Current Methods in Forensic Gunshot Residue Analysis

Detection of Bulk Explosives Advanced Techniques against Terrorism

Protection of the traveling public from terrorist threats involving explosives is a major goal of the Transportation Security Administration (TSA). For 20 years, the TSA (and the Federal Aviation Administration before it) have been investing in technologies to meet that goal. To support that activity, the TSA has asked the NRC to assess a variety of technological opportunities for offering such protection. The NRC is approaching this assignment by issuing a series of reports on chosen technology applications. This is the first of that series and presents an assessment of mass spectrometry for enhanced trace detection (ETD) of chemicals contained in explosives. The report describes limitations of trace detection in general and the current technologies in particular. It then presents a discussion of the potential for mass spectrometry to improve EDT including challenges faced by such a system, recommendations for starting a program to take advantage of mass spectrometry,
and recommendations for a phased implementation plan.

Current Analytical Trends in Drug Testing in Clinical and Forensic Toxicology

The organization of an Advanced Research Workshop with the title “Detection and Disposal of Liquid Explosives and Flammable Agents in Connection with Terrorism” was motivated by international findings about activities in this field of application. This ARW followed a meeting about the “Detection of Disposal Improvised Explosives” (St. Petersburg, 2005). Both items show the logistic problems as one of the lessons, terrorists have to overcome. These problems are connected with the illegal supply and transport of explosives and fuels and as countermeasure the detection of these materials. The invention of liquid explosives goes back to the middle of the 19th century and was used for special purposes in the commercial field of application. Because of the high sensitivity of liquid explosives against mechanical shock, caused by adiabatic compression of air-bobbles producing “hot spots” as origin of initiation the commercial application was not very successful. Because of this high risk, liquid explosives are not used in military or commercial application with some exceptions. In the commercial field explosives as slurries or emulsions consisting of suitable salts (Ammoniumnitrate etc.) and water are used to a large extend because of their high insensitivity. In many cases these slurries or emulsions were unfit for terrorist actions, because of their low sensitivity, large critical diameter and using in confinement. In the military field liquid explosives are used in World War I and II as bomb-fillings.

Year in Review

The detection of hidden explosives has become an issue of utmost importance in recent years. While terrorism is not new to the international community, recent terrorist attacks have raised the issue of detection of explosives and have generated a great demand for rapid, sensitive and reliable methods for detecting hidden explosives. Counterterrorist Detection Techniques of Explosives covers recent advances in this area of research including vapor and trace detection techniques (chemiluminescence, mass spectrometry, ion mobility spectrometry, electrochemical methods and micromechanical sensors, such as microcantilevers) and bulk detection techniques (neutron techniques, nuclear quadrupole resonance, x-ray diffraction imaging, millimeter-wave imaging, terahertz imaging and laser techniques). This book will be of interest to any scientists involved in the design and application of security screening technologies including new sensors and detecting devices which will prevent the smuggling of bombs and explosives. * Covers latest advances in vapor and trace detection techniques and bulk detection techniques * Reviews both current techniques and those in advanced stages of development * Techniques that are described in detail, including its principles of operation, as well as its applications in the detection of explosives

Development of High-intensity D-D and D-T Neutron Sources and Neutron Filters for Medical and Industrial Applications

Forensic Investigation of Explosions, Second Edition
This volume is an initiative undertaken by the IEEE Computational Intelligence Society’s Task Force on Security, Surveillance and Defense to consolidate and disseminate the role of CI techniques in the design, development and deployment of security and defense solutions. Applications range from the detection of buried explosive hazards in a battlefield to the control of unmanned underwater vehicles, the delivery of superior video analytics for protecting critical infrastructures or the development of stronger intrusion detection systems and the design of military surveillance networks. Defense scientists, industry experts, academicians and practitioners alike will all benefit from the wide spectrum of successful applications compiled in this volume. Senior undergraduate or graduate students may also discover uncharted territory for their own research endeavors.

**Advances in Analysis and Detection of Explosives**

Clandestine lab operators are not the mad scientists whose genius keeps them pent up in the laboratory contemplating elaborate formulas and mixing exotic chemicals. In fact, their equipment is usually simple, their chemicals household products, and their education basic. Most of the time the elements at the scene are perfectly legal to sell and own. It is only in the combination of all these elements that the lab becomes the scene of a criminal operation. Forensic Investigation of Clandestine Laboratories guides you, step-by-step, through the process of recognizing these illegal manufacturing operations. Then it shows you how to prove it in the courtroom. In non-technical language this book details: How to recognize a clandestine lab How to process the site of a clandestine lab How to analyze evidence in the examination laboratory What to derive from the physical evidence How to present the evidence in court The identification and investigation of a clandestine lab, and the successful prosecution of the perpetrators, is a team effort. A collaboration of law enforcement, forensic experts, scientists, and criminal prosecutors is required to present a case that definitively demonstrates how a group of items with legitimate uses are being used to manufacture an illegal controlled substance. Providing an understanding of how the pieces of the clandestine lab puzzle fit together, this book outlines the steps needed to identify and shut down these operations, as well as successfully prosecute the perpetrators.

**Explosives Detection using Magnetic and Nuclear Resonance Techniques**

Detection of Bulk Explosives: Advanced Techniques against Terrorism contains reviews of: existing and emerging bulk explosives detection techniques; scientific and technical policy of the Federal Border Service of the Russian Federation; challenges in application and evaluation of EDS systems for aviation security; multi-sensor approach to explosives detection. There are also reports devoted to the following individual explosive detection techniques: X-ray systems in airports; neutron in, gamma out techniques; neutron and gamma backscattering; nuclear quadruple resonance, including remote NQR; sub-surface radars; microwave scanners; laser-induced burst spectroscopy (LIBS); acoustic sensors; nonlinear location (NUD); systems for localization and destruction of explosive objects.

**The Aviation Security Problem and Related Technologies**
Existing and Potential Standoff Explosives Detection Techniques examines the scientific techniques currently used as the basis for explosives detection and determines whether other techniques might provide promising research avenues with possible pathways to new detection protocols. This report describe the characteristics of explosives, bombs, and their components that are or might be used to provide a signature for exploitation in detection technology; considers scientific techniques for exploiting these characteristics to detect explosives and explosive devices; discusses the potential for integrating such techniques into detection systems that would have sufficient sensitivity without an unacceptable false-positive rate; and proposes areas for research that might be expected to yield significant advances in practical explosives and bomb detection technology in the near, mid, and long term.

**Oak Ridge Multiple Attribute System (ORMAS) for Pu, HEU, HE, Chemical Agents, and Drugs**

**Opportunities to Improve Airport Passenger Screening with Mass Spectrometry**

**Forensic Investigation of Explosions**

Detection and quantification of trace chemicals is a major thrust of analytical chemistry. In recent years much effort has been spent developing detection systems for priority pollutants. Less mature are the detections of substances of interest to law enforcement and security personnel: in particular explosives. This volume will discuss the detection of these, not only setting out the theoretical fundamentals, but also emphasizing the remarkable developments in the last decade. Terrorist events—airplanes blown out of the sky (PanAm 103 over Lockerbie) and attacks on U.S. and European cities (Trade Center in New York and the Murrah Federal Building in Oklahoma City, railways in London and Madrid)—emphasize the danger of concealed explosives. However, since most explosives release little vapor, it was not possible to detect them by technology used on most organic substances. After PanAm 103 was downed over Scotland, the U.S. Congress requested automatic explosive detection equipment be placed in airports. This volume outlines the history of explosive detection research, the developments along the way, present day technologies, and what we think the future holds. - Written by experts in the field who set out both the scientific issues and the practical context with authority - Discusses and describes the threat - Describes the theoretical background and practical applications of both trace and bulk explosives detection

**Mass Spectrometry Handbook**

**Anti-personnel Landmine Detection for Humanitarian Demining reports on state-of-the-art technologies developed during a Japanese National Research Project (2002–2007). The conventional method of landmine detection is using metal detectors to sense the metal in mines, but often other metal fragments in minefields camouflage landmines and hinder progress using this form of demining. The challenge is to**
develop detection systems that can discriminate between AP landmines and random metal fragments. The JST adopted research proposals and the results are reported here. This book concentrates on aspects of three approaches to AP mine detection: enhancing and confirming the results of metal-detection scans using GPR; using robot vehicles and manipulators to operate within minefields remotely; and methods of sensing the explosives within mines. Results are presented in the fields of GPR, nuclear quadrupole resonance, neutron thermal analysis and biosensors. The integration of these methods for workable robot operation is demonstrated. The project was carried out in conjunction with mine action centers in Croatia, Cambodia and Afghanistan. Evaluation data from field trials are also given.

**Technical Abstract Bulletin**

It is essential that those in the criminal justice system understand the tasks that police dogs perform and the evidence that their work produces. Police and Military Dogs: Criminal Detection, Forensic Evidence, and Judicial Admissibility examines the use of police and military dogs for a wide variety of functions and explores canine biology and be

**Counterterrorist Detection Techniques of Explosives**

The emerging field of green analytical chemistry is concerned with the development of analytical procedures that minimize consumption of hazardous reagents and solvents, and maximize safety for operators and the environment. In recent years there have been significant developments in methodological and technological tools to prevent and reduce the deleterious effects of analytical activities; key strategies include recycling, replacement, reduction and detoxification of reagents and solvents. The Handbook of Green Analytical Chemistry provides a comprehensive overview of the present state and recent developments in green chemical analysis. A series of detailed chapters, written by international specialists in the field, discuss the fundamental principles of green analytical chemistry and present a catalogue of tools for developing environmentally friendly analytical techniques. Topics covered include: Concepts: Fundamental principles, education, laboratory experiments and publication in green analytical chemistry. The Analytical Process: Green sampling techniques and sample preparation, direct analysis of samples, green methods for capillary electrophoresis, chromatography, atomic spectroscopy, solid phase molecular spectroscopy, derivative molecular spectroscopy and electroanalytical methods. Strategies: Energy saving, automation, miniaturization and photocatalytic treatment of laboratory wastes. Fields of Application: Green bioanalytical chemistry, biodiagnostics, environmental analysis and industrial analysis. This advanced handbook is a practical resource for experienced analytical chemists who are interested in implementing green approaches in their work.

**Aspects of Explosives Detection**

This three volume set (CCIS 853-855) constitutes the proceedings of the 17th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, IPMU 2017, held in Cádiz, Spain, in June 2018. The 193 revised full papers were
carefully reviewed and selected from 383 submissions. The papers are organized in topical sections on advances on explainable artificial intelligence; aggregation operators, fuzzy metrics and applications; belief function theory and its applications; current techniques to model, process and describe time series; discrete models and computational intelligence; formal concept analysis and uncertainty; fuzzy implication functions; fuzzy logic and artificial intelligence problems; fuzzy mathematical analysis and applications; fuzzy methods in data mining and knowledge discovery; fuzzy transforms: theory and applications to data analysis and image processing; imprecise probabilities: foundations and applications; mathematical fuzzy logic, mathematical morphology; measures of comparison and entropies for fuzzy sets and their extensions; new trends in data aggregation; pre-aggregation functions and generalized forms of monotonicity; rough and fuzzy similarity modelling tools; soft computing for decision making in uncertainty; soft computing in information retrieval and sentiment analysis; tri-partitions and uncertainty; decision making modeling and applications; logical methods in mining knowledge from big data; metaheuristics and machine learning; optimization models for modern analytics; uncertainty in medicine; uncertainty in Video/Image Processing (UVIP).


Toxicological Profile for Tetryl (2,4,6-trinitrophenyl-N-methylnitramine)

The Analysis of Explosives surveys the principles of the various analytical methods, describes how these methods are used for the analysis of explosives, and reviews the major analytical work carried out in this field. Organized into 15 chapters, this book begins with the classification of explosives. Subsequent chapters discuss the different methods for the analysis of explosives. The detection and identification of explosive residues and hidden explosives are also explained. This monograph will be useful as a reference book for chemists in analytical and forensic laboratories, as well as a textbook for graduate students in analytical chemistry and forensic sciences.

Handbook on Radiation Probing, Gauging, Imaging and Analysis

Now in its second edition, Forensic Investigation of Explosions draws on the editor’s 30 years of explosives casework experience, including his work on task forces set up to investigate major explosives incidents. Dr. Alexander Beveridge provides a broad, multidisciplinary approach, assembling the contributions of internationally recognized experts who present the definitive reference work on the subject. Topics discussed include: The physics and chemistry of explosives and explosions The detection of hidden explosives The effect of explosions on structures and persons Aircraft sabotage investigations Explosion scene investigations Casework management The role of forensic scientists Analysis of explosives and their residues Forensic pathology as it relates to explosives Presentation of expert testimony With nearly 40 percent more material, this new edition contains revised chapters and several new topics, including: A profile of casework management in the UK Forensic Explosives Laboratory, one of the world’s top labs, with a discussion of their management system, training procedures, and
practical approaches to problem solving Properties and analysis of improvised explosives An examination of the Bali bombings and the use of mobile analytical techniques and mobile laboratories The collection, analysis, and presentation of evidence in vehicle-borne improvised explosive device cases, as evidenced in attacks on US overseas targets This volume offers valuable information to all members of prevention and post-blast teams. Each chapter was written by an expert or experts in a specific field and provides well-referenced information underlying best practices that can be used in the field, laboratory, conference room, classroom, or courtroom.

Scientific and Technical Aerospace Reports

This book represents a collection of papers presented at the 4th International Symposium on Analysis and Detection of Explosives held at the Mitzpeh Rachel Kibbutz Guesthouse in Jerusalem, September 7 to 10, 1992. The Symposium was attended by 150 participants from 20 countries and 50 lectures were given including 4 invited keynote lectures. The purpose of the Symposium, as the previous Symposia, was to present and to discuss new approaches, new applications, new methods and techniques in analysis and detection of explosives. The Symposium was, according to the feedback received from many participants, very successful and met the anticipated expectations. New collaborative initiatives between various laboratories from different countries were formed, which is a necessity in our common goals of law enforcement, aviation security and environmental quality, issues which are closely related to the analysis of explosives. I would like to extend my thanks to the Weizmann Institute of Science and the Israel National Police for sponsoring the Symposium, to the contributing Institutions and Agencies for making this Symposium financially possible, and to the members of the International Committee for helpful advice. I am most thankful to my colleagues from the Organizing Committee, especially Dr. Joseph Almog and Dr. Shmuel Zitrin from the Israel National Police, for helping in the organization of this Symposium.

Energy Research Abstracts

Food contains various compounds and many technologies exist to analyze those molecules of interest. However, the analysis of the spatial distribution of those compounds using conventional technology, such as liquid chromatography-mass spectrometry or gas chromatography-mass spectrometry is difficult. Mass spectrometry imaging (MSI) is a mass spectrometry technique to visualize the spatial distribution of molecules, as biomarkers, metabolites, peptides or proteins by their molecular masses. Despite the fact that MSI has been generally considered a qualitative method, the signal generated by this technique is proportional to the relative abundance of the analyte and so quantification is possible. Mass Spectrometry Imaging in Food Analysis, a volume in the Food Analysis and Properties Series, explains how the novel use of matrix-assisted laser desorption/ionization mass spectrometry imaging (MALDI-MSI) will be an ideal complementary approach. MALDI-MSI is a two-dimensional MALDI-MS technology that can detect compounds in a tissue section without extraction, purification, separation, or labeling. It can be used to visualize the spatial distribution of biomolecules in foods. Features: Explains the novel use of matrix-assisted laser desorption/ionization mass spectrometry imaging in food analysis Describes how MALDI-MSI will be a useful technique for optical quality assurance. Shows how MALDI-MSI detects food contaminants and residues Covers the historical development of

Canines

Nuclear quadrupole resonance (NQR) a highly promising new technique for bulk explosives detection: relatively inexpensive, more compact than NMR, but with considerable selectivity. Since the NQR frequency is insensitive to long-range variations in composition, mixing explosives with other materials, such as the plasticizers in plastic explosives, makes no difference. The NQR signal strength varies linearly with the amount of explosive, and is independent of its distribution within the volume monitored. NQR spots explosive types in configurations missed by the X-ray imaging method. But if NQR is so good, why is it not used everywhere? Its main limitation is the low signal-to-noise ratio, particularly with the radio-frequency interference that exists in a field environment, NQR polarization being much weaker than that from an external magnetic field. The distinctive signatures are there, but are difficult to extract from the noise. In addition, the high selectivity is partly a disadvantage, as it is hard to build a multichannel system necessary to cover a wide range of target substances. Moreover, substances fully screened by metallic enclosures, etc. are difficult to detect. A workshop was held at St Petersburg in July 2008 in an attempt to solve these problems and make NQR the universal technique for the detection of bombs regardless of type. This book presents the essentials of the papers given there.

Current Practice of Gas Chromatography-Mass Spectrometry

Department of Homeland Security Appropriations for 2007

Police and Military Dogs

This book presents a comprehensive and up-to-date account of the theory (physical principles), design, and practical implementations of various sensors for scientific, industrial, and consumer applications. This latest edition focuses on the sensing technologies driven by the expanding use of sensors in mobile devices. These new miniature sensors will be described, with an emphasis on smart sensors which have
embedded processing systems. The chapter on chemical sensors has also been expanded to present the latest developments. Digital systems, however complex and intelligent they may be, must receive information from the outside world that is generally analog and not electrical. Sensors are interface devices between various physical values and the electronic circuits that "understand" only a language of moving electrical charges. In other words, sensors are the eyes, ears, and noses of silicon chips. Unlike other books on sensors, the Handbook of Modern Sensors is organized according to the measured variables (temperature, pressure, position, etc.). This book is a reference text for students, researchers interested in modern instrumentation (applied physicists and engineers), sensor designers, application engineers and technicians whose job it is to understand, select and/or design sensors for practical systems.

Mass Spectrometry Imaging in Food Analysis

Existing and Potential Standoff Explosives Detection Techniques

Anti-personnel Landmine Detection for Humanitarian Demining

Now in its second edition, Forensic Investigation of Explosions draws on the editor's 30 years of explosives casework experience, including his work on task forces set up to investigate major explosives incidents. Dr. Alexander Beveridge provides a broad, multidisciplinary approach, assembling the contributions of internationally recognized experts

Detector Dogs and Scent Movement

This volume details the principles and instrumentation of gas chromatography-mass spectrometry (CG-MS), and outlines industrial, environmental, pharmaceutical, clinical, toxicological, forensic and food-related applications, revealing findings from the laboratories of 40 contributing scientists around the world using GC-MS in practice. It describes upstream and downstream applications of GC-MS in the petroleum industry and identifies chlorinated compounds in the environment with quadrupole ion-trap technology and high-resolution sector instruments.

Toxicological Profile for 2,4,6-trinitrotoluene

14 MeV Neutrons
Get Free Analysis And Detection Explosives Dt

Despite the often difficult and time-consuming effort of performing experiments with fast (14 MeV) neutrons, these neutrons can offer special insight into nucleus and other materials because of the absence of charge. 14 MeV Neutrons: Physics and Applications explores fast neutrons in basic science and applications to problems in medicine, the environment, and security. Drawing on his more than 50 years of experience working with 14 MeV neutrons, the author focuses on: Sources of 14 MeV neutrons, including laboratory size accelerators, small and sealed tube generators, well logging sealed tube accelerators, neutron generators with detection of associated alpha particles, plasma devices, high flux sources, and laser-generated neutron sources Nuclear reactions with 14 MeV neutrons, including measurements of energy spectra, angular distributions, and deductions of reaction mechanism Nuclear reactions with three particles in the final state induced by neutrons and the identification of effects of final state interaction, quasi-free scattering, and charge-dependence of nuclear forces Charged particle and neutron detection methods, particularly position-sensitive detectors Industrial applications of nuclear analytical methods, especially in the metallurgy and coal industries Quality assurance and quality control measures for nuclear analytical methods Nuclear and atomic physics-based technology for combating illicit trafficking and terrorism Medical applications, including radiography, radiotherapy, in vivo neutron activation analysis, boron neutron therapy, collimated neutron beams, and dosimetry This book reflects the exciting developments in both fundamental nuclear physics and the application of fast neutrons to many practical problems. The book shows how 14 MeV neutrons are used in materials detection and analysis to effectively inspect large volumes in complex environments.

The Analysis of Explosives

The concept for the Oak Ridge Multiple Attribute System (ORMAS) is a Nuclear Materials Identification System (NMIS) time-dependent coincidence processor that incorporates gamma ray spectrometry and utilizes a small, lightweight, portable DT neutron (14.1 MeV) generator (1 x 108 n/s), proton recoil scintillation detectors, and a gamma ray detector (HPGe). ORMAS is based on detecting fission neutrons and gamma rays from inherent source fission, fission induced by the external DT source, gamma ray detection of natural emissions of uranium and Pu, and induced gamma ray emission by the interaction of the 14.1 MeV neutrons from the DT source. This system is uniquely suited for detection of shielded highly enriched uranium (HEU), plutonium and other special nuclear materials, and detection of high explosives (HE), chemical agents, and in some cases, drugs. It could easily be adjusted to utilize a trusted processor that incorporates information barrier and authentication techniques using open software and then be useful in some international applications for materials whose characteristics may be classified. Since it is based entirely on commercially available components, the entire system, including the NMIS data acquisition boards, can be built with commercial off the shelf components (COTS). ORMAS incorporates the PINS technology of A.J. Caffrey of the Idaho National Engineering and Environmental Laboratory for HE, chemical agents, and drugs detection. The system hardware and software can be configured to obtain the following: Pu presence, Pu mass, Pu 240/239 ratio, Pu geometry, Pu metal vs. non metal (absence of metal), time (age) since processing for Pu, U presence, U mass, U enrichment, U geometry, U metal vs. non metal (absence of metal), high explosives, chemical weapons, and in some cases, drugs. A matrix of the quantities determined, the method of determination, whether active (external neutron source) or passive and the measurement equipment involved is given in the following table. Some of these attributes can be obtained by multiple data analysis methods. The gamma ray spectrometry methods for Pu, HE, and drugs are well known and have been developed
by other laboratories. The system hardware and software may also be configured to estimate a selected subset of these attributes. In addition, signatures from ORMAS for fissile material can be used for template matching such as has been implemented for confirmation of inventories and receipts for weapons components at the Y-12 National Security Complex in Oak Ridge since 1996. Recently, Y-12 personnel were trained and have been operating three NMIS systems at the Y-12 complex. ORMAS has the advantage of combining multiple technologies into a single system for a variety of applications and thus is cost effective.

Analytical Instrumentation Handbook

Detection canines have been utilized throughout the world for over a century, and while numerous attempts have been made to replicate the canine’s ability to detect substances by mechanical means, none has been as successful. The olfactory system is a highly intricate and sophisticated design for chemical sensing, and the olfactory capacity of many animals, including canines, is considered unmatched by machine due to not only their great sensitivity and superior selectivity but also their trainability and mobility. These unique features have led to the use of such animals as “whole-animal” biosensors. Amplifying the benefits and diminishing the limitations of detection canines’ interdisciplinary research is crucial to understanding canine olfaction and detection and enhancing this powerful and complex detector. The past 50 years have produced vast advancements in animal behavior/training technology to develop canines into more proficient and reliable sensors, while scientific research has provided tremendous support to help practitioners better understand how to utilize this powerful sensor. This book assembles a diverse group of authors with expertise in a variety of fields relating to detection canines and the chemical sensing industry, including both research and operational perspectives on detection canines. It illustrates how science enhances our understanding of how canines are employed for solving some of the world’s leading detection challenges.

Applications of Modern Mass Spectrometry: Volume 1

With the ever-spreading problem of violent crime in today’s society, techniques to assist forensic scientists and other law enforcement personnel have come to the forefront. With improvement in collection methods and analytical tools to conduct more thorough analyses, gunshot residue examination has made a dramatic impact as an area of trace evidence.

Detection of Liquid Explosives and Flammable Agents in Connection with Terrorism

Dogs detect scent from a source that is carried to them in a plume by the wind. The most important tool for a detector dog handler to have on searches is a knowledge of scent plume movement or “scent dynamics” (the science of scent movement). Such knowledge resides primarily in scientific journals that are largely inaccessible to detector dog handlers and written in language that is difficult to understand. Detector Dogs and the Science of Scent Movement: A Handler’s Guide to Environments and Procedures retrieves, reviews, and interprets the results of pertinent scientific research on scent dynamics and presents these results in terms that are easier for handlers to understand. Information
on the physiology of the dog’s nose, their sense of smell, and the properties of scent provide the essential information on the process of scenting. The composition of training aids for explosives, narcotics, human remains and other sources is discussed. Recommendations are made on the use of training aids, their placement during training, and the resulting availability of scent. Potential problems and handler errors in the use of training aids are also examined. The characteristics of scent plumes and how wind influences their movement are a key focus of the book. The primary task for the handler is to get the dog into the scent plume so that the dog can detect the scent and follow it to the source the handler seeks. As such, a knowledge of scent and scent plume movement will vastly improve the ability of the handler to accomplish this task. The influence of weather and physical settings such as terrain, vegetation, ground cover, soil and water on scent movement are examined in detail. Strategies for searching, detecting, and locating sources in all physical settings are presented. Specific effects associated with hills and mountains, fields and forests, bare soils and soils covered by vegetation, different soil types, and lakes and rivers are examined in detail. This includes specific recommendations are made about weather and physical settings that result in higher probability of success on searches. Detector Dogs and the Science of Scent Movement will be a vital resource for K9 handles in the private and public sectors—including in Homeland Security, law enforcement, and military settings—as well as a useful guide for lawyers, forensic, and investigative professionals who need to better understand K9 operations.

**Handbook of Modern Sensors**

Applications of Modern Mass Spectrometry covers the latest advances in the use of mass spectrometry in scientific research. The series attempts to present readers information on the broad range of mass spectrometry techniques and configurations, data analysis and practical applications. Each volume contains contributions from eminent researchers who present their findings in an easy to read format. The multidisciplinary nature of the works presented in each volume of this book series make it a valuable reference on mass spectrometry to academic researchers and industrial R&D specialists in applied sciences, biochemistry, life sciences and allied fields. The first volume of the series presents 5 reviews: - Applications of mass spectrometry for the determination of the microbial crude protein synthesis in ruminants - Qualitative and quantitative LC-MS analysis in food proteins and peptides - Chemometrics as a powerful and complementary tool for mass spectrometry applications in life sciences - Recent developments of allied techniques of qualitative analysis of heavy metal ions in aqueous solutions with special reference to modern mass spectrometry - New techniques and methods in explosive analysis.

**Recent Advances in Computational Intelligence in Defense and Security**

The need for this book arose from my teaching, engineering, and search experience in the non-power aspects of nuclear technology. The lack of a comprehensive textbook in industrial applications of radiation frustrated my students, who had to resort to a multitude of textbooks and research publications to familiarize themselves with the fundamental and practical aspects of radiation technology. As an engineer, I had to acquire the design aspects of radiation devices by trial-and-error, and often by incidental reading of a precious publication. As a researcher and a supervisor of graduate students, I found that the needed literature was either hard to find, or too scattered and diverse.
More than once, I discovered that what appeared to be an exciting new idea was an old concept that was tried a few decades earlier during the golden era of “Atom for Peace”. I am hoping, therefore, that this book will serve as a single comprehensive reference source in a growing field that I expect will continue to expand. This book is directed to both neophytes and experts, and is written to combine the old and the new, the basic and the advanced, the simple and the complex. It is anticipated that this book will be of help in reviving older concepts, improving and expanding existing techniques and promoting the development of new ones.

Forensic Investigation of Clandestine Laboratories

Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database.

Information Processing and Management of Uncertainty in Knowledge-Based Systems. Theory and Foundations

Compiled by the editor of Dekker's distinguished Chromatographic Science series, this reader-friendly reference is as a unique and stand-alone guide for anyone requiring clear instruction on the most frequently utilized analytical instrumentation techniques. More than just a catalog of commercially available instruments, the chapters are wri

Handbook of Green Analytical Chemistry

Due to its enormous sensitivity and ease of use, mass spectrometry has grown into the analytical tool of choice in most industries and areas of research. This unique reference provides an extensive library of methods used in mass spectrometry, covering applications of mass spectrometry in fields as diverse as drug discovery, environmental science, forensic science, clinical analysis, polymers, oil composition, doping, cellular research, semiconductor, ceramics, metals and alloys, and homeland security. The book provides the reader with a protocol for the technique described (including sampling methods) and explains why to use a particular method and not others. Essential for MS specialists working in industrial, environmental, and clinical fields.

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