

Institute of Chemical Technology (ICT) Prague executes educational and research activities in almost all branches of chemistry: chemical engineering, food chemistry and technology, biochemistry, water-treatment, biological sciences and technology, as well as environment protection, material sciences and other chemistry-based fields. This technical university has around 3000 students in MSc, doctoral, and BSc study programmes. The ICT academic staff comprises of 70 professors, 115 associate professors and 230 assistants.

Department of Food Chemistry & Analysis is a part of the **Faculty of Food and Biochemical Technology**, the research activities are focused mainly on:

- **Development / optimization of modern analytical methods** – implementation of emerging technologies, improved performance characteristics in (ultra)trace analysis
- **Environmental contaminants** – the fate in the environmental compartments, identification of emission sources
- **Chemical reactions in food** – Maillard reaction, lipids oxidation, flavour formation
- **Contaminants / toxicants** – occurrence in food crops, fate during processing, mitigation strategies
- **Natural biologically active components** – identification in complex mixtures, formation pathways, changes during household / industrial processing and storage
- **Traceability of food origin (metabolomic profiling)** – implementation of novel analytical fingerprinting tools to detect of authenticity of origin, production practice etc.
- **Organic farming** – assessment of the quality (including flavour) and chemical safety, mitigation strategies

Collaboration with food industry is also an important part of applied research and comprises:

- Testing of food quality and safety compliance to food law / regulations (products, raw materials, etc.)
- Investigation of the transfer of persistent environmental pollutants (POPs) into food chain
- Studies on the fate of food contaminants / toxicants during processing and storage
- Detecting of fakes and food adulteration
- Assessment of volatile profiles to identify compounds causing off-flavour or to detect markers of food origin
- Support of HACCP systems (set-up and validation)
- Optimisation of food processing technologies to reduce formation of processing contaminants

The ICT Prague team provides **scientific advice to governmental institutions** responsible for food quality and safety. **Co-operation with National accreditation and metrological institute** in the field of accreditation of testing laboratories, QA/QC, interlaboratory studies, reference materials and traceability of chemical measurements has been established in last decade.

Testing laboratory of the Department of Food Chemistry and analysis is **accredited according to the International standard ISO/IEC 17025:2005** by the CAI, signatory of the ILAC-MRA and participates regularly in proficiency testing (FAPAS, EU PT, IRMM, IAEA, etc.)



Institute of Chemical Technology, Prague
Technická 5, 166 28 Prague 6, Czech Republic, tel./fax +420 220 443 185
Metrological and Testing Laboratory
CMI associated laboratory, testing laboratory No. 1316.2
accredited by the Czech accreditation institute, signatory of MIRA ILAC

Recent papers (selected for last two years 2007 and 2008):

- Pulkrabova J., Hradkova P., Hajslova J., Poustka J., Napravnikova M., Polacek V.: Brominated flame retardants and other organochlorine pollutants in human adipose tissue samples from the Czech Republic. *Environ. Int.* 35, 63–68 (2008)
- Zachariasova M., Hajslova J., Kostelanska M., Poustka J., Krplova A., Cuhra P., Hochel I.: Deoxynivalenol and its conjugates in beer: A critical assessment of data obtained by enzyme-linked immunosorbent assay and liquid chromatography coupled to tandem mass spectrometry. *Anal. Chim. Acta* 625, 77–86 (2008)
- Zelinkova Z., Novotny O., Schurek J., Velisek J., Hajslova J., Dolezal M.: Occurrence of 3-MCPD fatty acid esters in human breast milk. *Food. Addit. Contam.* 25, 669–676 (2008)
- Volna K., Holcapek M., Kolarova L., Lemr K., Caslavsky J., Kacer P., Poustka J., Hubalek M.: Comparison of negative ion electrospray mass spectra measured by seven tandem mass analyzers towards library formation. *Rapid Comm. Mass Spectrom.* 22(2), 101–108 (2008)
- Lignell S., Darnerud P.O., Aune M., Cnattingius S., Hajslova J., Setkova L., Glynn A.: Temporal trends of synthetic musk compounds in mother's milk and associations with personal use of perfumed products. *Envir. Sci. Technol.* 42(17), 6743–6748 (2008)
- Lundegardh B., Botek P., Schulzova V., Hajslova J., Stromnerg A., Anderson C.: Impact of Different Green Manures on the Content of S-Alk(en)yl-L-cysteine Sulfoxides and L-Ascorbic Acid in Leek (*Allium porrum*). *J. Agric. Food Chem.* 56, 2102–2111 (2008)
- Hajslova J., Schulzova V.: Mushroom toxins. pp. 110–133. In: *Bioactive Compounds in Foods: Natural Toxicants and Process Contaminants*. J. Gilbert, H. Senyuva (eds.), ISBN-13: 9781405158756, Wiley-Blackwell, Chichester, UK
- Hajslova J., Cajka T.: Gas chromatography in food analysis. pp. 119–144. In: *Handbook of Food Analysis Instruments*. S. Ötleş (ed.), ISBN-13: 9781420045666, CRC Press, Taylor & Francis Group, Boca Raton, FL, USA
- Kovalczuk T., Poustka J., Hajslova J.: HPLC–MS/MS method for analysis of isoproturon in difficult matrix: Poppy seeds. *Czech J. Food Sci.* 26(2), 146–152 (2008)
- Cajka T., Vaclavik L., Riddellova K., Hajslova J.: GC–TOF-MS and DART–TOF-MS: Challenges in the Analysis of Soft Drinks. *LC GC Eur.* 21(5), 250–256 (2008)
- Klimankova E., Riddellova K., Hajslova J., Poustka J., Kolarova J., Kocourek V.: Development of an SPME–GC–MS/MS procedure for the monitoring of 2-phenoxyethanol in anaesthetised fish. *Talanta* 75, 1082–1088 (2008)
- Lancova K., Hajslova J., Kostelanska M., Kohoutkova J., Nedelnik J., Moravcova H., Vanova M.: Fate of trichothecene mycotoxins during the processing: Milling and baking. *Food Addit. Cont.* 25(5), 650–659 (2008)
- Lancova K., Hajslova J., Poustka J., Krplova A., Zachariasova M., Dostalek P., Sachambula L.: Transfer of Fusarium mycotoxins and 'masked' deoxynivalenol (deoxynivalenol-3-glucoside) from field barley through malt to beer. *Food Addit. Cont.* 25(6), 732–744 (2008)
- Kovalczuk T., Lacina O., Jech M., Poustka J., Hajalova J.: Novel approach to fast determination of multiple pesticide residues using of ultraperformance liquid chromatography-tandem mass spectrometry (UPLC–MS/MS). *Food Addit. Cont.* 25(4), 444–457 (2008)

- Cajka T., Hajslova J., Lacina O., Mastovska K., Lehotay S.J.: Rapid analysis of multiple pesticide residues in fruit-based baby food using programmed temperature vaporiser injection–low-pressure gas chromatography–high-resolution time-of-flight mass spectrometry. *J. Chromatogr. A* 1186(1–2) 281–294 (2008)
- Schurek J., Portoles T., Hajslova J., Riddellova K., Hernández F.: Application of head-space solid phase microextraction coupled to comprehensive two-dimensional gas chromatography–time-of-flight mass spectrometry for the determination of multiple pesticide residues in tea samples. *Anal. Chim. Acta* 611(2), 163–172 (2008)
- Klimankova E., Holadova K., Hajslova J., Cajka T., Poustka J., Koudela M.: Aroma profiles of five basil (*Ocimum basilicum* L.) cultivars grown under conventional and organic conditions. *Food Chem.* 107(1), 464–472 (2008)
- Ticha J., Hajslova J., Jech M., Honzicek J., Lacina O., Kohoutkova J., Kocourek V., Lansky M., Kloutvorova J., Falta V.: Changes of pesticide residues in apples during cold storage. *Food Control* 19, 247–256 (2008)
- Pulkrabova J., Hajslova J., Poustka J., Kazda R.: Fish as biomonitor of polybrominated diphenyl ethers and hexabromocyclododecane in aquatic environment: pollution of Elbe river-basin. *Environ. Health Perspect.* 115(S-1), 28–34 (2007)
- Hajslova J., Lancova K., Sehnalova M., Krplova A., Zachariasova M., Moravcova H., Nedelnik J., Markova J., Ehrenbergerova J.: Occurrence of Trichothecene Mycotoxins in Cereals Harvested in the Czech Republic. *Czech J. Food Sci.* 25(6), 339–350 (2007)
- Schulzova V., Hajslova J., Botek P., Peroutka R.: Furanocoumarins in vegetables: influence of farming system and other factors on levels of toxicants. *J. Sci. Food Agric.* 87(15), 2763–2767 (2007)
- Hajslova J., Pulkrabova J., Poustka J., Cajka T., Randak T.: Brominated flame retardants and related chlorinated persistent organic pollutants in fish from river Elbe and its main tributary Vltava. *Chemosphere* 69, 1195–1203 (2007)
- Hajkova K., Pulkrabova J., Hajslova J., Randak T., Zlabek V.: Chub (*Leuciscus cephalus*) as a bioindicator of contamination of the Vltava river by synthetic musk fragrances. *Arch. Environ. Contam. Toxicol.* 53, 390–396 (2007)
- Ticha J., Hajslova J., Kovalczuk T., Jech M., Honzicek J., Kocourek V., Lansky V., Kloutvorova J., Falta V.: Safe apples for baby-food production: Survey of pesticide treatment regimes leaving minimum residues. *Food Addit. Cont.* 24(6), 605–620 (2007)
- Cajka T., Hajslova J., Cochran J., Holadova K., Klimankova E.: Solid phase microextraction–comprehensive two-dimensional gas chromatography–time-of-flight mass spectrometry for the analysis of honey volatiles. *J. Sep. Sci.* 30(4), 534–546 (2007)
- Hajkova K., Pulkrabova J., Schurek J., Hajslova J., Poustka J., Napravnikova M., Kocourek V.: Novel approaches to analysis of estrogenic pharmaceuticals in environmental samples. *Anal. Bioanal. Chem.* 387(4), 1351–1363 (2007)
- Holadova K., Prokupkova G., Hajslova J., Poustka J.: Headspace SPME of phthalic acid esters from vegetable oil employing solvent based matrix modification. *Anal. Chim. Acta* 582, 24–33 (2007)
- Cajka T., Hajslova J.: Gas chromatography–time-of-flight mass spectrometry in food analysis. *LC GC Eur.* 20(1), 25–26, 28–31 (2007).

The research aimed at the development, optimization and implementation of analytical techniques involves almost all classes of hazardous organic compounds related to food processing chain.

- **Persistent environmental contaminants (POPs)**
- **Residues of modern pesticides, veterinary drugs, etc.**
- **Biologically active compounds, both health promoting and toxic, including mycotoxins, natural toxins, phytoestrogens**
- **Processing contaminants**

Recent and current participation in international research projects:

- **PERFOOD** (FP7–KBBE–2008–2B): PERFluorinated Organics in Our Diet
- **CONFIDENCE** (FP7–211326–CP Collaborative Project): Contaminants in Food and Feed: Inexpensive Detection for Control of Exposure
- **TRUEFOOD** (FOOD–CZ–2006–016264): Traditional United Europe Food. Hazardous chemical contaminants in traditional foods (control of mycotoxins during the production of traditional fermented food, processing contaminants – acrylamide and furans)
- **BIOCOP** (FP6–Food–2004–06988): New technologies to screen multiple chemical contaminants in foods. Development and validation of progressive analytical techniques for pesticides, environmental contaminants and natural toxins
- **TRACE** (FP6–Food–2004–006942): Tracing food commodities in Europe. Food authenticity – rapid and profiling methods, training and dissemination of knowledge
- **Quality Low Input Food** (Food–CT–2003–506358): Effect of crop management practices – organic, “low input” and conventional – the influence on the composition and quality of foods
- **HEATOX** (Food–CT–2003–506358): Heat generated food toxicants. Exploration of acrylamide formation and reducing its levels in processed food
- **STAMPS** (EVKI–CT–2002–00119): Standardized passive samplers. Sampling and determination of priority pollutants in surface waters – bioavailable fraction
- **FIRE** (QLK4–CT–2002–00596): Brominated flame retardants – integrated risk assessment for endocrine effects. Assessment of contamination levels, analytical techniques
- **Pesticides in baby food** (NATO for Peace–SfP–977983): Analytical methods and the effect of processing on pesticide residues – minimization of residues, HACCP
- **COST 864**: Combining traditional and advanced strategies for plant protection in pome fruit growing. Advanced mass spectrometric strategies for detection of pome fruit disease
- **COST 867**: Welfare of fish in european aquaculture. Metabolomic profiling: an efficient tool for fish welfare assessment
- **COST OC 924**: Health Promoting Components in Fresh Fruits and Vegetables. Food Crops from Organic Farming – influence of cultivation conditions (compounds selected as markers: furocoumarins in parsnip, glucosinolates in white cabbage, alkyl cystein sulphoxides in leek, lycopene and α -tomatine in tomatoes, α -solanine, α -chaconine, phenolic compounds in potatoes)

- **COST OC 926**: The fate of selected health protecting constituents during processing of food plants: analytical methods for phytoestrogens and prenylflavonoids in food; determination of phytoestrogens in soya foodstuffs and food supplements; examination of prenylflavonoids in hops and beer, study on the fate of soya phytoestrogens and hop prenylflavonoids during food / beer processing
- **COST OC 927**: Heat-induced hazardous compounds in processed foods. Investigation of volatile markers of acrylamide formation, SPME–GC×GC–TOFMS profiles of volatile compounds released from chips during industrial /household frying, occurrence of furan in various thermally treated foodstuffs; processing experiments
- **COST OC 636**: Modern methods for analysis of xenobiotics in aquatic environment (synthetic musk compounds, alkylphenols, pharmaceuticals, organohalogen compounds incl. fluorinated hydrocarbons, and brominated flame retardants) Quality assurance in organic micropollutant analyses – guidelines for monitoring strategies, Occurrence of newly emerging xenobiotics in water system and biota
- **COST OC 629**: Pollution in natural porous media. Innovative sampling and analytical techniques for xenobiotics; influence of floods on the pollution of alluvial ecosystem

Laboratory equipment:

- 2 GC Agilent 6890 with selective specific detectors (μ ECD, ECD, NPD) and autosamplers
- 2 GC Agilent 6890 with mass selective detectors (MSD–quadrupole) HP 5973 and Agilent 5975, both with electron and chemical ionization and autosamplers
- 1 GC Trace GC 2000 with mass selective detector (ITD) Polaris Q and autosampler Combi PAL / PTV; automated SPME unit attached
- 1 GC Agilent 6890 with high-resolution TOF-MS detector (GCT Premier, Waters) and DMI injector system ATAS: FOCUS 4/Optic 3; automated SPME unit attached
- 1 GC Agilent 6890 for comprehensive two-dimensional GC (GC×GC) with high speed TOFMS detector (Pegasus III, LECO Corp.) and autosampler MPS2; automated SPME unit attached
- 1 GC Agilent 7890 with high speed TOFMS detector (TruTOF, LECO Corp.)
- 2 gradient HPLC systems Agilent HPLC 1100 with FLD, UV and DAD, temperature control, autosamplers
- 1 gradient HPLC rapid resolution systems Agilent HPLC 1200 with FLD, UV and DAD, temperature control, autosamplers (Hewlett Packard)
- 1 LC–MSⁿ system Spectronex LCQ DECA / HPLC separation unit Agilent 1100
- 1 LC–MS/MS system Quattro Premier Waters / HPLC separation unit Alliance 2695XE
- 1 UPLC Acquity with high-resolution TOFMS detector (LCT Premier XE, Waters)
- 1 JEOL AccuTOF LC – plus high resolution time-of-flight mass spectrometer (JEOL) equipped with DART (Direct Analysis in Real Time) ion source (IonSense)



ICT PRAGUE research team
–your partner for 7th FP in all fields related to FOOD QUALITY and CHEMICAL SAFETY

Jana Hajslova, Vladimír Kocourek

Contact:

Phone: 00420 602 833 424
E-mail: jana.hajslova@vscht.cz

www.vscht.cz

