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Their structures were elucidated on the basis of nuclear magnetic resonance (NMR) spectra and confirmed by leading to their crystalline 2,4-dinitrophenylhydrazone. II (alkyl=ethyl and *n*-butyl) were strongly mutagenic to *Salmonella typhimurium* TA 1535 and *Escherichia coli* WP 2 *hcr*$^-$ without S 9 mix, while II with *t*-butyl group was not mutagenic. The formation of II from I is considered to proceed by the nitrosation of I for itself indicating a possible involvement of formylmethyl metabolite in the carcinogenesis of nitrosamines having 2-hydroxyethyl group.

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Chemical and Mutagenic Properties of α-Phosphonooxy Nitrosamines

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[Ninth International Meeting on N-Nitroso Compounds : Relevance to Human Cancer (Schloss Weikersdorf, Baden, Austria, September, 1986) で発表]

Chemical and mutagenic properties of the products of solvolysis of α-acetoxy nitrosamines in phosphate buffer was investigated. α-Acetoxy nitrosamine decomposed two ways in aqueous phosphate buffer ; *O*-acyl fission yielded α-hydroxy nitrosamine which decomposed into aldehydes and alcohols, while *O*-alkyl fission gave a resonance hybrid of α-*N*-nitroso carbonium and iminium ions, which was trapped with phosphate and afforded α-phosphonooxy nitrosamine. Formation of α-phosphonooxy nitrosamines was dependent on the structure of α-acetoxy nitrosamines ; those with secondary α-phosphonooxy group including cyclic nitrosamines were easily formed, while among those with primary phosphonooxymethyl group, only those with an alkyl group containing a branched α-carbon as isopropyl, *sec*-butyl and *tert*-butyl were isolated. They were good substrates of alkaline phosphatase and showed NMR spectrum due to the presence of phosphorus atom. They were decomposed by acid catalysis and the rate was dependent on the structure. They were directly mutagenic in bacterial tester strains except a compound with *tert*-butyl group. The strength of the activity was similar or stronger in *Salmonella typhimurium* TA 1535 and much weaker in *Escherichia coli* WP 2 and WP 2 *hcr*$^-$ than those of α-acetoxy nitrosamines. Stability in neutral aqueous solution and strong mutagenicity of α-phosphonooxy nitrosamine suggested their possible involvement in the metabolic activation as a precursor of α-hydroxy nitrosamine, and also in the organotropic carcinogenicity of

N-nitrosodialkylamine as a transport form.

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Activation of *N*-Nitrosodialkylamines by Near-ultraviolet Irradiation: Formation of Direct-acting Mutagens and DNA-Damaging Products

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[Ninth International Meeting on N-Nitroso Compounds : Relevance to Human Cancer (Schloss Weikersdorf, Baden, Austria, September 1986) で発表]

On near-ultraviolet (UVA) irradiation in a phosphate buffer, *N*-nitrosomorpholine (NMOR) and *N*-nitrosopyrrolidine (NPYR) were converted into direct-acting mutagens. The activated NPYR was fractionated and the active product was isolated. The compound was shown to be identical as α-phosphonooxy NPYR in several properties ; retention times in high pressure liquid chromatographies, mutagenic specificities and the potency, ultraviolet spectrum, and inactivation by phosphatase treatment. The photo-activation was inhibited by superoxide dismutase, and therefore superoxide is implicated as playing a key role in the active mutagen formation.

N-Nitrosoproline and eighteen other *N*-nitrosodialkylamines were irradiated with UVA in the presence of ϕX174 RFI DNA. The DNA underwent single-strand breaks giving the RFII DNA. This indicates that *N*-nitrosodialkylamines in general have this property. The DNA chain cleavage was inhibited both by superoxide dismutase and by hydroxyl-radical scavengers.

These results provide new aspects in the genotoxic mechanism of *N*-nitrosodialkylamines.

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