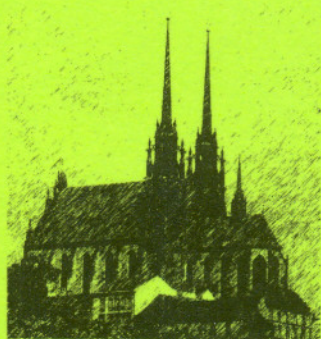
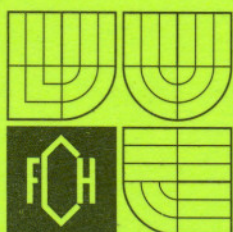


The Seventh European Meeting on Environmental Chemistry
EMEC7

THE BOOK OF ABSTRACTS



Brno, Czech Republic, December 6 - 9, 2006

**The Seventh European Meeting
on Environmental Chemistry (EMEC7)
THE BOOK OF ABSTRACTS**

PUBLISHER:

Brno University of Technology, Faculty of Chemistry

EDITOR:

Josef Čáslavský, Ph.D.

TECHNICAL EDITOR:

Radek Prikryl, Ph.D.

TECHNICAL ASSISTANCE:

Ludmila Nová, Radim Lána

COVER PAGE:

Radek Prikryl, Ph.D.

PRINTED BY:

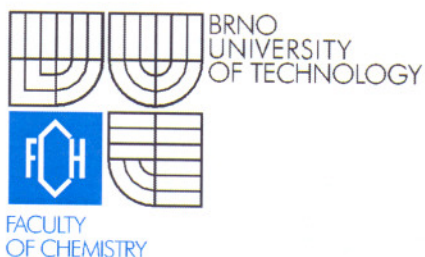
Brno University of Technology, Faculty of Chemistry
Purkyňova 118, 612 00 Brno,
Czech Republic

Printed in 280 coppies

Brno, Czech Republic, December 6 - 9, 2006

**The Seventh European Meeting on Environmental Chemistry
is organized by:**

Faculty of Chemistry, Brno University of Technology
<http://www.fch.vutbr.cz/>
dean@fch.vutbr.cz



The European Association of Chemistry and the Environment
<http://www.research.plymouth.ac.uk/ace/>



Conference web-site:

<http://www.fch.vutbr.cz/emec7>

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**11. ANALYTICAL METHODS FOR ENVIRONMENTAL
SCIENCE**

POSTERS No. 85 – 128

NEW DESIGNED AND FULLY AUTOMATED GERDIEN AIR-ION COUNTER

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Concentration of small air-ion is one of the crucial parameters in the ionizing radiation measurements and atmospheric electricity research. Also, beneficial influence of negative small air-ions on mood and behaving of people and animals is well-known.¹ Small air-ions consist typically of 4-12 molecules of water clustered around central ion. Their typical mobility is $1.3 - 3 \text{ cm}^2\text{V}^{-1}\text{s}^{-1}$ depending on their polarity.²

Aspirated Gerdien condenser is the most prevailing instrument used for measurements of air-ion concentration and mobility. Our new designed detector³ which is based on Gerdien's principle and named CDI-06 (Cylindrical Detector of Ions), is fully automated and portable instrument which measures and performs acquisition of not only positive and negative small air-ions, but also temperature, relative humidity and pressure. Power supply of the instrument is managed with 12 V lead accumulator, so autonomy of the instrument can be extended up to a few months, depending on frequency of programmed measurements. Data are represented on internal 2-row display or on PC in the form of tables and graphs and stored in 1.2 MB internal memory.

CDI-06 consists of cylindrical electrostatic condenser with outer and central coaxial electrodes made of stainless steel, fan (Micronel D604Q) that enables air flowing axially through the condenser, and femtoammeter which is current amplifier (Low Power CMOS Dual Operational Amplifier: LPC662IM). Central measuring electrode is hanging on sapphire bulbs due to stopping of surface current leakage. Typical measuring current is about 100 fA. To avoid cable capacity, triboelectric, piezoelectric and similar effects which generates small currents that could disturb our measurements, amplifier is positioned on the outer electrode, as near as possible to central measuring electrode. Amplifier is directly connected to 24-bit A/D converter, which sends digital signal in acquisition and controlling system. Converter ADS1224 manufactured by Texas Instruments is used. It works on sigma-delta prinipal with 24-bit resulting resolution. Control of the system is done with 8-bit RISC microcontoller ATmega 128 manufactured by ATMEL.

CDJ-06 is an instrument of high accuracy and sensitivity with large capabilities for measuring and monitoring of the ion and meteorological parameters of the atmosphere.

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The Book of Abstracts

The Seventh European Meeting on Environmental Chemistry, Brno, Czech Republic,
December 6 - 9, 2006

Organized by Faculty of Chemistry, Brno University of Technology and The European
Association of Chemistry and the Environment

Editor: Ing. Josef Čáslavský, CSc., Faculty of Chemistry,
Brno University of Technology

Printed by Brno University of Technology, Faculty of Chemistry

Brno 2006

Printed in 280 copies

256 pages

ISBN 80-214-3320-5