ASTM Standards

for monitoring chemical hazards in the workplace

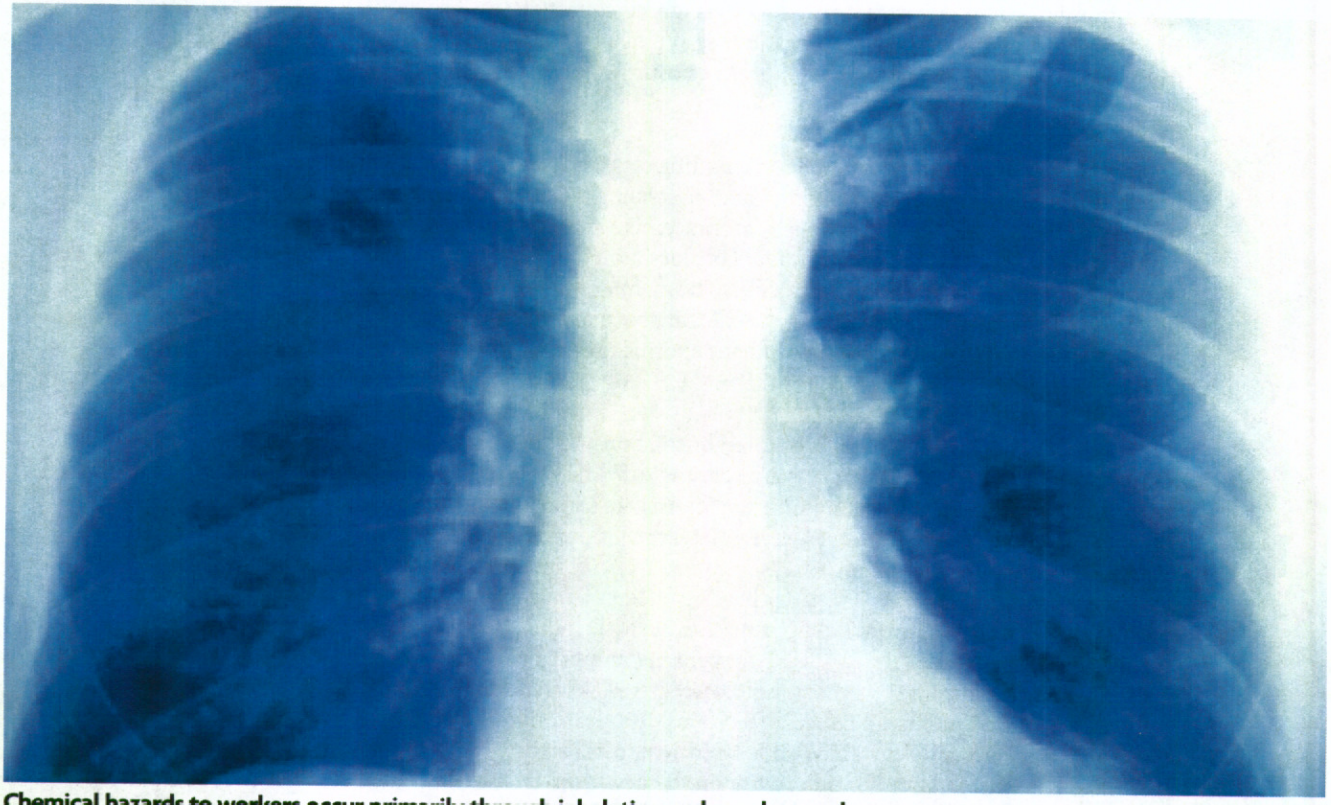
BY KEVIN ASHLEY, PH.D., AND MARTIN HARPER, PH.D., CIH

The health of workers in many industries is at risk through occupational exposure to toxic substances. In order to estimate workers' exposures, occupational contact with airborne hazardous materials at the job site is typically monitored by sampling and analyzing workplace atmospheres. This monitoring takes place because, in occupational settings, inhalation is ordinarily the most likely route of entry of hazardous substances into the body. Dermal contact and ingestion are other potential routes of occupational exposure to chemical agents. Hence in addition to methods for workplace air monitoring, procedures for measuring surface contaminants in the workplace are also desirable.

Within ASTM International Committee D22 on Sampling and Analysis of Atmospheres, Subcommittee D22.04 on Sampling and Analysis of Workplace Atmospheres produces standards that describe methods of collecting and measuring chemical hazards in the workplace. This subcommittee has been active for decades, and its members (presently numbering more than 50) have developed many needed standards consisting of test methods, practices, and guides. These consensus standards are meant for use by industrial hygienists, chemists, engineers, health physicists, toxicologists, epidemiologists, and myriad other professionals. To date, D22.04 has promulgated more than 30 standards (Table 1). Many of these standards have also appeared in ASTM compendia publications such as *Environmental Sampling and Analysis.* Different types of standards are produced, including standards for terminology, as well as standard guides, practices, and test methods (in order of increasingly detailed specification).

WORKPLACE STANDARDS DEVELOPMENT

Standards developed by Subcommittee D22.04 cover a broad range of subjects. Chemical agents covered include, for instance, toxic organic and inorganic gases and vapors; acid mists; and metals and metalloids in aerosols and surface dusts. Examples of standard methods for monitoring toxic organic vapors of concern include methods for isocyanates, vinyl chloride, and ethylene oxide. Standard procedures for measuring inorganic species such as fluorides, sulfuric acid mist, and hy-



Chemical hazards to workers occur primarily through inhalation and

drogen sulfide have also been developed. ASTM sampling and analytical methods for harmful metals such as lead and hexavalent chromium in workplace air have recently been published. In addition to specific chemical species, standard test methods for determining toxic agents such as crystalline ceramic whiskers, asphalt fumes, and diesel particulate matter have also been promulgated.

Ordinarily, the portions of these ASTM standard methods dealing with sampling are meant for use by industrial hygienists, while the sample preparation and analysis aspects are targeted for use by laboratory personnel, that is, chemists. Standard sample collection procedures may involve filter sampling for aerosols of interest, sorbent tube sampling of gases and vapors, and/or sampling of specific aerosol fractions of a particular size range of concern. Depending on the sampling objectives, the industrial hygienist could rely on standard procedures to obtain personal samples of air to which workers are exposed by attaching a sampling device to the worker. Alternatively, the industrial hygienist might instead obtain area samples of airborne substances in specific work areas, for example, near emission sources.

Samples can be "spot" measurements, taken by using direct-reading methods (for example, colorimetric techniques), or they may be long-term samples requiring laboratory analysis. Depending on the application, standard analytical test methods might be based on techniques as simple as gravimetry, or more complicated methodologies such as gas or liquid chromatography, and electrochemical or spectrometric measurement, to cite a few examples. Extraction or digestion, and derivatization techniques are also described, where necessary for analysis. These ASTM standard methods are available for use by analysts in industrial hygiene chemistry laboratories.

In addition to the numerous standard test methods that can be applied in measuring toxic agents in the workplace, ASTM standard procedures for other matters of concern in workplace monitoring have been developed. For instance, standards on workplace sampling strategies, calibration of sampling instrumentation, and minimization of errors associated with weighing collected aerosols have been published. Quality assurance and quality control aspects are addressed in all standards, thus ensuring consistency in sampling and analysis and optimal data quality.

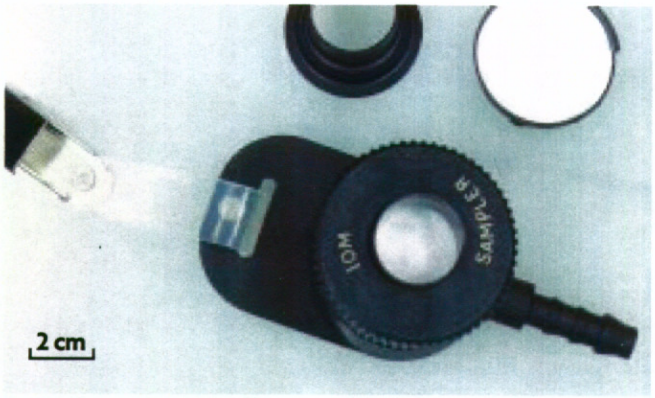
Currently, the subcommittee is addressing several new work items. These include a draft document on counting collected airborne fibers (including asbestos), another draft describing the determination of metals and metalloids by atomic emission spectrometry, as well as new work items under consideration for the sampling and analysis of airborne silica dusts. The membership of D22.04 would like to solicit ideas for any additional new standards that may be needed for workplace exposure monitoring purposes.

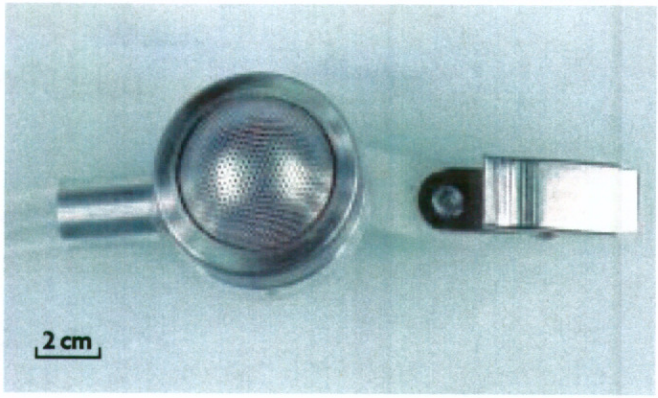
Worker inhalation exposures can be extremely high. ASTM standards for monitoring workplace atmospheres are instrumental in exposure reduction efforts.

Sorbent tube samplers for workplace gases and vapors are used in a number of standards developed by Subcommittee D22.04.

SYMPOSIA

A number of ASTM symposia sponsored or co-sponsored by Committee D22 are concerned, at least in part, with workplace monitoring; some of these past and future symposia are listed in Table 2. D22 holds biennial summer week-long informal conferences on new developments in its areas of interest, and formal conferences in alternate years. The latter have resulted in a number of ASTM Special Technical Publications. Occasionally other, shorter symposia (ordinarily two days) are held in conjunction with D22 meetings during ASTM committee week. ASTM International has ceased publishing Special Technical Publications; however, papers presented at ASTM-sponsored symposia can be submitted for consideration for publication in the new, peer-re-



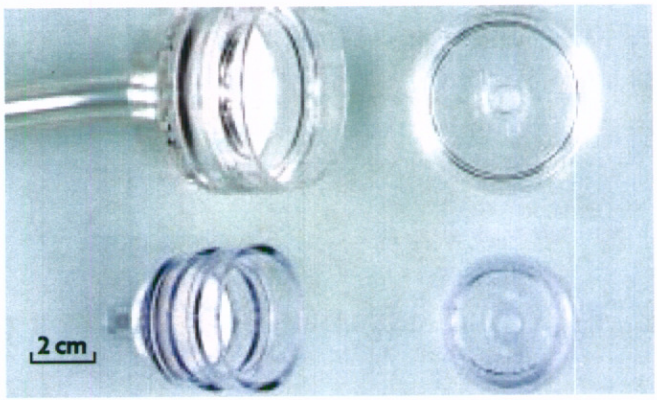


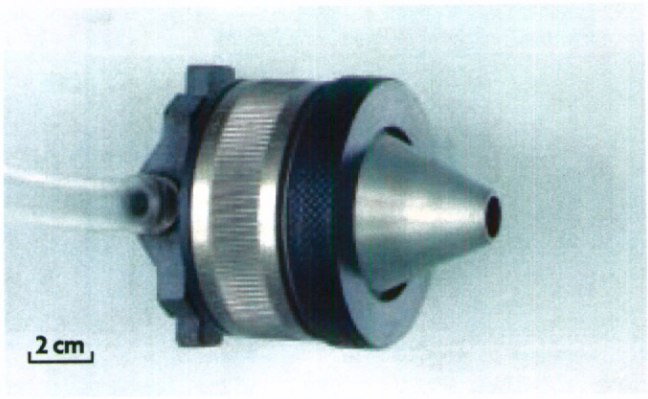
CONCLUSION

Consensus standards are considered by many to be the most technically sound and most credible documents for use in their particular fields of application. This was recognized by the U.S. Congress through passage of the National Technology Transfer and Advancement Act of 1995 (Public Law 104-113), which directs federal agencies to (a) rely upon consensus standards in their guidelines and ac-

Table 1: Standards of Subcommittee D22.04 on Workplace Atmospheres

D 3686-95(2001), Practice for Sampling Atmospheres to Collect Organic Compound Vapors (Activated Charcoal Tube Adsorption Method)
D 3687-01, Practice for Analysis of Organic Compound Vapors Collected by the Activated Charcoal Tube Adsorption Method
D 4185-96(2001), Practice for Measurement of Metals in Workplace Atmosphere by Flame Atomic Absorption Spectrophotometry
D 4413-98(2003), Test Method for Determination of Ethylene Oxide in Workplace Atmospheres (Charcoal Tube Methodology)
D 4490-96(2001), Practice for Measuring the Concentration of Toxic Gases or Vapors Using Detector Tubes
D 4532-97(2003), Test Method for Respirable Dust in Workplace Atmospheres
D 4597-03, Practice for Sampling Workplace Atmospheres to Collect Gases or Vapors with Solid Sorbent Diffusive Samplers
D 4599-03, Practice for Measuring the Concentration of Toxic Gases or Vapors Using Length-of-Stain Dosimeters
D 4600-95(2000), Test Method for Determination of Benzene-Soluble Particulate Matter in Workplace Atmospheres
D 4765-03, Test Method for Fluorides in Workplace Atmospheres
D 4766-98(2003), Test Method for Vinyl Chloride in Workplace Atmospheres (Charcoal Tube Method)
D 4856-99, Test Method for Determination of Sulfuric Acid Mist in the Workplace Atmosphere (Ion Chromatographic)
D 4913-00, Practice for Determining Concentration of Hydrogen Sulfide by Direct Reading, Length of Stain, Visual Chemical Detectors
D 5337-97, Practice for Flow Rate for Calibration of Personal Sampling Pumps
D 5578-94(1999), Test Method for Determination of Ethylene Oxide in Workplace Atmospheres (HBr Derivatization Method)
D 5836-03, Test Method for Determination of 2,4-Toluene Diisocyanate (2,4-TDI) and 2,6-Toluene Diisocyanate (2,6-TDI) in Workplace Atmospheres (1-2 PP Method)
D 5932-96(2002), Test Method for Determination of 2,4-Toluene Diisocyanate (2,4-TDI) and 2,6-Toluene Diisocyanate (2,6-TDI) in Air (with 9-(N-Methylaminomethyl) Anthracene Method) (MAMA) in the Workplace
D 6056-96(2001), Test Method for Determining Concentration of Airborne Single-Crystal Ceramic Whiskers in the Workplace Environment by Transmission Electron Microscopy
D 6057-96(2001), Test Method for Determining Concentration of Airborne Single-Crystal Ceramic Whiskers in the Workplace Environment by Phase Contrast Microscopy
D 6058-96(2001), Practice for Determining Concentration of Airborne Single-Crystal Ceramic Whiskers in the Workplace Environment
D 6059-96(2001), Test Method for Determining Concentration of Airborne Single-Crystal Ceramic Whiskers in the Workplace Environment by Scanning Electron Microscopy
D 6061-01, Practice for Evaluating the Performance of Respirable Aerosol Samplers
D 6062M-96(2001), Guide for Personal Samplers of Health-Related Aerosol Fractions [Metric]
D 6246-02, Practice for Evaluating the Performance of Diffusive Samplers
D 6494-99, Test Method for Determination of Asphalt Fume Particulate Matter in Workplace Atmospheres as Benzene Soluble Fraction
D 6552-00, Practice for Controlling and Characterizing Errors in Weighing Collected Aerosols
D 6561-00, Test Method for Determination of Aerosol Monomeric and Oligomeric Hexamethylene Diisocyanate (HDI) in Air with (Methoxy-2-phenyl-1) Piperazine (MOPIP) in the Workplace
D 6562-00, Test Method for Determination of Gaseous Hexamethylene Diisocyanate (HDI) in Air with 9-(N-methylaminomethyl) Anthracene Method (MAMA) in the Workplace
D 6669-01, Practice for Selecting and Constructing Exposure Scenarios for Assessment of Exposures to Alkyd and Latex Interior Paints
D 6785-02, Test Method for Determination of Lead in Workplace Air Using Flame or Graphite Furnace Atomic Absorption Spectrometry
D 6832-02, Test Method for the Determination of Hexavalent Chromium in Workplace Air by Ion Chromatography and Spectrophotometric Measurement Using 1,5-Diphenylcarbazide
D 6877-03, Test Method for Monitoring Diesel Particulate Exhaust in the Workplace
D 6966-03, Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Determination of Metals
E 1370-96(2002), Guide for Air Sampling Strategies for Worker and Workplace Protection





Examples of Filter Samplers Used in ASTM Methods for Collecting Workplace Aerosols in Order to Monitor Worker Exposure.

tivities, and (b) participate in the consensus standards development process. Voluntary consensus standards are often used as a basis for commercial and regulatory action. For instance, in the United States, many ASTM standards having to do with the workplace and the environment have been cited in regulations promulgated by the U.S. Environmental Protection Agency and the Occupational Safety and Health Administration. Employees of both of these agencies as well as the National Institute for Occupational Safety and Health of the Centers for Disease Control and Prevention regularly attend meetings of Committee D22 and its subcommittees.

Laboratory analytical procedures for analyzing workplace atmospheric samples are covered in many of the standards developed in subcommittee D22.04.

Table 2: Examples of D22-Sponsored or Co-Sponsored Symposia Related to Workplace Exposure Monitoring

- Symposium on Calibration in Air Monitoring (1974)
- Sampling and Analysis of Toxic Organics in the Atmosphere (1978)
- Toxic Materials in the Atmosphere: Sampling and Analysis (1980)
- Definitions for Asbestos and Other Health-Related Silicates (1982)
- Quality Assurance for Environmental Measurements (1983)
- Sampling and Calibration for Atmospheric Measurements (1985)
- Monitoring Methods for Toxics in the Atmosphere (1988)
- Biological Contaminants in Indoor Environments (1989)
- Modeling of Indoor Air Quality and Exposure (1992)
- Lead in Paint, Soil and Dust (1993)
- Sampling Environmental Media (1995)
- Advances in Environmental Measurement Methods for Asbestos (1997)
- Sampling and Analysis of Isocyanates (2000)
- Asbestos Monitoring at the World Trade Center Site (2002)
- Symposium on Silica Sampling and Analysis (2004)
- Symposium on Beryllium Sampling and Analysis (2005)

ACKNOWLEDGMENT

Subcommittee D22.04 and Committee D22 for their many years of commitment to the development of needed ASTM standards on workplace contaminant monitoring. //

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Analytical Performance Criteria
ASTM International Standards for Monitoring Chemical Hazards in Workplaces

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INTRODUCTION

The health of workers in many industries is at risk through occupational exposure to toxic substances. To estimate workers' exposures, occupational contact with hazardous materials at the job site is typically monitored by sampling and analyzing workplace atmospheres. This is because in occupational settings, inhalation is ordinarily the most likely route of entry of hazardous substances into the body. Dermal contact and ingestion are other potential routes of occupational exposure to chemical agents. Hence, in addition to methods for workplace air monitoring, procedures for measuring surface contaminants in the workplace are also needed.

Within ASTM (American Society for Testing and Materials) International Committee D22 on Air Quality (formerly Sampling and Analysis of Atmospheres), Subcommittee D22.04 on Sampling and Analysis of Workplace Atmospheres produces standards that describe methods to collect and measure chemical hazards in the workplace. This subcommittee has been active for decades, and its members (presently numbering over 50) have developed many needed standards consisting of test methods, practices, and guides. These consensus standards are meant for use by industrial hygienists, chemists, engineers, health physicists, toxicologists, epidemiologists, and myriad other professionals. Experts from private industry, government, and academia have all contributed extensively to the development of standards for workplace contaminant monitoring. Numerous voluntary consensus standards produced by ASTM International Subcommittee D22.04 have been developed based on National Institute of Occupational Safety and Health (NIOSH) and Occupational Safety and Health Association (OSHA) methods (published in the *NIOSH Manual of Analytical Methods* (www.cdc.gov/niosh/nmam) and the *OSHA Analytical Methods Manual* (www.osha.gov/dts/sltc/methods), respectively).

STANDARDS DEVELOPMENT IN SUBCOMMITTEE D22.04

Currently over 30 standards for which D22.04 is responsible have been promulgated (Table I). These documents are published along with other standards produced by Committee D22 in Volume 11.03 of the *Annual Book of ASTM Standards*. Many of these standards have also appeared in ASTM compendia publications such as *Environmental Sampling and Analysis*.

The standards developed by subcommittee D22.04 cover a broad range of subjects (Table I). Chemical agents covered include, for instance, toxic organic and inorganic gases and vapors, acid mists, and metals and metalloids in aerosols and surface dusts. Examples of standard methods for monitoring toxic organic vapors of concern include methods for isocyanates, vinyl chloride, and ethylene oxide. Standard procedures for measuring inorganic species such as fluorides, sulfuric acid mist, and hydrogen sulfide

TABLE I. ASTM International Standards of Subcommittee D22.04 on Sampling and Analysis of Workplace Atmospheres

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D3687-01 Standard Practice for Analysis of Organic Compound Vapors Collected by the Activated Charcoal Tube Adsorption Method
D4185-96(2001) Standard Practice for Measurement of Metals in Workplace Atmosphere by Flame Atomic Absorption Spectrophotometry
D4413-98(2003) Standard Test Method for Determination of Ethylene Oxide in Workplace Atmospheres (Charcoal Tube Methodology)
D4490-96(2001) Standard Practice for Measuring the Concentration of Toxic Gases or Vapors Using Detector Tubes
D4532-97(2003) Standard Test Method for Respirable Dust in Workplace Atmospheres
D4597-03 Standard Practice for Sampling Workplace Atmospheres to Collect Gases or Vapors with Solid Sorbent Diffusive Samplers
D4599-03 Standard Practice for Measuring the Concentration of Toxic Gases or Vapors Using Length-of-Stain Dosimeters
D4600-95(2000) Standard Test Method for Determination of Benzene-Soluble Particulate Matter in Workplace Atmospheres
D4765-03 Standard Test Method for Fluorides in Workplace Atmospheres
D4766-98(2003) Standard Test Method for Vinyl Chloride in Workplace Atmospheres (Charcoal Tube Method)
D4856-99(2004) Standard Test Method for Determination of Sulfuric Acid Mist in the Workplace Atmosphere (Ion Chromatographic)
D4913-00 Standard Practice for Determining Concentration of Hydrogen Sulfide by Direct Reading, Length of Stain, Visual Chemical Detectors
D5337-97(2004) Standard Practice for Flow Rate Calibration of Personal Sampling Pumps
D5578-94(1999) Standard Test Method for Determination of Ethylene Oxide in Workplace Atmospheres (HBr Derivatization Method)
D5836-03 Standard Test Method for Determination of 2,4-Toluene Diisocyanate (2,4-TDI) and 2,6-Toluene Diisocyanate (2,6-TDI) in Workplace Atmospheres (1-2 PP Method)
D5932-96(2002) Standard Test Method for Determination of 2,4-Toluene Diisocyanate (2,4-TDI) and 2,6-Toluene Diisocyanate (2,6-TDI) in Air (with 9-(N-Methylaminomethyl) Anthracene Method) (MAMA) in the Workplace
D6056-96(2001) Standard Test Method for Determining Concentration of Airborne Single-Crystal Ceramic Whiskers in the Workplace Environment by Transmission Electron Microscopy
D6057-96(2001) Standard Test Method for Determining Concentration of Airborne Single-Crystal Ceramic Whiskers in the Workplace Environment by Phase Contrast Microscopy
D6058-96(2001) Standard Practice for Determining Concentration of Airborne Single-Crystal Ceramic Whiskers in the Workplace Environment
D6059-96(2001) Standard Test Method for Determining Concentration of Airborne Single-Crystal Ceramic Whiskers in the Workplace Environment by Scanning Electron Microscopy
D6061-01 Standard Practice for Evaluating the Performance of Respirable Aerosol Samplers
D6062M-96(2001) Standard Guide for Personal Samplers of Health-Related Aerosol Fractions [Metric]
D6246-02 Standard Practice for Evaluating the Performance of Diffusive Samplers
D6494-99 Standard Test Method for Determination of Asphalt Fume Particulate Matter in Workplace Atmospheres as Benzene Soluble Fraction
D6552-00 Standard Practice for Controlling and Characterizing Errors in Weighing Collected Aerosols
D6561-00 Standard Test Method for Determination of Aerosol Monomeric and Oligomeric Hexamethylene Diisocyanate (HDI) in Air with (Methoxy-2-phenyl-1) Piperazine (MOPIP) in the Workplace
D6562-00 Standard Test Method for Determination of Gaseous Hexamethylene Diisocyanate (HDI) in Air with 9-(N-methylaminomethyl) Anthracene Method (MAMA) in the Workplace
D6669-01 Standard Practice for Selecting and Constructing Exposure Scenarios for Assessment of Exposures to Alkyd and Latex Interior Paints
D6785-02 Standard Test Method for Determination of Lead in Workplace Air Using Flame or Graphite Furnace Atomic Absorption Spectrometry
D6832-02 Standard Test Method for the Determination of Hexavalent Chromium in Workplace Air by Ion Chromatography and Spectrophotometric Measurement Using 1,5-Diphenylcarbazide
D6877-03 Standard Test Method for Monitoring Diesel Particulate Exhaust in the Workplace

(Continued on next page)

TABLE I. ASTM International Standards of Subcommittee D22.04 on Sampling and Analysis of Workplace Atmospheres (*Continued*)

D6966-03 Standard Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Determination of Metals
D7035-04 Standard Test Method for the Determination of Metals and Metalloids in Workplace Air by Inductively Coupled Plasma Atomic Emission Spectrometry
D7049-04 Standard Test Method for Metal Removal Fluid Aerosol in Workplace Atmospheres
E1370-96(2002) Standard Guide for Air Sampling Strategies for Worker and Workplace Protection

have also been developed. ASTM sampling and analytical methods for harmful metals such as lead and hexavalent chromium in workplace air have recently been published. Besides specific chemical species, standard test methods for determining toxic agents such as crystalline ceramic whiskers, asphalt fumes, and diesel particulate matter have also been promulgated.

Ordinarily, the sections of these ASTM standard methods (Table I) dealing with sampling are meant for use by industrial hygienists, while the sample preparation and analysis aspects are targeted for use by laboratory personnel, that is, chemists. Standard sample collection procedures may involve filter sampling for aerosols of interest, sorbent tube sampling of gases and vapors, and/or sampling of specific aerosol fractions of a particular size range of concern. Depending on the sampling objectives, the industrial hygienist could rely on standard procedures to obtain personal samples of air to which workers are exposed by attaching a sampling device to the worker. Alternatively, the industrial hygienist might instead obtain area samples of airborne particulate matter in specific work areas, for example, near emission sources.

To test for surface contamination, the industrial hygienist may obtain wipe samples from equipment or workplace components with which workers come into contact. Standardized surface wipe sampling procedures for asbestos and for metals have been published by ASTM International (Table I). These standards have been developed based in part on OSHA and NIOSH wipe sampling methods. Targeted primarily for the collection of samples from rough or fragile surfaces, a vacuum sampling method for metals is currently being developed that is similar to that described for asbestos vacuum sampling.

Sample preparation and analysis are ordinarily carried out in fixed-site laboratories, but some field-portable standard analytical methods are also available. Depending on the application, standard analytical test methods might be based on techniques such as gas or liquid chromatography, extraction or digestion, derivatization, and electrochemical or spectrometric measurement, to cite a few examples. These ASTM standard methods are available for use by analysts in industrial hygiene chemistry laboratories.

In addition to the numerous standard test methods that can be applied in measuring toxic agents in the workplace, ASTM standard procedures for other subjects of concern in workplace monitoring have been developed (Table I). For instance, standards on workplace sampling strategies, calibration of sampling instrumentation, and minimization of errors associated with weighing collected aerosols have been published. Quality assurance and quality control aspects are addressed in the standards, thus ensuring consistency in sampling and analysis and optimal data quality.

Regarding standards under development, presently the subcommittee is addressing several new work items. These include a draft document on counting asbestos fibers collected on filters, a draft field-portable fluorescence method for measurement of beryllium and, as mentioned earlier, a draft vacuum sampling method for collecting surface dust for subsequent metals determination. The membership of D22.04 would like to solicit ideas for any additional new standards that may be needed for workplace exposure monitoring purposes.

ASTM standards are available for a fee and can be conveniently accessed via the ASTM International webpage: www.astm.org. ASTM International is a nonprofit organization, and funds obtained from the sales of standards support the ongoing activities of the society. However, standards developed by Subcommittee D22.04 and published in Volume 11.03 of the *Annual Book of ASTM Standards* are available free of charge for members of Committee D22 on Air Quality.

ASTM INTERNATIONAL SYMPOSIA

A number of symposia sponsored or cosponsored by ASTM Committee D22 on Air Quality are concerned, at least in part, with workplace monitoring; some of these symposia are listed in Table II. D22 holds biennial summer weeklong informal conferences on new developments in its areas of interest, with formal conferences being held in alternate years. The latter have resulted in a number of ASTM special technical publications. Occasionally, other shorter symposia (ordinarily 2 days) are held in conjunction with D22 meetings during the biannual ASTM committee week. ASTM International has ceased publishing special technical publications; however, papers presented at ASTM-sponsored symposia can be submitted for consideration for publication in the new, peer-reviewed *Journal of ASTM International*.

TABLE II. Examples of Symposia Related to Workplace Exposure Monitoring Sponsored or Cosponsored by ASTM Committee D22

Symposium on Calibration in Air Monitoring (1974)
Sampling and Analysis of Toxic Organics in the Atmosphere (1978)
Toxic Materials in the Atmosphere: Sampling and Analysis (1980)
Definitions for Asbestos and Other Health-Related Silicates (1982)
Quality Assurance for Environmental Measurements (1983)
Sampling and Calibration for Atmospheric Measurements (1985)
Monitoring Methods for Toxics in the Atmosphere (1988)
Biological Contaminants in Indoor Environments (1989)
Modeling of Indoor Air Quality and Exposure (1992)
Lead in Paint, Soil, and Dust (1993)
Sampling Environmental Media (1995)
Advances in Environmental Measurement Methods for Asbestos (1997)
Sampling and Analysis of Isocyanates (2000)
Asbestos Monitoring at the World Trade Center Site (2002)
Symposium on Silica Sampling and Analysis (2004)
Symposium on Beryllium Sampling and Analysis (2005)
Indoor Emissions Testing (2005)

FEDERAL AGENCIES AND VOLUNTARY CONSENSUS STANDARDS

Consensus standards are considered by many to be the most technically sound and most credible documents for use in their particular fields of application. This was recognized by the U.S. Congress through passage of the National Technology Transfer and Advancement Act of 1995 (Public Law 104-113), which directs federal agencies to: (a) rely on consensus standards in their guidelines and activities, and (b) participate in the consensus standards development process. For instance, in the United States, many ASTM standards having to do with the workplace and the environment have been cited in regulations promulgated by the Environmental Protection Agency and OSHA. Employees of both of these agencies, as well as NIOSH of the Centers for Disease Control and Prevention, regularly attend meetings of Committee D22 and its subcommittees. Experts from federal agencies have contributed significantly to the development of numerous ASTM standards produced by Subcommittee D22.04 and other ASTM subcommittees and committees.

FURTHER INFORMATION

For further information on ASTM Subcommittee D22.04 and its activities, please contact Kevin Ashley, CDC/NIOSH, 4676 Columbia Parkway, Mail Stop R-7, Cincinnati, OH 45226-1998; phone: (513) 841-4402; fax: (513) 841-4500; e-mail: KAshley@cdc.gov. For information on ASTM Subcommittee D22 on Air Quality and its subcommittees, contact George Luciw, D22 Staff Manager, ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959; phone: (610) 832-9710; e-mail: gluciw@astm.org. Additional information can be found on the website of ASTM International at www.astm.org.

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We wish to thank the members of Subcommittee D22.04 and Committee D22 for their many years of commitment to the development of ASTM International standards on workplace contaminant monitoring. This article is an update of material published in 2004 in *ASTM Standardization News*.