



Designation: D 5197 – 9703

Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)¹

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1. Scope

1.1 This test method covers a procedure for the determination of formaldehyde (HCHO) and other carbonyl compounds (aldehydes and ketones) in air. ~~This test method is most specific for formaldehyde but, with modification, at least 13 other~~ Other carbonyl compounds ~~e~~ that have been validated for determination by this method include acetaldehyde, acetone, propanal (propionaldehyde), methacrolein, 2-butanone (methyl ethyl ketone), butyraldehyde, benzaldehyde, isovaleraldehyde, valeraldehyde, o-tolualdehyde, m-tolualdehyde, p-tolualdehyde, hexanal, and 2,5-dimethylbenzaldehyde. Acrolein and crotonaldehyde may be quantified with good accuracy following special precautions (see 10.2.5).

1.2 This test method involves drawing air through a cartridge containing silica gel coated with 2,4-dinitrophenylhydrazine (DNPH) reagent. Carbonyl compounds readily form stable derivatives with the DNPH reagent. The DNPH derivatives are analyzed for parent aldehydes and ketones utilizing high performance liquid chromatography (HPLC). The sampling procedure is a modification of U.S. EPA Method TO-11A (see 2.2).

1.3 This test method is based on the specific reaction of carbonyl compounds with DNPH in the presence of an acid to form stable derivatives according to the reaction shown in Fig. 1, (where: both R and R^1 are alkyl or aromatic groups (ketones), or both, or either R or R^1 is a hydrogen atom (aldehydes)). The determination of formaldehyde and other carbonyl compounds, as a DNPH derivatives, is similar to that of U.S. EPA Method TO-11A in that it utilizes HPLC with UV detection as the analytical finish. The detection limits have been extended to other carbonyl compounds that can be determined as outlined in Section ~~13~~ 10.2.4. This test method is suitable for determination of formaldehyde and other carbonyl compounds in the concentration range from approximately 10 ppb to 1 ppm (v/v).

1.4 The sampling method gives a time-weighted average (TWA) sample. It can be used for long-term (1 to 24 h) or short-term (5 to 60 min) sampling of air for formaldehyde.

1.5 This test method instructs the user on how to prepare sampling cartridges from commercially available chromatographic

¹ This test method is under the jurisdiction of ASTM Committee D-22 on Sampling and Analysis of Atmospheres and is the direct responsibility of Subcommittee D22.05 on Indoor Air.

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