This estimate leads crematoria staff to believe that their flue gas cleaning system is functioning well, although the amount released by diffusion before reaching the filter is high. The total degree of removal is thus low.

The method that I propose is based on the chemical and physical concepts of absorption, chemical binding, vapour pressure and condensation. This is the method used to inactivate the mercury-containing gas in fluorescent strip lights and is called the absorption method. The element selenium (Se) is placed in the furnace. When mercury is released it is directly absorbed by the selenium, forming the extremely stable compound mercury selenide (HgSe).

Heated mercury has a very high vapour pressure, while mercury selenide has a very low vapour pressure. This compound is thus present throughout the process. The flue gases leaving the furnace are then led through an effective condenser where the mercury selenide condenses on the walls of the tubing. The condenser is regularly cleaned to remove the deposit.

In this way, the mercury is completely processed at the crematorium, there is no loss, and the waste needs no further treatment. The degree of removal is about 98%* of the mercury entering the furnace.

* This is the measured value, but as the uncertainty in the measurement of mercury is generally 10%, values of mercury reduction above 90 % are not usually given.

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