



Science of The Total Environment

Cancer risk assessment from trihalomethanes in drinking water

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Abstract

This study intends to calculate the lifetime cancer risks resulting from intakes of trihalomethanes (THMs) in drinking water based on the presence of each THM species. The slope factors for each THM species are used, combined with exposure model and Monte Carlo simulations, to calculate the cancer risks with consideration of different exposure routes (oral ingestion, inhalation and dermal absorption). The results revealed that the **highest risk comes from the inhalation exposure to chloroform during showers**, which also dominates the total risk associated with chloroform exposure. For dichlorobromomethane and chlorodibromomethane, inhalation exposure also plays an important role for total risks; however, contribution from the oral consumption cannot be ignored for these two compounds. Bromoform contributes the least cancer risk among the four THM species, with a risk factor two orders of magnitude smaller than the other three THM species. For all of the four THM species, exposure from dermal absorption is not significant when compared with oral ingestion and inhalation exposures. This study also uses the THMs data collected from Taiwan to calculate the cancer risks associated with THM exposures in different areas of Taiwan. Due to the variations of the THMs compositions, it is observed that higher concentrations of total THMs do not necessarily lead to higher cancer risks. Areas with higher bromide concentration in raw water and often with higher total THM concentration may actually give lower cancer risk if the THMs formed shift to bromoform. However, this also leads to the violation of THM standards since bromoform has much higher molecular weight than chloroform. Based on the results of the cancer risks calculated from each THM species, the regulatory issue of the THMs was also discussed.