

# **BIBLIOGRAPHY**

## **ABC FIRE DEBRIS SPECIALTY EXAMINATION**

The following recommendations are made for those who wish to prepare to take the Fire Debris Specialty examination.

For a good general review begin by reading:

"The Rules of Professional Conduct" supplied by the American Board of Criminalistics.

Forensic Science Handbook, Richard Saferstein, Ed.

- Chapter 1, "Legal Aspects of Forensic Science"
- Chapter 2, "Forensic Applications of High Performance Liquid Chromatography"
- Chapter 3, "Forensic Applications of Mass Spectrometry"
- Chapter 6, "Arson and Explosive Investigation"

Kirk's Fire Investigation, John D. DeHaan, Third Edition

- Chapter 1, "Introduction"
- Chapter 2, "The Elementary Chemistry of Combustion"
- Chapter 3, "The Nature and Behavior of Fire"
- Chapter 4, "Combustion Properties of Liquid and Gaseous Fuels"
- Chapter 5, "Combustion Properties of Solid Fuels"
- Chapter 6, "Sources of Ignition"
- Chapter 7, "Structure Fires and Their Investigation"
- Chapter 12, "Explosions and Explosive Combustion"
- Chapter 13, "Chemical Fires and Hazardous Materials"
- Chapter 14, "Laboratory Services"

Basic Gas Chromatography, H. M. McNair and E. J. Bonelli

Organic Chemistry, R. T. Morrison and R. N. Boyd, Second Edition

- Chapter 2, "Methane"
- Chapter 4, "Alkanes"
- Chapter 12, "Arenes"

Modern Methods of Chemical Analysis, R. L. Pescok and L. D. Shields, John Wiley & Sons, Inc., Second edition, 1976.

- Chapter 3, "Extraction"
- Chapter 4, "Chromatography"
- Chapter 5, "Liquid Chromatography"
- Chapter 7, "Gas Chromatography"

**The above texts are offered for your convenience.** Other texts covering organic chemistry of compounds found in petroleum products, petroleum refining, gas chromatography, and instrumental analysis including infrared spectrometry, high performance liquid chromatography, and mass spectrometry can be used. (See suggested reading list below).

ASTM E-1413-91, Standard Practice for separation and concentration of flammable or combustible liquid residues from fire debris samples by dynamic headspace concentration.

ASTM E-1412-91, Standard Practice for separation and concentration of flammable or combustible liquid residues from fire debris samples by passive headspace concentration.

ASTM E-1385-90, Standard Practice for separation and concentration of flammable or combustible liquid residues from fire debris samples by steam distillation.

ASTM E-1386-90, Standard Practice for separation and concentration of flammable or combustible liquid residues from fire debris samples by solvent extraction.

ASTM E-1387-90, Standard Test Method for Flammable or Combustible Liquid Residues In Extracts From Samples Of Fire Debris By Gas Chromatography.

ASTM E-1388-90, Standard Practice for sampling of headspace vapors from fire debris samples.

ASTM E-1389-90, Standard Practice for cleanup of fire debris sample extracts by acid stripping.

ASTM E752, Practice for safety and health requirements related to occupational exposure to carbon disulfide.

ASTM E 1459 Standard Practice for Receiving, Documenting, Storing and Retrieving Evidence in a Forensic Science Laboratory.

For more in depth treatment, supplement the above reading with the selections below. Give particular attention to those areas in which you may not have specific experience.

Aldridge, T. A., & Oates, M., (1984) Fractionation of accelerants and arson residues by solid phase extraction. Journal of Forensic Sciences **31** (2) 666-686.

DeHaan, J. D. & Bonarius, K., (1988) Pyrolysis products of structure fires. Journal of the Forensic Science Society **28** (5/6) 299-309.

Ettling, B. V., (1963) Determination of hydrocarbons in fire remains. Journal of Forensic Sciences **8** 261-267.

Fire Protection Handbook, National Fire Protection Association, Fifteenth Edition, Section 17, Chapter 6, "Water Spray Protection".

Lentini, J. J., Tontarski, R. E., DeHaan, J. D., O'Donnell, J. F., & Rogers, B. J., (1989) Glossary of terms related to chemical and instrumental analysis of fire debris. Fire and Arson Investigator **40** (2) 25-34.

Keto, R. O., & Wineman, P. L., (1991) Detection of petroleum-based accelerants in fire debris by target compound gas chromatography/mass spectrometry. Analytical Chemistry **63** 1964-1971.

Kinard, W. D. and Midkiff, C. M., (1991) Arson evidence container evaluation : II. "New generation" KAPAK bags. Journal of Forensic Science **36** (6) 1714-1721.

Kirkbride, K.P. and Kobus, H. J. (1991) The explosive reaction between swimming pool chlorine and brake fluid. Journal of the Forensic Science **36** (3) 902-907.

Kubler, D. G., Greene, D., Stackhouse, C. and Stodmeyer, T., (1981) The isolation of accelerants by headspace

sampling and by steam distillation Arson Analysis Newsletter **5** (5) 64-79.

Mach, M. H., (1977) Gas chromatography-mass spectrometry of simulated arson residue using gasoline as an accelerant. Journal of Forensic Sciences **22** (2) 348-357.

Mann, D. C., (1987) Comparison of automotive gasolines using capillary gas chromatography I: comparison methodology. Journal of Forensic Sciences **32** (3) 606-615.

Mann, D. C., (1987) Comparison of automotive gasolines using capillary gas chromatography II: limitations of automotive gasolines in casework. Journal of Forensic Sciences **32** (3) 616-628.

Mann, D. C., & Gresham, W. R., (1990) Microbial degradation of gasoline in soil. Journal of Forensic Science **35** (4) 913-923.

Midkiff, C. R., (1975) Brand identification and comparison of petroleum products - a complex problem. Fire and Arson Investigator **26** (2) 18-21.

Midkiff, C. R., (1986) Is it a petroleum product? How do you know? Journal of Forensic Science **31** (1) 231-234.

NFPA (National Fire Protection Association) 921 - Guide for Fire and Explosion Investigation, 1995.

Nowicki, J. F. (1990) An accelerant classification scheme based on analysis by gas chromatography/mass spectrometry (GC-MS). Journal of Forensic Sciences **35** (5) 1064-1086.

O'Donnell, J. F. (1985) The sampling of burned areas for accelerant residue analysis. Fire and Arson Investigator **35** (4) 18-20.

Sanders, W. N. & Maynard, J. B. (1968) Capillary gas chromatographic method for determining the C<sub>3</sub> - C<sub>12</sub> hydrocarbon in full range motor gasolines. Analytical Chemistry **40** (3) 527-535.

Sanderson, J.L., Balliet, C. A., and Balliet, M. A., (1990) Sampling techniques for accelerant residue analysis. Fire and Arson Investigator **40** (3) 35-40.

Smith, R. M., (1987) Arson analysis by mass chromatography. in Forensic Mass Spectroscopy, Jehuda Yinon (ed.), Boca Rotan, FL: CRC Press, Inc., 131-159.

Smith, R. M., (1983) Mass chromatographic analysis of arson accelerants. Journal of Forensic Sciences **28** (2) 318-329.

Stone, I. C., Lomonte, J. N., Fletcher, L. A., Lowry, W. T. (1978) Accelerant Detection in Fire Residues. Journal of Forensic Sciences **23** (1) 78-83.

Thornton, J. I. & Fukayama, B., (1979) The Implications of refining operations to the characterization and analysis of arson accelerants. Part I. Physical Separation. Arson Analysis Newsletter May 1-16 Part II. Chemical conversions, Treating Processes, and Subsidiary Processes. August 1-16.

Tontarski, R. E., (1983) Evaluation of polyethylene containers used to collect evidence for accelerant detection. Journal of Forensic Sciences **28** (2) 440-445.

Trimpe, M. A., (1991) Turpentine in arson analysis. Journal of Forensic Sciences **36** (4) 1059-1073.

Waters, L. V. and Lee, A. P., (1993) Multiple Analysis of Fire Debris Samples Using Passive Headspace Concentration. Journal of Forensic Sciences **38** (1) 165-183.

Youngless, T. L., Swansiger, J. T., Danner, D. A., and Greco, M. (1985) Mass spectral characterization of petroleum dyes, tracers, and additives. Analytical Chemistry **57** (9) 1894-1902.

The following sources are suggested readings for those who would like to broaden their knowledge in the area of fire debris analysis. They are **NOT** required reading for the examination.

**Instrumental analysis including gas chromatography:**

Modern Practice of Gas Chromatography, Robert L. Grob, Ed., 1977, John Wiley & Sons.

Basic Relationships of Gas Chromatography. Leslie S. Ettre and John V. Hinshaw, 1993, ADVANSTAR Communications.

High Resolution Gas Chromatography, K. J. Hyver Ed., and P. Sandra, Guest Author, 3rd ed., 1989, Hewlett-Packard.

Principles of Instrumental Analysis, Douglas A. Skoog, 1985, CBS College Publishing.

Chapter 18, Mass Spectrometry

Chapter 25, Introduction to Chromatographic Separations

Chapter 26, Gas Chromatography

Chapter 27, High-Performance Liquid Chromatography

**Fire debris analysis:**

Forensic Science: An Introduction to Criminalistics. Peter R. De Forest, R. E. Gaensslen, Henry C. Lee, Chapter 4 "Arson accelerants and explosives" McGraw-Hill Book, 1983.

Gas Chromatography in Forensic Science, Ian Tebbett, Ed., Chapter 5, "Gas Chromatography in Arson and Explosives Analysis", (Published by Ellis Horwood), 1992.

"Sample preparation for the chemical analysis of debris in suspect arson cases", W. Bertsch and Q. Zhang, Analytica Chimica Acta, **236** (1990) 183-195.

"Methods of fire debris preparation for detection of accelerants", B. Caddy, F. P. Smith, and J. Macy, Forensic Science Review, **3** (1), June 1991, 58-69.

**Petroleum refining:**

"Petroleum: Its composition, analysis and processing" by Richard W. King, in Occupational Medicine: State of the Art Reviews, Vol, 3 No. 3, July-September 1988. 409-430.

Petroleum (Refinery Process, Survey) (1982) Kirk/Othmer Encyclopedia of Chemical Technology **17** Third Edition, John Wiley & sons, Inc.

Ettling, B. V., (1974) Analysis of paraffin wax in fire remains. Journal of Forensic Sciences **20** (3) 476-483.

**Chemistry and Physics of Fire:**

Fire Protection Handbook, National Fire Protection Association, Fifteenth Edition, Section 3, Characteristics and Behavior of Fire, Section 4, Fire Hazards of Materials.