

Letters to the Editor

Hazard of Testing Smokeless Gunpowder with Nitric Acid

Dear Sir:

In the April 1982 issue (Vol. 27, No. 2, April 1982, pp. 318–329) of this journal, one of us (J.I.T.) reported on the characterization of smokeless gunpowder by strong acid color tests. Eight reagents used contained concentrated sulfuric acid; one test involved concentrated nitric acid.

There may, however, be a hazard connected with the testing with nitric acid of gunpowder containing diphenylamine and variously substituted diphenylamine derivatives. In strong nitric acid, the diphenylamine stabilizer may rearrange to form *N*-nitrosodiphenylamine. This has been confirmed experimentally by the present authors, with the *N*-nitrosodiphenylamine identified by high-performance liquid chromatography; the reaction conditions need not be particularly optimized in order for this compound to be formed.

Nitrosoaromatics are now strongly suspected of being carcinogenic. If the diphenylamine concentration in the gunpowder is on the order of 1%, and 1 mg of smokeless powder is tested, then 10 μg of diphenylamine could possibly be converted. Although the rearrangement to *N*-nitrosodiphenylamine is not likely to be efficient, there is nevertheless the possibility of a few micrograms being formed. Current thought concerning this material is that it should only be handled in a glove box, and not be broadcast throughout the laboratory as a result of an exothermic reaction in a porcelain spot tile.

We therefore recommend, on the basis of this potential hazard, that color testing of smokeless gunpowder with nitric acid not be conducted. No toxic hazard, apart from those applicable to any strong acid, would seem to be associated with the other eight sulfuric acid reagents originally described; sulfuric acid cannot cause diphenylamine to rearrange into the nitroso compound.

Dr. John I. Thornton
Professor of Forensic Science
School of Public Health
University of California
Berkeley, CA 94720

Dr. Edgard O'N. Espinoza
Chief, Criminalistics Section
National Fish and Wildlife Forensics Laboratory
1490 East Main St.
Ashland, OR 95720