

BOOK REVIEW

L. Thomas Chamberlain,¹ J.D., Ph.D.

Review of: *Aspects of Explosive Detection*

REFERENCE: Marshal M, Oxley J. *Aspects of explosive detection*, 2nd ed. Oxford, UK: Elsevier, 2009, 288 pp.

Aspects of Explosive Detection is a comprehensive treatise on explosives detection devices which could easily be used as a university textbook in a course on the subject matter or as a means to bring a reader to a good understanding of current and future uses of explosive detection technologies.

The treatise begins with building a brief history of the threats and events associated with explosives that was the driving force behind the development of explosives detection to thwart terrorist threats. One of the milestones was the passage of the Federal Aviation Security Improvement Act after the Pan Am 103 incident. This Act funded a unique branch within the FAA charged with funding efforts through government contacts and grants to design and build detectors. The major impetus to deploy detectors began after the TWA-800 tragedy which turned out not to be a terrorist attack. The editors in their initial chapter go on to describe the threat and the issues associated with the different explosive threats such as an IED (improvised explosive device).

The editors continue to give a brief overview of “Trace” and “Bulk” detection technologies and give a very brief introduction to “certified” technologies that can only apply to imaging detection systems due to the regulations promulgated at the time by the FAA. The overview in the initial part of the book covers the various “Trace” and “Bulk” technologies now developed and give the reader a glimpse of some newer emerging technologies. The comprehensive descriptions of the various technologies are given in the following chapters by various authors that come from diverse backgrounds including instrument manufacturers, research institutions, and government.

The authors also represent the views from three different countries involved with the problem of explosives detection. The countries include Great Britain, Israel, and the United States.

A second introductory chapter setting the stage for the topic provides the reader with a good overview of propellants and explosives along with the chemistry and physics behind the release of energy during “deflagration” and “detonation.”

After discussing the various explosives and their chemical composition, the editors lead a discussion on the impact that the chemical and physical properties have on the various means of detection, be it “Trace” including canines or “Bulk.”

One important area the treatise does not fully develop is the impact that quantitative standards have had on the development of emerging detectors and the testing of their efficacy. This includes the development of artificial fingerprints as standards for explosive trace detectors (ETDs) and nonexplosive bulk standards for explosive detection systems (EDS).

Detailed chapters on the various explosives detector technologies follow that cover canines, the “Bulk” technologies, and the “Trace” technologies (Chapters 3–10). There are also detailed descriptions of some of the more recent technologies being deployed at civilian airports such as backscatter X-ray for use in detecting hidden weapons and explosives under clothing and trace portals used to detect explosive residue on passengers. An excellent discussion is presented in Chapter 3 on how canines actually key on explosives and their sensitivities.

The comprehensive chapters on the various technologies cover the chemical basis for the colorimetric tests all the way through the physics of nuclear technologies and X-ray systems including the FFA/TSA “certified” EDS computerized tomography imaging systems. Large cargo inspection systems are also covered in detail.

“Trace” explosives detection systems begin with the use of mass spectrometry as a detector. This is followed by ion mobility spectrometry (IMS) with an important discussion on particle collection. The reader is led through the modern development of particle collectors and concentrators that were crucial in the improvement of ETDs. This allowed the development of Trace portals to move forward because of the huge volumes of air collected and the need to concentrate that volume so it could be introduced as a sample into an IMS or MS. There is also a discussion of the developments in IMS technology that allowed for the simultaneous detection of negative and positive species of explosives.

Additional techniques utilizing fluorescent receptors or conjugated polymer sensors are discussed.

The treatise also includes a chapter on postblast response that would be useful in a forensic approach to a bomb scene.

A final chapter is rather unique in a treatise on explosive detection in that it covers many legal issues associated with using detectors to search for explosives, comparing “reasonableness” under the Fourth Amendment protections and the need for security. Also covered are topics associated with surveillance, profiling, and the U.S. Patriot Act.

¹Private Consultant, Tampa, FL.