

Preface

The history of explosives dates back to more than 2000 years and it is a matter of common knowledge that Chinese were the first to make the first ever “explosive,” namely, gunpowder or black powder sometime before 200 BC. There was a huge lull in the field for nearly 1400 years since then, till Roger Bacon, an English monk carried out detailed experiments on black powder around AD 1249. But, the real momentum in the development of explosives and propellants picked up only in the midpart of the nineteenth century with a number of contributors, mostly from Europe, Alfred Nobel being the most notable among them. A gist of the important milestones in the development of explosives and propellants is given in Chapter 1.

Twentieth century has witnessed some remarkable milestones in the synthesis of explosives of high power, higher thermal stability, and low vulnerability. Simultaneously, great progress was made in the development of propellants for rockets, guns, mortars, and small arms. Similar milestones were reached in the field of pyrotechnics which are essential parts of any system that uses explosives and propellants. Many major breakthroughs in the field of explosives, propellants, and pyrotechnics (collectively and loosely named as “high energy materials” (HEMs)) were possible in the twentieth century because of great strides that were made in the fields of chemistry—particularly synthetic organic chemistry, advanced instrumentation, detonics, and engineering. Despite the impressive progress witnessed in the field of HEMs, during the last century, it must be admitted that the rate of progress is much slower as compared to other fields like polymer chemistry, electronics, and computers owing to a number of constraints and restrictions an HEM scientist has to encounter in developing a new HEM, like safety, stability (thermal, mechanical, storage, etc.), cost, and other considerations.

Excellent books, manuals, and journals are available in the field of HEMs (important journals mentioned at Chapter 1) and with the advent of the Web, large amount of information on HEMs is only a click away. But I felt that there is a need for a book where the main thrust will be on the various **CONCEPTS** of HEMs rather than details of their preparation, properties, and applications. With about more than 30 years of experience in HEMs, having been associated with production, quality assurance, and R&D related to explosives and propellants of various types, I realized that there exists a need for a book with the main purpose of making the basic concepts of HEMs clear for the HEM community as a whole. This book is the result of that realization wherein I have tried to illustrate the concepts in as simple manner as possible so that the reading becomes easy, interesting, and assimilable. I hope that this book will be particularly useful to the beginners in the field of HEMs, whether they are in production or inspection or R&D.

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It is possible that this being the first edition, there can be errors or commissions or omissions at some places. In such cases, I will be grateful if they are brought to my notice along with any constructive suggestions so that the necessary corrections/editing can be done in the next edition.