

Asbestos can be screened quickly in the field by a two-part test. In this test magnesium is liberated from chrysotile, and a blue-colored complex is formed; or iron is liberated from amosite or crocidolite, and a red-colored complex is formed. Before the acid wash steps were added to the procedure, the presence or absence of asbestos was correctly indicated in 126 out of 174 samples. Forty-eight samples gave false positive reactions, but since there were no false negative reactions, the test was considered practical. After adding the acid wash steps, the chemical test correctly indicated the presence or absence of asbestos in all 41 samples tested. There were no false positive or negative reactions. The results were verified by transmission electron microscopy, X-ray diffraction, or dispersion staining.

Quick screening test for asbestos

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PLAINTIFF'S EXHIBIT

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Introduction

The three most common types of asbestos are chrysotile ($3 \text{ MgO} \cdot 2 \text{ SiO}_2 \cdot 2 \text{ H}_2\text{O}$), amosite ($1.5 \text{ MgO} \cdot 5.5 \text{ FeO} \cdot 8 \text{ SiO}_2 \cdot \text{H}_2\text{O}$), and crocidolite ($\text{Na}_2\text{O} \cdot 3 \text{ FeO} \cdot \text{Fe}_2\text{O}_3 \cdot 8 \text{ SiO}_2 \cdot \text{H}_2\text{O}$). Chrysotile accounts for about 90% of all asbestos processed. Amosite is used primarily for heat and pipe insulation, and crocidolite is used to make acid-resistant cement pipe and electric battery cases. Almost 3000 asbestos products are manufactured today; the construction industry uses about two-thirds of all asbestos for soundproofing and fireproofing.⁽¹⁾

Because of the dangers to humans from asbestos and the need to be aware of its presence in any environment, the National Institute for Occupational Safety and Health (NIOSH) developed a quick and simple method for on-the-spot testing for asbestos in samples of bulk material. In this test, magnesium or iron is released from asbestos and reacts with color-forming reagents to indicate the possible presence of asbestos.⁽²⁾ The chemical test can be used directly in the field; and, if the presence of asbestos is indicated by the chemical test, samples should be submitted to the laboratory for more exhaustive confirmation by the use of dispersion staining, transmission electron microscopy (TEM), or equivalent methods.⁽³⁻⁴⁾ X-ray diffraction analysis, for example, has been shown to be feasible for the detection of asbestos in bulk samples and filter samples.⁽⁵⁻⁸⁾

apparatus

Teflon dish or white plastic plate
Plastic or glass rod
Plastic squeeze bottle for quick wash-down
Dropping plastic pipet

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15 mL disposable plastic beaker
25 mm size 0.8 μm mixed cellulose ester filter
25 mm size polyvinyl chloride filter
25 mm Swinnex filter holder and gasket
10 mL disposable plastic syringe

reagents (reagent grade)

Phosphoric Acid, concentrated
10 N sodium hydroxide -
Dissolve 40 g of NaOH in 100 mL of water

Mg Reagent -

Dissolve 1 mg of p-nitrophenylazo- α -naphthol in 100 mL of 2 N NaOH. Age at least a day. This reagent has a shelf life of 3 months.

Hydrofluoric acid -

Dilute 20 mL of HF with 20 mL of water. Add 0.6 mL of concentrated HCl.

Fe Reagent -

Dissolve 2 g of 1,10-phenanthroline in 50 mL of ethanol. This reagent is stable over 3 months.

Glycerin, reagent grade

Acetic acid, concentrated glacial

Sulfuric acid, concentrated

Double de-ionized water

procedure

magnesium test

1. In those instances where the presence of acoustical plaster or other calcium-bearing materials is suspected, positive reactions will be obtained with the magnesium test. To eliminate the calcium interference, the following procedure is used. Place a portion of the bulk sample, about the size of a large pea, in a plastic beaker. Add a few drops of

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