

CONCENTRATION DISTRIBUTION OF ARSENIC AND  
SELENIUM IN THE MARINE ATMOSPHERE  
AND THEIR EMISSION FROM THE OCEAN  
(ABSTRACT)

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For estimation of concentration distribution of arsenic and selenium in the marine atmosphere and their sources, airborne particulate matter was sampled at various points along the route of the research ship SHIRASE over the West Pacific Ocean, Indian Ocean and Antarctic Ocean. Measurements of concentrations of selenium and arsenic in the marine atmosphere were carried out.

A high volume air sampler (Kimoto Denshi Kogyo KK's Model 120) with Quartz fiber filter (Pallflex 2500 QAT-UP 20×25 cm) was used for sampling airborne particulate matter. The sampling air flow rate was 1000–1500 l/min, and the sampler was operated for one day. Sampled airborne particulate matter was subjected to acid decomposition with nitric acid-hydrogen peroxide solution to make a sample solution. Selenium was determined by fluorescence HPLC using 2,3-diaminonaphthalene. Concurrently, arsenic was determined by hydride generation atomic absorption spectrophotometry using a liquid nitrogen cold trap.

In general, concentrations of selenium and arsenic in the atmosphere in urban areas are several thousands of pg/m<sup>3</sup> as represented by values in Yokohama. The concentrations of selenium and arsenic along the route between Tokyo and the Philippines over the West Pacific Ocean were 370 pg/m<sup>3</sup> (selenium) and 940 pg/m<sup>3</sup> (arsenic) on an average. These concentrations were higher than those in the other marine areas. It is considered that the marine area between Tokyo and the Philippines is influenced from anthropogenic sources in East Asia. However, in the marine area between the Philippines and Fremantle over the West Pacific Ocean and Indian Ocean, where the influence from anthropogenic sources is low, these concentrations were 210 pg/m<sup>3</sup> (selenium) and 64 pg/m<sup>3</sup> (arsenic) on an average, as low as 1/20–1/50 of the concentration in the urban areas. In the Antarctic Ocean isolated from the anthropogenic sources, atmospheric concentrations were far lower: 110–160 pg/m<sup>3</sup> (selenium) and 45–58 pg/m<sup>3</sup> (arsenic) on an average. Especially, the arsenic concentration was far lower. These concentrations in the atmosphere can be regarded as background values for the marine atmosphere.

However, a comparatively high concentration of selenium was observed several times over the Antarctic coast. Biological activity in sea water is especially high in this marine area. Therefore, it is considered that selenium in the marine atmosphere near the Antarctic Continent does not originate from the anthropogenic sources on land but organic selenium produced by microorganisms in sea water.

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