

UNIVERSITY OF PARDUBICE
Faculty of Chemical Technology
Department of Theory & Technology of Explosives
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CZ-532 17 Pardubice

AUSTIN DETONATOR, s.r.o.
CZ-755 37 Vsetín

**MILITARY INSTITUTE FOR WEAPON
AND AMMUNITION TECHNOLOGY**
CZ-763 21 Slavičín

PROGRAMME
of the fourth Seminar

**„NEW TRENDS IN RESEARCH OF ENERGETIC
MATERIALS“**

held at University of Pardubice

Pardubice, the Czech Republic

April 11 - 12, 2001

*intended as a meeting of students, postgraduate students, university teachers and
research and development workers concerned from the all world*

Seminar is held under the aegis of his magnificence,

Prof. Miroslav Ludwig, Ph.D.,
rector of the University of Pardubice

Chairman of the Seminar:

Prof. Svatopluk Zeman, D.Sc.

Scientific Committee:

Prof. Thomas B. Brill (*University of Delaware, USA*)
Dr. Adam S. Cumming (*DERA, Fort Halstead, Sevenoaks, U. K.*)
Prof. Boris L. Korsounskii, D.Sc. (*Russian Acad. Sci., Moscow, Russia*)
Prof. Andrzej Maranda, D.Sc. (*Military Univ. Technol., Warsaw, Poland*)
Dr. Muhamed Sućeska (*Brodarski Inst., Zagreb, Croatia*)
Assoc. Prof. Waldemar A. Trzciński (*Military Univ. Technol., Warsaw*)
Assoc. Prof. Pavel Vávra, Ph.D. (*Univ. Pardubice*)
Assoc. Prof. Boris Vetlický, Ph.D. (*Univ. Pardubice*)
Dr. Fred Volk, (*ICT Pfinztal, Germany*)

Organizing Committee:

Jiří Vágenknecht, Ph.D. (*Univ. Pardubice*)
Mgr. David Nimrichtr (*Gymnasium Pardubice*)
Marcela Jungová, M.Sc. (*Univ. Pardubice*)
Břetislav Janovský, Ph.D. (*Univ. Pardubice*)
Miloslav Krupka, Ph.D. (*Univ. Pardubice*)
Petr Kohlíček, M.Sc. (*Univ. Pardubice*)
Jiří Kočí, M.Sc. (*Univ. Pardubice*)
Jiří Pachmáň, M.Sc. (*Univ. Pardubice*)
Jaroslav Pulicar, M.Sc. (*Univ. Pardubice*)
Pavel Valenta, M.Sc. (*Austin Detonator*)
Assoc. Prof. Ladislav Lehký, Ph.D. (*division SYNTHESIA*)
Josef Tichý, Ph.D. (*division SYNTHESIA*)
Miloš Hauner, M.Sc. (*Military Inst. for Weapon & Ammun. Technol.*)

GENERAL INFORMATION:

Seminar Venue:

Seminar will take place in a new University hall, which is a part of University library on Studentská street 519, Pardubice, near the hotel Harmony (*see enclosed map*).

Accommodation:

Participants, which have preliminary asked for accommodation booking, will get following accommodation:

- participants from Poland and Croatia - in hotel HARMONY, Bělehradská street (*see enclosed map*),
- participants from Finland, Germany, Israel, Japan, The Netherlands, Russia, Slovakia, Switzerland and USA - in hotel LABE in the center of Pardubice (*see enclosed map*).

Lunches:

There is possibility to bespeak lunches in the hotel HARMONY (*near to University hall*) the day before the lunch.

Official Language:

English will be the official working language. Simultaneous interpretation in Czech and from Czech will be partly ensured.

Registration fees:

No fees will be charged. Participants will cover any other charges (*accommodation, diet etc.*).

Proceedings:

Participants can buy corresponding Proceedings at the beginning of the Seminar. Price of the Proceedings is 200,- CZK (i.e. \$ 5,-).

Presentation of papers:

Data, slide and sheet projectors will be available for oral presentation.

Tables (*1980 mm high and 1000 mm wide*) will be available for poster presentation.

Special Programme:

Social party for foreign participants with dinner will be arranged in hotel HARMONY restaurant on April 11th at 18:00.

In the case of participants interest it is possible to organize a visit of the Department of Theory and Technology of Explosives.

Lecture programme – Wednesday April 11th

08:40 **Opening of Seminar** – speech of Prof. Jiří Málek, Ph.D., vice-rector of University

1. Session

Chairman: Dr. Adam S. Cumming
DERA Fort Halstead

09:00 Zdeněk Jalový, Pavel Mareček, Kamil Dudek and Tomáš Weidlich
Dept. of Theory & Technology of Explosives, University of Pardubice, Czech Rep.

Synthesis and Properties of 1,1-Diamino-2,2-dinitroethylene.

09:20 Zenon Wilk and Bogdan Zygmunt
Institute of Industrial Organic Chemistry, Warsaw, Poland

Research of High Energy Explosives with Fluoropolymer Binders..

09:40 Yuji Kohno, Kazuyoshi Ueda and Akira Imamura
Dept. of Chemistry, Graduate School of Science, Hiroshima University, Japan

Molecular Orbital Study and Molecular Dynamics Simulations of Initial Decomposition Process on the Unique N-N Bond in Nitramines in the Crystalline State.

10:00 Bogdan Florczak, Marek Lipiński and Jadwiga Szymczak
Institute of Industrial Organic Chemistry, Warsaw, Poland

Solid Composite Propellants. Some Problems of Selection of Fuel Composition in Aspect of Performance Characteristics of Engine.

10:20-10:50 **Coffee break**

11:10 Fred Volk and Fritz Schedlbauer
Fraunhofer Institut für Chemische Technologie (ICT), Pfinztal, Germany

Analysis of Post Detonation Products of Different Explosive Charges.

11:30 Stanislaw Cudzilo and Andrzej Maranda
Military University of Technology, Warsaw, Poland

Shock Sensitivity of AN/TNT and AN/TNT/Al Explosives.

11:50 Waldemar A. Trzciński
Military University of Technology, Warsaw, Poland

Determination of the Metal Acceleration Ability of Explosives.

12:10-14:00 **Lunch break.**

Lecture programme – Thursday April 12th

2. Session

Chairman: Dr. Fred Volk
ICT Pfinztal

- 08:40 Maija Hihkiö, Juho Hyypä and Mati Memmilä
Defence Forces Research Institute of Technology, Lakiala, Finland
Calorimetric and Thermal Study of Propellants in Safety Research.
- 09:00 Adam S. Cumming
DERA Fort Halstead, Sevenoaks, U.K.
High Energy Materials Research in the UK.
- 09:20 Marcel Hanus
Military Institute for Weapon and Ammunition Technology, Slavičín, Czech Rep.
Dynamic Mechanical Analysis of Composite Solid Rocket Propellants.
- 09:40 Jiří Pachmáň and Marcel Hanus
Dept. of Theory & Technology of Explosives, University of Pardubice, Czech Rep.
Some Aspect of Stability Evaluation of Double Based Solid Rocket Propellants.
- 10:00-10:30 **Coffee break**
- 10:30 Maša Rajić and Muhamed Sućeska
Marine Research & Special Technologies, Zagreb, Croatia
Analytical Application of Thermal Methods in the Field of High Explosives
- 10:50 Wim P. C. de Klerk, Antoine E. D. M. van der Heijden, Wilianne H. M. Welland
TNO Prins Maurits Laboratory, Rijswijk, The Netherlands
HNF, a Promising High-Energetic Material Investigated by Thermal Analysis.
- 11:10 Stephan Wilker, Jan Petržílek, Jan Skládal, Uldis Ticmanis, Gabriele Pantel
and Lutz Stottmeister
WIWEB, Swisttal, Germany
Stability Analyses of Double Base Propellants in Dependence of their DPA and NGL Content.
- 11:30 V. V. Nedelko, N. V. Chukanov, N. I. Golovina, B. L. Korsounskii, T. S. Larikova
and Fred Volk
Institute of Problems of Chemical Physics, Chernogolovka, Russian Federation
Thermal Decomposition of Various Modification of Hexanitrohexaazaisowurtzitane
- 11:50-13:50 **Lunch break**

3. Session

Chairman: Prof. Svatopluk Zeman
University of Pardubice

13:50 Jacek Borkowski, Jan Szymanowski, Maciej Miszczak and Wim P. C. de Klerk
Military Institute of Armament Technology, Zielonka, Poland

Compatibility of Explosives with other Materials.

14:10 Michal Fraczak, Tadeusz Piotrowski, Andrzej Plaskowski and Bogdan Zigmunt
Institute of Organic Industrial Chemistry, Warsaw, Poland

Process Tomography (PT) – New Opportunities in Combustion Run Diagnosis.

14:30 Zvonimir Ester and Luka Čačić
Faculty of Mining, Geology and Petroleum, University of Zagreb, Croatia

Application of Linear Shaped Charges for the Cutting Steel.

14:50 **Closing remarks**

Poster programme

A special poster session will take place on Wednesday (April 11th) from 14:00 up to 17:00 h. in Congressional hall (*in building of Rector's office*). During this time authors should be present for discussion at the posters.

P 01 Andrzej Marczuk, Maciej Miszczak, Jan Szymanowski and Jacek Borkowski
Military Institute of Armament Technology, Zielonka, Poland

An Application of Thin Layer Chromatography in Technological Research of Explosives.

P 02 Maciej Miszczak, Ewa Szymanowska, Jan Szymanowski, Wojciech Goryca, and Eugenius Milewski
Military Institute of Armament Technology, Zielonka, Poland

Studies on Physico-Chemical Processes Going on in Mortar Augmenting Propelling Charges in Aspect of their Chemical Stability and Compatibility.

P 03 Aleš Eisner and Karel Ventura
Dept. of Analytical Chemistry, University of Pardubice, Czech Rep.

Determination of Additives from Explosive Materials in Lime Plaster from Manufacturing Plant and Store.

P 04 Jiří Vágenknecht and Ladislav Adamík
Dept. of Theory & Technology of Explosives, University of Pardubice,

Determination of the Characteristics of a Cumulative Jet of Products of the Detonation

- P 05** Muhamed Sućeska, Svatopluk Zeman, Maša Rajić and Zdeněk Jalový
Marine Research & Special Technologies, Zagreb, Croatia
Theoretical Prediction of TNAZ Detonation Properties.
- P 06** Kamil Dudek, Pavel Mareček and Zdeněk Jalový
AliaChem, a.s., Res. Institute of Industrial Chemistry, Pardubice, Czech Rep.
Synthesis and some Properties of 1,3,3-Trinitroazetidine (TNAZ).
- P 07** Radim Huczala, Svatopluk Zeman and Zdeněk Friedl
Dept. of Theory & Technology of Explosives, University of Pardubice
Relationships between Electric Charges at Nitrogen Atoms of Primarily Split Off Nitro Groups and Detonation Characteristics of some *m*-Dinitrobenzopolyazaarenes.
- P 08** Pavel Vávra
Dept. of Theory & Technology of Explosives, University of Pardubice
Electronic Density of Molecule and some Properties of High Explosives.
- P 09** Petr Kohlíček, Svatopluk Zeman and Andrzej Maranda
Dept. of Theory & Technology of Explosives, University of Pardubice
The Study of Chemical Micromechanism Governing Detonation Initiation of Condensed Explosive Mixture.
- P 10** Svatopluk Zeman and Miloslav Krupka
Dept. of Theory & Technology of Explosives, University of Pardubice
Some Predictions of the Heats of Fusion, Heats of Sublimation, and Lattice Energies of Energetic Materials.
- P 11** Andrzej Orzechowski, Alina Sikorska and Bogdan Zygmunt
Institute of Industrial Organic Chemistry, Warsaw, Poland
Plastic Explosive for Reactive Armour.
- P 12** Martina Chovancová, Peter Očko, Jozef Lopúch and Luboš Čavojský
Military Technical & Testing Inst. Záhorie, Slovak Republic
Stability Investigation of Marked Plastic Explosives.
- P 13** Daniel Buczkowski, Mirosław Gućma and Witold Pagowski
Institute of Industrial Organic Chemistry, Warsaw, Poland
Explosive Properties of Reactive Mixtures Creating During Manufacturing of Explosives.
- P 14** Andrzej Książczak and Tomasz Wolszakiewicz
Institute of Industrial Organic Chemistry, Warsaw, Poland
Thermochemistry of the Binary System Nitrocellulose (13.2 %) + Dinitrotoluene.
- P 15** Bogdan Florczak and Katarzyna Lipińska
Institute of Industrial Organic Chemistry, Warsaw, Poland
Thermochemical Properties of Composite Propellants Combustion Products.

- P 16** Peter Očko and Martina Chovancová
Military Technical & Testing Inst. Záhorie, Slovak Republic
Fragmentation of 100 mm HE Warhead.
- P 17** Georgii M. Khrapkovskii, Ekaterina V. Nikolaeva, Denis V. Chachkov
and Alexander G. Shamov
Kazan State Technological University, Kazan, Russian Federation
**Nitro-Nitrite Rearrangement and Mechanism of Gas-Phase Monomolecular
Decomposition of C-Nitrocompounds.**
- P 18** Grigorii M. Khrapkovskii, Evgenii A. Matukhin and Valerii I. Kovalenko
Kazan State Technological University, Kazan, Russian Federation
**Structural Changes and Directional Regulation of Properties in Obtaining
Cellulose Nitroesters.**
- P 19** Waldemar Witkowski, Karol Buchalik, and Radoslaw Trebinski,
Institute of Organic Industry, ul. Anopol 6, PL-03-236 Warsaw, Poland
Determination of TNT Equivalence Using the Blast Wave Measurements.
- P 20** Jiří Strnad and Jiří Majzlík
Dept. of Theory & Technology of Explosives, University of Pardubice
Determination of Electrostatic Spark Sensitivity of Energetic Materials.
- P 21** Miloslav Krupka
Dept. of Theory & Technology of Explosives, University of Pardubice
Devices and Equipment for Testing of Energetic Materials.
- P 22** A. Mouloud and M.A. Benmahamed
UER de Chimie Appliquée, EMP, BP17c, Bordj-El-Bahri, Algiers
**Effect of Copper Chromite Particle Size on the Combustion Process of a Plastisol
Propellant. Part I: Thermal Investigations by DSC"**

Instruments demonstration

Instruments will be demonstrated on Wednesday (April 11th) from 14:00 up to 17:00 h. in Congressional hall (*in building of Rector's office*). Demonstrations will include instruments developed in Dept. of Theory & Technology of Explosives and with its cooperation with firms OZM Res. and RMI.

Differential Thermal Analysis for Energetic Materials

Electric Spark Sensitivity

Dynamic Mechanical Analysis