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| 1. Record Nr. | UNISALENTO991003957779707536 |
| Titolo | Archivio civile |
| Pubbl/distr/stampa | Piacenza : La Tribuna, 1975-2004 |
| ISSN | 1720-4267 |
| Descrizione fisica | Mensile |
| Collana | Archivio civile |
| Disciplina | CDD 340.5 |
| Lingua di pubblicazione | Inglese |
| Formato | Materiale a stampa |
| Livello bibliografico | Periodico |
| Note generali | Cod. ACNP: P 00045835 |
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- | | |
|-------------------------|---|
| 2. Record Nr. | UNINA9910830897503321 |
| Autore | Mahadevan Erode G |
| Titolo | Ammonium nitrate explosives for civil applications [[electronic resource]] : slurries, emulsions and ammonium nitrate fuel oils / / Erode G. Mahadevan |
| Pubbl/distr/stampa | Weinheim, : Wiley-VCH, 2013 |
| ISBN | 3-527-64568-3
1-283-91539-1
3-527-64570-5 |
| Edizione | [1st ed.] |
| Descrizione fisica | 1 online resource (232 p.) |
| Disciplina | 662.2 |
| Soggetti | Ammonium nitrate fuel oil |
| Lingua di pubblicazione | Tedesco |
| Formato | Materiale a stampa |
| Livello bibliografico | Monografia |
| Note generali | Description based upon print version of record. |
| Nota di bibliografia | Includes bibliographical references and index. |
| Nota di contenuto | Ammonium Nitrate Explosives for Civil Applications; Copyright Page; Contents; Acknowledgment; Preface; 1 Classification of Explosives; 1.1 |

Initiation Sensitivity; 1.2 Size; 1.3 Usage; 1.4 Physical Form; 2 Explosive Science; 2.1 Introduction; 2.1.1 Low Explosives; 2.1.2 High Explosives; 2.2 Initiation and Detonation; 2.2.1 Mechanism; 2.3 Propagation and Detonation; 2.3.1 Propagation; 2.3.2 Detonation; 2.3.2.1 Ideal/Nonideal Detonation/Critical Diameter/Ideal Diameter; 2.3.2.2 Detonation Pressure and Velocity; 2.4 Reaction Chemistry in Explosives; 2.4.1 Heat of Reaction 2.4.2 Rules of Hierarchy 2.4.3 Calculation of Oxygen Balance and Fuel Values; References; 3 Ammonium Nitrate Explosives; 3.1 Introduction; 3.1.1 Chronology; 3.2 Design of Commercial Explosives; 3.2.1 Importance of Oxygen Balance; 3.2.2 Physical, Performance, and Safety Requirements; 3.3 Tests; 3.3.1 Ballistic Mortar Test; 3.3.2 Trauzl Lead Block Test; 3.3.3 Velocity of Detonation (VOD); 3.3.4 Gap Test and Continuity of Detonation Test; 3.3.5 Aquarium Test; 3.3.6 Double Pipe Test; 3.3.7 Cylinder Test (Crushing Strength); 3.3.8 Plate Dent Test; 3.3.9 Underwater Test (UWT); 3.3.10 Crater Test 3.4 Assessment of Safety and Stability Characteristics 3.4.1 Impact Test; 3.4.2 Torpedo Friction Test; 3.4.3 Accelerated Hot Storage (ageing Test); 3.4.4 Cold Temperature Storage Test; 3.4.5 Thermal Stability Tests Using DTA and TGA Procedures; 3.5 Summary; References; 4 Ammonium Nitrate and AN/FO; 4.1 Introduction and History; 4.2 Physical and Chemical Properties of Ammonium Nitrate; 4.2.1 Basic Data; 4.2.2 Decomposition Chemistry of AN; 4.2.3 Phase Transition in AN and its Importance in Explosives; 4.3 Manufacture of Ammonium Nitrate; 4.3.1 Prilled Ammonium Nitrate 4.4 Ammonium Nitrate Fuel Oil Explosives 4.4.1 Background; 4.4.2 AN/FO Manufacture; 4.4.2.1 Mixing Process and Equipment; 4.4.2.2 Continuous Process; 4.4.2.3 Bulk Delivery Systems; 4.4.3 Properties of AN/FO; 4.4.3.1 Physical; 4.4.3.2 Oil Absorbency and Porosity/Bulk Density/Crushing Strength; 4.4.3.3 Resistance to Effect of Temperature Cycling; 4.4.4 Characteristics of ANFO; 4.4.4.1 Density/Strength; 4.4.4.2 Strength of the AN/FO Explosive; 4.4.4.3 Energy Content of AN/FO; 4.4.4.4 Velocity of Detonation and Effective Priming; 4.4.4.5 Mechanism of Detonation Propagation in AN/FO 4.4.4.6 Influence of Fuel 4.4.4.7 Effect of Moisture/Wet Boreholes/Water-Resistant AN/FO; 4.4.4.8 Water-Resistant AN/FO; 4.4.4.9 Increasing the Energy of AN/FO and its Fume Characteristics; 4.4.5 Safety Considerations in AN/FO; 4.4.6 Summary - AN/FO Explosives; 4.4.7 Quality Checks; References; Further Reading; 5 Slurries and Water Gels; 5.1 Development; 5.2 Design; 5.2.1 Large-Diameter Packaged Product (Water Gels); 5.2.2 List of Ingredients; 5.2.3 Small-Diameter, Cap-Sensitive Water Gels; 5.2.4 Bulk Delivery Product; 5.2.5 Basic Concepts of Formulation; 5.2.5.1 Oxygen Balance 5.2.5.2 Thumb Rules for Design

Sommario/riassunto

The book describes the science and technology of formulation and manufacturing of non-nitroglycerine explosives with ammonium nitrate as the main ingredient. Based on the author's industry experience of more than thirty years, it provides an unparalleled treatment of one of the commercially most important classes of explosives and therefore stimulates further research and development efforts in the field of explosives for civil applications.