

ESTIMATION OF ENVIRONMENTAL MERCURY LEVELS AND THEORITICAL EXPOSURE ANALYSIS OF MERCURY



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ABSTRACT

Mercury contamination in aquatic and terrestrial ecosystem is an environmental problem worldwide. Mercury is a known human neurotoxin and has traditionally has been used in medicine, cosmetics, paints, laboratory equipment as well as tooth fillings. Mercury is ubiquitous in the environment and can be found either naturally (Geothermal process, biomass burning, volcanoes) or anthropogenic ally (coal-fired utility plants, gold mining operations and discharge from chlor-alkali and cement production). The airborne mercury particles from atmospheric sources that reach aquatic systems through rainfall can be converted to methyl mercury, which is the most toxic form of mercury. Use of thermal release to obtain mercury speciation information has long been used. In this work, Direct mercury analyzer(DMA-80) is used for total mercury determination. The performance of this equipment for mercury speciation was compared with the use of other mercury thermal desorption equipment that employs continuous heating. The two main advantages of using the DMA-80 were that it enabled quantitative analysis including detection of Hg[0] and analysis of very small quantity of samples.



ANALYSIS OF MERCURY

One of the biggest environmental concerns caused by coal-fired power plants is the emission of mercury (Hg), which is toxic metal. To control the emission of Hg from coal-derived flue gas, it is important to understand the behavior and speciation of Hg as well as the interaction between Hg and solid materials in the flue gas stream. In order to evaluate the potential health risk of population through consumption of fish and seafood, the weekly intake rates for all species were estimated. The provisional tolerable weekly intake (PTWI) value for mercury is 5 µg/kg body weight. Daily fish consumption by the Malaysian population is 160 g/person/day with an average weight of an individual of 64 kg. The PTWI values for mercury by an adult (µg/kg-1 body weight) for each species were calculated using the formula below:

$$\text{PTWI } (\mu\text{g/kg-1}) = \frac{(\text{Mean Hg in fish } (\mu\text{g/g-1 wet weight}) \times \text{Weekly fish consumption (g)})}{\text{Body weight (kg)}}$$

After that maximum, minimum, mean, standard deviation and confidence values are calculated.

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