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[Lab. of Public Health]

**Aldehydes as mutagens formed by ozonation of humic substances.**HIROAKI MATSUDA, TAKAHIKO SATO\*, HISAMITSU NAGASE, YOUKI OSE,  
HIDEAKI KITO, KATSUMI SUMIDA

Humic substances and p-hydroxybenzaldehyde, one of their components, were ozonated and quantitative analysis of the mutagenic aldehydes (formaldehyde, acetaldehyde, glyoxal, glyoxylic acid and methylglyoxal) was performed. Glyoxal and glyoxylic acid were the main mutagenic compounds. The ozone-treated solutions were flowed through a granular activated carbon (GAC) column and the KMnO<sub>4</sub> consumed of the effluent decreased to about 40-50 %. Most of the aldehydes formed by ozonation reduced, but glyoxal increased.

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**Generation of mutagenicity by ozonation of humic substances' components.**MITSUNOBU HIBINO, HIROAKI MATSUDA, TAKAHIKO SATO\*, YOUKI OSE,  
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Components of humic substances, such as vanillin, syringaldehyde, vanillic acid, and di-n-butylphthalate, were ozonated and subjected to the mutagenicity assay using *Salmonella typhimurium* TA 98 and 100 with and without S9 mix. The strong mutagenic activity was found on all components except di-n-butylphthalate by strain TA 100 with and without S9 mix. Substances with strong mutagenic activity in ozonated vanillin were water-soluble and were slightly extracted with benzene, dichloromethane and ethyl acetate. Following gel chromatography on Sephadex G-10, the strong mutagens generated by ozonation were found with molecular weights > 300.

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[Lab. of Public Health]

**Mutagenicity from ozonation of humic substances.**HIROAKI MATSUDA, YOUKI OSE, TAKAHIKO SATO\*, HISAMITSU NAGASE,  
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Eight structural components of humic substances were ozonated. Mutagenic activity was found on TA 100 for all ozonated components. Ozonation products from p-hydroxybenzaldehyde, one of the components, were determined by GC-MS and aldehydes, ketones and carboxylic acids were identified. Among these products, acetaldehyde, formaldehyde, glyoxal, methylglyoxal and glyoxylic acid were recognized to be mutagenic. Furthermore, p-hydroxybenzaldehyde was first ozonated and then chlorinated. A great variety of chlorinated organic compounds, many of which are known mutagens, have been identified by GC-MS in the ether extract. Aldehydic products by ozonation were identified from ozonation followed by chlorination of humic substances and p-hydroxybenzaldehyde.