

CURRICULUM VITAE

Kim H. Esbensen

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Name: Kim Harry Esbensen, Ph.D., Dr. (h.c.), ATV e-mail: khe.consult@gmail.com
Date of birth: 06.04.1950 homepage: www.kheconsult.com
Place of birth: Ålborg, Denmark

Children: Pelle Fredriksen Esbensen (14.04.79); Gry Andrea Esbensen Norang (04.07.86)

Artium (1969): Herning Gymnasium, Denmark

First University Degree (1978): M.Sc. (geology, geochemistry)
University of Århus, Denmark

Second University Degree (1981): Ph.D. (meteoritics, metallurgy, data analysis)
Technical University of Denmark, Copenhagen

PROFESSIONEL EXPERIENCE

Employer 1 Chemometric Research Group, University of Umeå
1982-1983 *Swedish research council fellowship*

Employer 2 TERRA SWEDE prospecting AB
1983-1984 *Data analyst, geologist*

Employer 3 Norwegian Computing Centre (NR)
1984-1991 *Research scientist (SAND & STAT groups)*

Norsk Hydro Research Centre, Bergen 1991-1992. Invited guest professor

Employer 5 SINTEF: Industrial & Technological Research Centre, Oslo
1992-1995 *Senior research scientist*

*Chercheur associé, Centre du Recherche en Géomatique (CRG)
Université Laval, Quebec, 1993-1999, chercheur affilié 1999-2014*

Employer 6 Telemark University College (HiT-TF) Porsgrunn, Norway
1993-2001 *Professor (chemometrics)*

Employer 7 Telemark Technological R&D Centre Porsgrunn, Norway
1995-2001 *Head of chemometrics group, IPTEC*

Employer 8 University of Ålborg, Esbjerg, Denmark (AAUE)
2001-2010 *Research professor (chemometrics) & Professor mso (chemometrics & sampling)*
2010-2015 *External professor (chemometrics & sampling)*

Employer 9 Norwegian Univ. of Science and Technology (NTNU), Trondheim
2006-2007 *Dept. of Chemical Engineering. Professor II (20%)*

*Professor extraordinary, Stellenbosch University, Institute of Wine-Biotechnology, 2006 -2010
Professor associé, University de Quebec à Chicoutimi (UQAC), 2012-2017*

Employer 10 National Geologic Survey of Denmark & Greenland (GEUS)
2010-2015 *Research professor (Geoscience Data Analysis and Sampling)*

2015- **KHE Consulting.** Domicile: Sortedam Dossering 93A, DK-2100 Copenhagen, Denmark

VISITING SCIENTIST

- 1978: Department of Geology, University of Bergen (6 month student fellowship)
1980: Institute of Geophysics and Planetary Physics, University of California, Los Angeles (UCLA) (9 months Ph.D. fellowship)
82-83: Chemometric Research Group, University of Umeå. Visiting research scientist
1991: Senior guest professor, Norsk Hydro, Oil & Gas Research Center, Bergen (6 months)
1992: Visiting professor, Université Laval, Quebec, Canada (1 month)
2000: Visiting professor, Kemometrigruppen, Levnedsmiddelinstituttet, KVL, Copenhagen (6 months)
2017: École de Technologie Supérieure (ÉTS), Montreal, Canada.

LANGUAGES

Scandinavian languages, English (*German, French*) (partial proficiency)

PROFESSIONAL MEMBERSHIPS; INTERNATIONAL COMMITTEES

International Pierre Gy Sampling Association (IPGSA)
The International Chemometrics Society (ICS)
Russian Chemometrics Society
American Geophysical Union (AGU)
Danish Chemometric Society (IDA)
Danisk Academy of Technological Sciences (ATV)
Norwegian Chemical Society (Chemometrics)
Planetary Society
Meteoritics Society
International Association for Mathematical Geology (IAMG), councillor 1990-1992

PEER REVIEWER

Journal of Chemometrics	Chemometrics and the Intelligent Laboratory Systems	NIRnews
Mathematical Geology	Geochimica et Cosmochimica Acta	Journal of NIR Systems
Microchimica Acta	Talanta	TOS Forum (Editor)
		Trends in Analytical Chemistry (TrAC)

INTERNATIONAL CONFERENCES; CHAIRMAN, ORGANIZER

Third International Symposium on Chemometrics (MADLUST), Tromsø, July 2-6, 1990: Chairman organizing & scientific committees.

6.th Scandinavian Symposium on Chemometrics (SSC6), HIT/TF, Porsgrunn, Aug. 15-19, 1999: Chairman organizing & scientific committees.

1st World Conference on Sampling and Blending (WCSB1), Esbjerg, Aug. 19-22, 2003. Chairman organizing & scientific committees

7th World Conference on Sampling and Blending (WCSB7), Bordeaux, June 10-12, 2015. Co-chairman scientific committee & Proceedings Editor

8th World Conference on Sampling and Blending (WCSB8), Perth, May 11-13 2017. Scientific committee & Proceedings co-editor

EDITORIAL RESPONSIBILITIES

Co-Editor: "Symposium on Applied Statistics", DTH, Copenhagen, 1980-1982

Editorial board: "Nonrenewable Resources" (IAMG), 1991 - 1995

Editorial board: "Journal of Chemometrics" (JOCHEM), 1999 – 2003

Editorial board: "Chemometrics and Intelligent Laboratory Systems" (CHEMOLAB), 2006-2008

Guest editor: Proceedings 6.th Scandinavian Symposium on Chemometrics (SSC6), 1998, 398 p.
Journal of Chemometrics. Wiley Publ.

Guest Editor: Proceedings 1st World Conference on Sampling and Blending (WCSB1) &
Tribute to Pierre Gy (50 years of TOS), 2004. 236 p. CHEMOLAB. Elsevier Publ.

Editor: TOS forum, IMPublications, Chichester 2013 –

Column Editor: "SAMPLING" in Spectroscopy Europe/Asia. IMPublications, Chichester 2015 -

Co-Editor: Proceedings 7.th World Conference on Sampling and Blending (WCSB7) Bordeaux 2015

Co-Editor: Proceedings 8.th World Conference on Sampling and Blending (WCSB8) Perth 2017

FIELDS OF RESEARCH

Chemometrics; Multivariate Data Analysis, Theory of Sampling (TOS), Acoustic Chemometrics;

AMT (Angle Measure Technique); Multivariate Image Analysis (MIA);

Process Analytical Technologies (PAT); Philosophy of Science

GRADUATE COURSES (M.SC), LECTURED (HIT-TF)

Introduction to experimental design and multivariate data analysis (chemometrics)

Instrumental Analysis (Process Analytical Chemometrics)

POSTGRADUATE COURSE, LECTURED & TUTORED (HIT-TF & AAU)

Advanced Multivariate Data Analysis

(Dr. ing.)

Sampling – theory & practice

(Ph.D./M.Sc.)

Multivariate Image Analysis (MIA, AMT)

(Ph.D./M.Sc.)

Philosophy of Science

(Ph.D.)

Process Analytical Technology (PAT)

(Ph.D.)

M.SC. (ENG.) THESES & GRAD. PROJECTS SUPERVISED 1993-2016

60 M.Sc. (Eng.) theses; 5 B.Sc. theses; 25 siv. ing. (9-10 semester) projects (*selected titles*)

- Design and construction of an experimental two-phase flow rig "HITAFF"
- Acoustic chemometrics: Multi-phase flow monitoring and quantification
- Powder science and technology, pneumatic transport monitoring
- Acoustic Machine Condition Monitoring (AMCM) - marine applications
- AMT (Angle Measure Technique) - theory, implementation and applications
- Multivariate calibration of dynamic powder transportation characteristics
- Full-scale optimisation of efficiency regimens for "Hurtigrute" *M.S. Richard With & M.S. Kong Harald*
- Full-scale multivariate statistical process monitoring of an electro-calcinating oven
- QSAR - Quantitative Structure Activity Relationships: 49 alkyl-phenols in water
- Chemometric analysis of membrane technological purification processes
- Acoustic in-line oil/gas pipeline status monitoring (scale laboratory test)
- Experimental acoustic chemometric grainsize distribution determination
- Chemometric Mg(OH₂) precipitation process monitoring
- Multivariate signal analysis of North sea oil rig drilling riser movement
- Multivariate Image Analysis (MIA) & Multivariate Image Regression (MIR)
- Image analytical inventory of pressurised gas containers - warehouse logistics
- Monitoring of powder transportation processes (acoustic chemometrics)
- Chemometric optimisation of HPLC phosfolipid determination

- At-line process-analytical monitoring of thermoplastic roadmarking materials
- On-line NIR analysis (optimal multivariate calibration) in a polyethene plant
- Characterisation of porous materials and granular mixtures by AMT and MIA
- Theory of sampling: didactic forays
- Sampling bias characterisation of batch - and continuous 3-D industrial mixers
- MIA characterisation of biofilms
- Acoustic chemometric determination of "pitch" concentration in bulk paper making
- Optimal industrial pneumatic transportation of unbroken MgO
- Multivariate calibration of an industrial five-component system (*confidential*)
- Chemometric determination of critical absorption parameters for CO₂ and SO₂
- Mixture designs in practise: optimisation of gasoline additives
- Multivariate data analytical characterisation of granular segregation modeling
- Characterisation of industrial mixer efficiency (Theory of Sampling, TOS)
- Structurally correct process sampling at "ESSI Konsumfisk, Esbjerg" (AAUE)
- Optimisation of industrial batch and process sampling (rocks, soil and powders) (AAUE)
- Chemometric optimization of multi-phase, multi-component fermentation (AAUE)
- Acoustic chemometric monitoring of bedload transportation processes: flume test rig simulation (AAUE)
- TOS analysis of sampling equipment on planetary probes (Moon, Mars) (HIT/TF)
- Urban geochemistry Copenhagen – TOS meets archeology meets chemometrics (KU/GEUS)

PH.D. SUPERVISED / CO-SUPERVISED (YEAR DEFENDED):

- Ph.D. (dr.ing.) **Thorbjørn Tønnesen Lied** (HIT/TF) 1996-2001:
Multivariate image regression (MIR) for quantitative predictions.
- Ph.D. (dr.ing.) **Maths Halstensen** (HIT/TF) 1997-2001:
Experimental multi-phase flow monitoring.
- Ph.D. (dr.ing.) **Jun Huang** (HIT/TF) 1998-2001:
Developments in Applied Chemometrics: AMT, acoustic chemometrics and N-way image analysis.
- Ph.D. (dr.ing.) **Maria Lundhaug** (HIT/TF) 1999-2002:
Chemometric SAR remote sensing data analysis
- Ph.D. (dr. ing.) **Lars Petersen** (AAUE) 2001-2005:
Pierre Gy's Theory of Sampling (TOS) – in practise: Laboratory and Industrial Didactics.
- Ph.D. (dr. ing.) **Peter Paasch-Mortensen** (AAUE), 2002-2006:
Process Analytical Chemistry – Opportunities and Problems for Bio-industrial Implementation. Industry sponsored Ph.D.
- Ph.D. (dr. med.) **Jonas Angel Sjøland** (SDU) 2003-2007:
Inflammation and Fibrin Structure in Patients with End-stage Renal Disease.
(SDU) SDU-stipend. Co-supervisor
- Ph.D. (dr. ing.) **Casper K. Dahl** (AAUE) 2001-2008:
Theory of Sampling Contributions to Multivariate Image Analysis with a special focus on Image Analytical Sampling.
- Ph.D. (dr. ing.) **Hans Henrik Friis Pedersen** (AAUE) 2004-2008:
Mathematical modeling of an epoxy curing process. AAUE stipend.
- Ph.D. (dr. ing.) **Jens Bo Holm-Nielsen** (AAUE) 2003-2008:
Process Analytical Technologies for Anaerobic Digestion Systems.
- Ph.D. (dr. ing.) **Carina Juhl Lomborg** (AAUE) 2006-2009:
Process Analytical Technologies in Applied Biotechnology:
Bio-mass conversion, 2.nd generation bioethanol & speciality product fermentation.

- Ph.D. (dr. ing.) **Ingvild Eide-Haugmo** (NTNU) 2008-2011:
Environmental impacts and aspects of absorbents for CO₂ capture.
- Ph.D. (Eng.) **Felicia Nkem Ihunegbo** (Telemark University College) 2010-2012:
Process Analytical Technology studies for reliable process monitoring.
- Ph.D. (Eng.) **Claas Wagner**, Aalborg University, campus Esbjerg (2010-2013):
Non-representative sampling versus data reliability – Improving monitoring reliability of fuel combustion processes in large-scale coal and biomass-fired power plants.
- Ph.D. (Eng.) **Zahra Kardanpour**, AAU & GEUS (2011-2015): Representative sampling procedures (Theory of Sampling) for counteracting soil heterogeneity in multi-element environmental contaminant assessment and geochemical characterization.
- Ph.D. (Eng.) **Karin Engström**, AAU (2015-2018): Sampling in iron ore operations – Evaluation and Optimization of sampling systems to reduce total measurement variability.

AWARDS, HONORS

- 1977-1980: Royal Danish Academy of Sciences "Emil Herborg" fellowship
1978: University of Copenhagen: "Silver Medal" (M.Sc. thesis)
2004: Honorary Doctor: University of Lappeenranta, Finland
2005: Member of Danish Academy of Technological Sciences, ATV
2012: Russian Chemometrics Society (RCS) Gold Medal
2013: Pierre Gy Sampling Gold Medal

PATENTS

Patent filed by Norsk Hydro (aug. 1995), accepted 1998:
"Metode og utstyr for opptak og prosessering av digitale bilder av borekjerne"
Kim H. Esbensen: Co-inventor

Patent filed by Borealis ASA (aug. 1999), accepted 2001:
"Determination of molecular structure of polymers through the acoustic spectrum emitted by polymers flowing through a constriction"
Kim H. Esbensen: Co-inventor

Patent filed by Borealis ASA (aug. 2003), accepted 2005:
"Acoustic rheometer - Polymer characterization method for determining polymer rheological properties, involves comparing obtained acoustic emission spectrum with that obtained from polymers of known characteristics" NO0003/US Grant.no. US6945094 Grant date: 20 09 2005
Kim H. Esbensen: Co-inventor

RESEARCH GROUPS

The Applied Chemometrics Research Group, ACRG, was established at HIT-TF, Norway June 1995.
Homepages: <http://www-pors.hit.no/tf/forskning/kjemomet/kjemomet.html>

ACRG moved to Aalborg University, Esbjerg, Denmark @ July 1.st 2001, now in the form of ACACSRG: Applied Chemometrics, Analytical Chemistry and Sampling Research Group (undergoing a minor name change to ACABS in 2003). Homepages: www.acabs.dk

R&D was reorganized in connection with taking up a research professorship at the Geological Survey of Denmark and Greenland (GEUS) 2010-2015, now in the context of the "Geoscience Data Analysis and Sampling (virtual laboratory)" at GEUS, Reservoir Geology. Homepages: www.gdas.com.

After three decades, at three academic institutions, the Applied Chemometrics Research Group was terminated May 1.st 2016 in connection with establishment **KHE Consulting** (www.kheconsult.com).

Academic teaching responsibilities, R&D and doctoral supervision continue within the context of adjunct, external and visiting professorships at five universities:

University of Aalborg (AAU) Denmark
Geological Survey of Denmark and Greenland (GEUS)
University of Quebec, Chicoutimi (UQAC) Canada,
University College of Southeast Norway (HSN)
University of Southeast Norway (USN)
Recinto Universitario de Mayaguez, Puerto Rico

DOCTORAL OPPOSITIONS (PH.D. & DR. PHILOS)

Tom-Gøran Skog	Norwegian University of Technology, 21.02.2014 <i>“Development of hollow fiber membranes and membrane modules suitable for high pressure natural gas sweetening”</i>
Jin Mi Triolo	University of Southern Denmark (SDU), Odense 16.12.2013 <i>“Novel mathematical algorithms to predict energy potential and biodegradability of carbon sources for biogas production”</i>
Benjamin Kaku Arvoh	Telemark University College, 07.12.2012 <i>“Soft sensors for quantitative characterization in multi-phase gas/oil/water systems”</i>
Dosti S. Dihalu	Delft University of Technology, 12.06.2012 <i>“Terra Igcnita of Sampling: Grouping and Segregation”</i> .
Ketil Svinning	Norwegian University of Science and Technology, 30.09.2011 <i>“Design and manufacture of Portland cement – Application of statistical analysis”</i>
Maaret Paakunainen	Lappeenranta University of Technology, Finland 12.12.2009 <i>“Sampling in Chemical Analysis”</i>
Nils-Olav Scheie	Norwegian University of Technology/Telemark College, 16. 10.2008 <i>“Soft Sensors for Level Estimation”</i>
Andrei Kupyna	Norwegian University of Life Sciences, Ås, 01.02.08 <i>“Acoustic Chemometrics—a Potential Method for Determination of Characteristics of Liquid Flows”</i>
Björn Gustavsson	Luleå University of Technology, Sweden, 04.12.2007 <i>“Heterogeneities in Samples of Contaminated Soils”</i>
Xuxun Lai	Technical University of Denmark (BioCentrum), 11.09.2006 <i>“Analysis of vaccine adjuvant using Near Infrared technology”</i>
Yiwu Zheng	Technical University of Denmark (BioCentrum), 08.09.2006 <i>“Analysis of vaccine: structure, storage, moisture and classification by infrared technology”</i>
Michael Edberg Hansen	Technical University of Denmark (DTU/IMM), 19.01.2004 <i>“Indexing and Analysis of Fungal Phenotypes using Morphology and Spectrometry”</i>
Gunnar Sandvik	Norwegian University of Technology/Telemark College, June 2003 <i>“Identification of signals describing pairwise interactions in plankton, bacteria and bacteriophage – A study of model, microcosm and lake”</i>

Charlotte Söderström	S-SENCE & Division of Applied Physics, Dept. of Physics and Measurement Technology, Linköping University, May. 9, 2003 <i>"Measuring microbial activity with an electronic tongue"</i>
Louise Radzikowski	BioCentrum-DTU Biochemistry and Nutrition, Technical University of Denmark (DTU), Copenhagen, Oct. 31, 2002 <i>"Analysis of proteins in wheat and rye – correlation to varieties and quality"</i>
Dorthe Kjær Pedersen	Dept. Dairy & Food Science, KVL, Copenhagen, June 14, 2002 <i>"Spectroscopic and chemometrics exploration of food quality – Early prediction of food quality"</i>
Susanne Holmin	S-SENCE & Division of Applied Physics, Dept. of Physics and Measurement Technology, Linköping University, Feb. 22, 2002 <i>"LIQUID SENSING – Development and characterisation of an Electronic Tongue based on electrochemical methods"</i>
Andrei Ipatov	Roskilde University, Denmark Aug. 17, 2001 <i>"Flow-injection analysis of multi-component liquids with multi-sensor detection"</i>
Claus A. Anderson	Technical University of Denmark (KVL), Cph. 08.09.2000 <i>"Exploratory multivariate data analysis with applications in food technology"</i>
Per Waaben Hansen	Tech. University of Denmark (ATV/KVL), Cph. 15.01.1999 <i>"Spectroscopic Analyses on Dairy Products"</i>
Ib Rune Johanssen	Universitet i Oslo, Norway 10.06.1998 <i>"Compensation methods for spectral interference in infra-red gas spectrometry"</i>
Riitta Heikka	Lappeenranta Technical University, Finland 13.11.1998 <i>"Sampling and Calibration in Process Analytical Chemistry"</i>
Trond Frisøe	University of Bergen, Norway 28.05.1997 <i>"Quality Determinations of Petroleum Liquids from Complex Permittivity Spectra"</i>
Jannicke Hilland	University of Bergen, Norway 21.11.1997 <i>"On-line Quality Determination of Petroleum Fluids by means of Dielectric Spectroscopy and Chemometric modelling"</i>
Anita Th. Smith	NTNU, Trondheim, Norway 05.12.1997 <i>"Toxicology of chemical mixtures - the synthetic approach"</i>
Hans-Rene Bjørsvik	University Umeå, Sweden, 12.12.1995 <i>"Monitoring and Optimisation of Syntheses of Pharmaceutical Chemicals by Multivariate Modelling and Design"</i>

OUTREACH ACTIVITIES

TOS Forum	Esbensen (Editor). Scientific magazine, IMPublications, Chichester https://www.impopen.com/tosf
SAMPLING	Column editor, SPECTROSCOPY EUROPE/ASIA, IMPublications, Chichester, UK. https://www.spectroscopyeurope.com/
DS 3077 (2013)	"Representative sampling – Horizontal standard". 2.nd Ed. 2013-08-26 www.ds.dk

International Pierre Gy Sampling Association, IPGSA: <https://intsamp.org/>

331 PUBLICATIONS (*H-INDEX: 47*); 434 LECTURES/PRESENTATIONS (*UPDATED JANUARY 01, 2021*)

331. Larsen, A. & K.H. Esbensen (2020) *Principles of gas sampling: TOS with critical challenges*. TOS Forum, Issue 10 pp. 41-47. doi: <https://doi.org/10.1255/tosf.126>
330. Esbensen, K.H. (2020) *TOS reflections: Is there a third way? (to promote the Theory of Sampling)*. TOS Forum, Issue 10 pp. 21-23. doi: <https://doi.org/10.1255/tosf.122>
329. Esbensen, K.H. (2020) *Introduction to the Theory and Practice of Sampling*. TOS Forum, Issue 10 pp. 16 doi: <https://doi.org/10.1255/tosf.119>
328. Francois-Bongarcon, D. Vann, J. & K.H. Esbensen (2020) *Origin of the World Conference on Sampling and Blending (WCSB)*. TOS Forum, Issue 10 pp. 7-10 doi: <https://doi.org/10.1255/tosf.116>
327. Halstensen, M., Hundhausen, U & K. H. Esbensen. (2020) *Partial least squares PLS1 vs. PLS2 – optimal input/output modeling in a compound industrial drying oven*. pp. 458-465 *in* Proc 61.st Conf. Simulation and Modelling (SIMS 2020), Sept 22-24, 2020, Finland ISBN: 978-91-7929-731-2
326. Halstensen, M., Agu, O. Victoria., Hundhausen, U. & K.H. Esbensen (2020). *Real-time monitoring of wood cladding spray painting properties and nozzle condition using acoustic chemometrics*. pp. 352-359 *in* Proc 61.st Conf. Simulation and Modelling (SIMS 2020), Sept 22-24, 2020, Finland ISBN: 978-91-7929-731-2
325. Dominy, S.C., Simon C. Dominy, Purevgerel, S. & K.H. Esbensen (2020) *Quality and sampling error quantification for gold mineral resource estimation*. Spectroscopy Europe, vol 32, no 6 (2020).
324. Esbensen, K. H.; Romañach , R. J., (2020) *Sampling for NIR-analysis*. Chap 19, *in* Handbook of Near-Infrared Analysis, 4.th Ed. Ciurczak, E.W., Igne,B., Workman,J., Burns, D.A. (Eds.) CRC Press Taylor & Francis Group. ISBN: 978-1-138-57648- 3 (*in-press*)
323. Esbensen, K.H. (2020) **Introduction to the Theory and Practice of Sampling**. 328 p. IM Publications ISBN 978-1-906715-29-8
322. Sánchez-Paternina, A.; Sierra-Vega, N. O.; Cárdenas, V.; Méndez, R.; Esbensen, K. H.; Romañach, R. J. (2019) *Variographic analysis: A new methodology for quality assurance of pharmaceutical blending processes*. Computers & Chemical Engineering (2019), 124, 109-123.
321. Rendeman,F., Pedersen,J.R., Esbensen, K.H. (2019) *Theory of Sampling—an approach to representativity offering front line companies added value and potential substantial savings*. Spectroscopy Europe, vol 32, no 3
320. Horn H., Dibdiakova J., Esbensen K. H., Vestlund A. (2019) *Representative sampling of solid biofuels to ensure optimized bioenergy plant operation*. 2019 European Biomass Conference & Proceedings pp. 1912-1920.
319. Esbensen, K.H. (2019) *Questions your company should be asking when procuring sampling equipment*. Spectroscopy Europe, vol 32, no 2
318. Bédard,P. L, Esbensen, K.H. (2019) *A didactic introduction to the Theory of Sampling: 2-D sampling experiments on heterogeneous floor tiles*. Spectroscopy Europe, vol 32, no 1
317. Minkinen, P. O. & Esbensen, K. H. (2019) *Sampling of particulate materials with significant spatial heterogeneity - Theoretical modification of grouping and segregation factors involved with correct sampling errors: Fundamental Sampling Error and Grouping and Segregation* Analytica Chimica Acta. 1049, pp. 47-64
316. Esbensen, K.H., Swarbrick, B. (2019) *Sampling for spectroscopic analysis: consequences for multivariate calibration*. Spectroscopy Europe, vol 31, no 6

315. Halstensen, M. Kvaal, K., Esbensen, K.H. (2019). *Image analytical sandstone plug poro-perm prediction using angle measure technique (AMT) and chemometrics – A feasibility study*. Chemometrics and Intelligent Laboratory Systems vol. 193, (9 pages) doi.org/10.1016/j.chemolab.2019.103847
314. Romañach, R. J.; Méndez, R.; Esbensen, K. H. (2019), *Application of TOS principles for real-time monitoring of pharmaceutical powder blends by Near Infrared Spectroscopy*. Spectroscopy Europe, vol 31, no 5
313. Appel, P.W.U & K.H. Esbensen (2019) *Reducing global mercury pollution with simultaneous gold recovery from small-scale mining tailings*. TOS Forum, Issue 9 pp. 3-9 (2019) doi: 10.1255/tosf.108
312. Martínez-Cartagena, P. A., Alvarado-Hernández, B. B. Sierra-Vega, N. O., Méndez, R., Esbensen, K. H., Romañach, R. J. (2019) *Design and Pilot Studies of TOS-Compliant Sampling Interface For Process Analytical Technology (PAT) Analysis of Pharmaceutical Flowing Powders Mixtures*. 9th World Conference on Sampling and Blending Beijing (WCSB9), China, May 6-9 2019 pp. 728-736
311. Esbensen, K.H. (2019). *Future directions for sampling and blending: Theory of Sampling (TOS) – What's Next?* 9th World Conference on Sampling and Blending Beijing (WCSB9), China, May 6-9 2019 pp. 63-73
310. Esbensen, K.H. & P.W.U. Appel (2019) *Barefoot sampling in San Juan de Limay, Nicaragua: remediation of mercury pollution from small scale gold mining tailings*. TOS Forum, Issue 9, pp. 10-15 doi: 10.1255/tosf.109
309. Bédard, P.L., Esbensen, K.H. (2019) *Revisiting the Replication Experiment*. Spectroscopy Europe vol 31, no 4
308. Dybkjær, K., Rasmussen, E. S., Śliwińska, K. K., Esbensen, K. H. & Mathiesen, A. (2019) *A palynofacies study of past fluvio-deltaic and shelf environments, the Oligocene-Miocene succession, North Sea Basin: A reference data set for similar Cenozoic systems*. Marine and Petroleum Geology. vol 100, pp. 111-147
307. Jiang, L., Esbensen, K.H. (2019) *Passing a milestone—the successful WCSB9*. Spectroscopy Europe, vol 31, no 3
306. Esbensen, K.H. (2019) *Sampling commitment – and what it takes*. Spectroscopy Europe, vol 31, no 1
305. Desroches, D.; Bedard, P.; Lemieux; Esbensen, K.H. (2019). *Representative sampling and use of HHXRF to characterize lot and quality of quartzite at a pyrometallurgical ferrosilicon plant*. Minerals Engineering <https://doi.org/10.1016/j.mineng.2019.105852>
304. Esbensen, K. H.; Romañach, R. J.; Román-Ospino, A. D., (2018) *Theory of Sampling (TOS): A Necessary and Sufficient Guarantee for Reliable Multivariate Data Analysis in Pharmaceutical Manufacturing in Multivariate Analysis in the Pharmaceutical Industry*, Ferreira, A. P., Menezes, J. C.; Tobyn, M. (Eds.) Chap. 4, pp 53-91. Academic Press ISBN 978-0-12-811065-2
303. Esbensen, K.H. (2018) *A Tale of two laboratories II: resolution*. Spectroscopy Europe, vol 30, no 6.
302. Esbensen, K.H. (2018) *A Tale of two laboratories I: the challenge*. Spectroscopy Europe, vol 30, no 5.
301. Romañach, R. J.; Sanchez-Paternina, A.; Esbensen, K. H., (2018) *Variographic Analysis of 1-lots Pharmaceutical Manufacturing (Powder Mixing)*. American Pharmaceutical Review 2018, 21 (1), 22-26.
300. Arkenbout, A., Olie, K. & Esbensen, K.H. (2018) *Emission regimes of POPs in a major Dutch incinerator Re Regulated, measured and hidden issues*. Proceedings “DIOXIN 2018”, Krakow, Poland.
299. Esbensen, K.H. (2018) *Pierre Gy (1924-2015): The key role of sampling errors*. Spectroscopy Europe, vol 30, no 4.
298. Paoletti, C., Esbensen, K.H. (2018) *Representative sampling and society*. Spectroscopy Europe vol 30, no 3
297. Schovsbo, N.H., Thomsen, E., Nytoft, H.P. & Esbensen, K.H. (2018) *Oil maturity, families and oil-source rock correlations in the Danish North Sea based on biomarker studies*. 80th EAGE Conference & Exhibition 11-14 June 2018, Copenhagen, Denmark. Ext. abstract DOI: 10.3997/2214-4609.201801491
296. Minkinen, P.O. & Esbensen, K.H. (2018) *Following TOS will save you a lot of money (pun intended)*. Spectroscopy Europe, vol 30, no 2

295. Engström, K., Olausson, L. & Esbensen, K.H. (2018) *Experimental evaluation of surface water sampling variability for environmental monitoring in iron ore operations using concepts from the Theory of Sampling (TOS)*. Mine Water and the Environment (on-line print) DOI 10.1007/s10230-019-00598-1
294. Engström, K. & K.H. Esbensen (2018) *Variographic Assessment of Total Process Measurement System Performance for a Complete Ore-to-Shipping Value Chain*. Minerals, Issue 8(7) 310-334. DOI: 10.3390/min8070310
293. Esbensen, K.H. & B. Swarbrick (2018) **Multivariate Data Analysis – An introduction to Multivariate Data Analysis, Process Analytical Technology and Quality by Design**. 462 p. (6.th edition) CAMO Software AS. ISBN 978-82-691104-0-1
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LECTURES/PRESENTATIONS/COURSES

(UPDATED JANUAR 01, 2021)

434. Esbensen, K.H. (2019) *Theory and Practice of Representative Sampling (TOS) - Advanced issues* UMICORE, Hoboken, Belgium, October 31, 2019.
433. Esbensen, K.H. (2019) *Comprehensive introduction to the Theory and Practice of Representative Sampling (TOS)* EYDE Industrial Cluster, Kristanssand, Norway, September [3, 4, 17] 2019.
432. Martinez-Cartagena, P.A., Alvarado-Hernandez, B.B., Sierra-Vega, N.O. Mendez, R, Esbensen, K.H* . & Romanach, R. J. (2019) *Design and pilot studies of TOS-compliant sampling: Interface for process analytical technology (PAT) analysis of pharmaceutical flowing powder mixtures*. 9th World Conference on Sampling and Blending (WCSB9), May 6-9, 2019, Beijing, China (* oral delivery in absence of P.A.M.-C.)
431. Esbensen, K.H. (2019) *Future directions for sampling and blending: Theory of Sampling (TOS) – What's next?* (Keynote lecture) 9th World Conference on Sampling and Blending (WCSB9), May 6-9, 2019, Beijing, China
430. Esbensen, K.H. (2019) *Comprehensive introduction to the Theory and Practice of Representative Sampling (TOS)* Endress & Hauser Conducta, Gerlingen, Germany, February 6, 2019.
429. Esbensen, K.H. (2018) *Relationship between Theory of Sampling (TOS) and proper chemometric calibration, prediction and validation*. Analytical and Pharmaceutical Group, El departamento de Química del Recinto Universitario de Puerto Rico, Mayagüez, Nov. 1, Mayagüez, Puerto Rico
428. Esbensen, K.H. (2018) *Necessary and sufficient sampling competence (Theory of Sampling, TOS) for reliable process monitoring in pharma*. Analytical and Pharmaceutical Group, El departamento de Química del Recinto Universitario de Puerto Rico, Mayagüez, Oct. 31, Mayagüez, Puerto Rico
427. Esbensen, K. H. (2018) *From-lot-to-sample-to-calibration-to-prediction-to-validation*. Guest seminar El departamento de Química del Recinto Universitario de Puerto Rico, Mayagüez, Oct. 30
426. Esbensen K, H. (2018) *The universal power of Theory of Sampling (TOS) in practice*. Keynote lecture: 1. International Congress on Mineral Sampling. October 25-26, Lima, Peru.
425. Engström, K. & Esbensen K, H. (2018) *Variographic total process – and measurement system Characterization across the complete ore-to-shipment value chain at LKAB, Sweden*. 1. International Congress on Mineral Sampling. October 25-26, Lima, Peru.
424. Engström, K. & Esbensen K, H. (2018) *Optimal grade control sampling practice in open pit mining – A full-scale Blast Hole vs. Reverse Circulation comparison variographic experiment*. 1. International Congress on Mineral Sampling. October 25-26, Lima, Peru.
423. Esbensen, K.H. (2018) *Introduktion til representative prøvetagning – i relation til måleteknik*. Måleteknisk Dag, Aug. 15, Odense. FORCE Måleteknik.
422. Esbensen, K.H. (2018) *Minimum necessary and sufficient competence for practical representative Sampling (Theory of Sampling, TOS) in complex industrial processes*. June 29th. The Rand Refinery, Johannesburg, South Africa.
421. Esbensen, K.H. (2018) *Introduction to Representative Sampling in the commercial Laboratory, Theory of Sampling (TOS)*. October 9th. Eurofins Vitamin Testing Denmark A/S, Vejle. Denmark.
420. Schovsbo, N.H. Thomsen, E, Nytoft, H.P. Esbensen, K.H. (2018) *Oil maturity, families and oil-source rock correlations in the Danish North Sea based on biomarker studies*. 80th EAGE Conference & Exhibition 11-14 June 2018, Copenhagen, Denmark. (Proceedings paper)
419. Esbensen, K.H. (2018) *Introduction to Representative Sampling – Theory of Sampling (TOS)*. Institut für Wassergüte und Ressourcenmanagement Technical University of Vienna. March 5, 2018.

418. Esbensen, K.H. (2018) *MSPC is not enough for proper process monitoring and control – Chemometrics can do better: TOS variography*. 11.th Winter Symposium on Chemometrics: Modern Methods of Data Analysis (Drushbmetrics Project). Polyani, St. Petersburg, Russia, February 26-March 02, 2018.
417. Esbensen, K.H. (2018) *Representative sampling, Theory of Sampling (TOS) in the applied science laboratory and for process monitoring*. Treteknisk Forsknings Institutt (Norwegian Wood Technology Research Institute, TTI), Jan. 17, Blindern, Oslo
417. Esbensen, K.H. (2018) *TOS (Theory of Sampling) in the geoscience analytical laboratory*. IGN, University of Copenhagen. February 19, 2018.
416. Esbensen, K.H. Haack, H., Erleben, K., Misztal, M. (2018) *Dendritic Core Crystallization in Minor Planets – An empirically constrained Numerical Simulation Study*. 33.rd Nordic Geological Winter Meeting, Jan. 10-12, 2018. DTU, Copenhagen.
415. Arkenbout, A. & K.H. Esbensen (2017) *Application of the Theory of Sampling (TOS) for quantification of unintentionally produced POPs (Persistent Organic Pollutants)*. DIOXIN2017, Vancouver Aug. 20-25 2017
414. Arkenbout, A., Li, M., Olie, K., Bauman, K.J.A.M. & K.H. Esbensen (2017). *Can sheep wool be used as biomarker for dioxin pollution*. (ePOSTER) DIOXIN2017, Vancouver Aug. 20-25 2017
413. Esbensen, K.H. (2017) *Introduction to representative sampling for the –omics sciences*. Swedish University of Agricultural Sciences, Alnarp, Sweden. June 19, 2017.
412. Esbensen, K.H. (2017) *Theory of Sampling – What's next?* 8th International Conference on Sampling and Blending, May 9-11 2017. Perth, Australia.
411. Esbensen, K.H. (2017) *"Sampling Hall of Fame vs. Sampling Hall of Shame"*. 8th International Conference on Sampling and Blending, May 9-11 2017. Perth, Australia.
410. Esbensen, K.H. (2017) *Introduction to representative sampling – Theory of Sampling (TOS)*. DONG REnaissance, Ballerup, Copenhagen. April 25.th 2017.
409. Esbensen, K.H. (2017) *Sampling – Theory and Practice*. Keynote lecture. LBMA Assaying and Refining Conference, March 20th 2017. ALCHEMIST Issue 85, pp. 3-6. London Bullion Market Association Publ.
408. Esbensen, K.H. (2017) *Theory of Sampling (TOS) for Engineering and Process Technology*. École de Technologie Supérieure (ÉTS), Montreal, Canada. February 24, 2017.
407. Esbensen, K.H. (2017) *Theory of Sampling (TOS) for Pharma (3-day course)*. Novo Nordisk Pharmaplan (NNP). Copenhagen. February 1-3 2016.
406. Esbensen, K.H. (2016) *Introduction to the Theory of Sampling (TOS)*. A/S Nikkelverk, Glencore Kristiansand, Norway. Dec. 8th 2016.
405. Esbensen, K.H. (2016) *Introduktion til repræsentativ prøvetagning (TOS)*. Landbrugets Videnscenter SEGES, Brabrand. November 2nd 2016.
404. Esbensen, K.H. (2016) *Introduktion til repræsentativ prøvetagning (TOS)*. Chr. Hansen. Copenhagen Oct. 12th 2016.
403. Esbensen, K.H. (2016) *Introduction to the Theory of Sampling (TOS)*. Eyde Cluster Kristianssand, Norway. Aug. 25-26, 2016.
402. Esbensen, K.H. (2016) *TOS – an introduction for environmental forensics*. INEF 2016. International Network for Environmental Forensics Conference 2016. June 27-29, Örebro, Sweden.
401. Esbensen, K.H. (2016) *Introduction to the Theory and Practise of Sampling (TOS) for process industry*. Eyde Industry Cluster, Kristiansand, Norway. August 25-26, 2016.
400. Esbensen, K.H. (2016) *Theory of Sampling – a universal missing link in analysis*. Guest lecture at University of Sydney, Faculty of Science and Engineering. June 17.th 2016.

399. Møller, H, Esbensen, K.H. & R. Wurzbach (2016) *Grease sampling and analysis for in-service Condition Monitoring (CM) of wind turbine blade bearings*. LUBMAT World Conference, June 8-11, 2016. Bilbao.
398. Esbensen, K.H. (2016) *Theory of Sampling – a missing link in Pharma?* Outreach seminars, April 6 2016. Novo Nordisk Engineering/Prahmaplan, Copenhagen.
397. Esbensen, K.H. (2016) *TOS – Introduction for food science professionals*. March 30-31, 2016. European Food Safety Agency (EFSA). Parma. Italy.
396. Schovsbo, N.H., Esbensen, K.H., Nielsen, A.T., Derbez, E., Gaucher, E.C., Poirier-Coutansais, X., Riou, A., Tallone, P. & Milton-Taylor, D. *Rock Types in the Scandinavian Alum Shale Resource Play: Definitions and Predictions* (2015) 77.th EAGE Meeting, Madrid, June 2015.
395. Esbensen, K.H. (2015) *The critical role of representative sampling before analysis, NIR or otherwise...* Keynote Lecture. NIR 2015 World Conference, Oct. 19-23, 2015. Foz de Iguazu, Brazil.
394. Esbensen, K.H. (2015) *Proper TOS sampling, Variographic Analysis, Total Measurement System Uncertainty and fit-for-purpose Acceptance levels for Pharmaceutical Mixing Process Monitoring – A call for a paradigm shift*. 7.th World Conference on Sampling and Blending (WCSB7), June 10-12, 2015. Bordeaux.
393. Esbensen, K.H. (2015) *Sampling meets DOE meets Chemometrics – Monitoring of Pharmaceutical Processes*. Keynote lecture. CAMO User Group Meeting (UGM), April 16-17 2015. Prague.
392. Esbensen, K.H. (2015) *1-D TOS; Variographic Analysis, measurement Systems and Fit-for-Purpose Acceptance Limits*. IFPAC Annual Meeting, Jan. 25-28 2015 Arlington, Washington D.C.
391. Esbensen, K.H. (2014) *Introduction to the Theory of Sampling in the industrial practice*. DSM HQ, Delft, Holland. Nov 30, 2014
390. Esbensen, K.H. (2014) *TOS: Theory of Sampling – i assessorens tjeneste*. Bureau Veritas, Fredericia, Nov 27, 2014.
389. Esbensen, K.H. (2014) *Introduction and Application of the Theory of Sampling (TOS) in the industrial practice*. SASOL, Sasolburg, South Africa, Nov 3-7, 2014.
388. Esbensen, K.H. (2014) *The FINAL word on the chemometric evergreen “cross validation”*. Advanced Manufacturing Technology (AMT), PFIZER Global Supply, Peapack, New Jersey, USA Oct 9.th 2014
387. Esbensen, K.H. (2014) *Process sampling (TOS) and variographics – a powerful corporate QC tool*. Advanced Manufacturing Technology (AMT), PFIZER Global Supply, Peapack, New Jersey, USA Oct 9.th 2014
386. Esbensen, K.H. (2014) *Overview of the Theory of Sampling (TOS) for continuous manufacturing*. Rutgers University, Dept. of Chemical and Biochemical Engineering, Piscataway, New Jersey, USA October 7, 2014.
385. Esbensen, K.H. (2014) *Overview of the Theory of Sampling (TOS) for continuous manufacturing*. New Jersey Institute of Technology, Newark, N.J. USA October 6, 2014.
384. Esbensen, K.H. (2014) *Introduction to the Theory and Practise of Representative Sampling (TOS)*. Ph.D. course (Aarhus University, research school), Foulum Research Station, Sept. 23-25, 2014
383. Esbensen, K.H. (2014) *A holistic approach to validation integrating the Theory of Sampling*. 17. International Diffuse Reflectance Conference, Chambersburg, Pennsylvania, USA, Aug 2-8 2014.
382. Esbensen, K.H. (2014) *It is not only about IDRS, it is just as much about what comes before ... Representative sampling (Theory of Sampling)*. 17. International Diffuse Reflectance Conference, Chambersburg, Pennsylvania, USA, Aug. 2-8 2014.
381. Esbensen, K.H. (2014) *Process sampling/variographics: Quality control of the complete on-line*

- measurement system. 17. International Diffuse Reflectance Conference, Chambersburg, Pennsylvania, USA, Aug. 2-8 2014.
380. Esbensen, K.H. (2014) *Theory of Sampling in a multivariate perspective – What can chemometrics contribute?* Keynote lecture: SAMPLING 2014, Perth July 29-30, 2014.
 379. Esbensen, K.H. (2014) *Theory of Sampling (TOS) – a powerful tool for total Measurement Uncertainty (MU) estimation.* Q-Interline Annual UG Meeting, Holbæk, Denmark June 3, 2014.
 378. Esbensen, K.H. (2014) *Corporate introduction to the Theory of Sampling (TOS).* Fonterra HQ, Hamilton, New Zealand, March 20, 2014
 377. Esbensen, K.H. (2014). *Theory of Sampling (TOS) vs. Measurement Uncertainty (MU) – a call for integration.* Guest Seminar: Institute of Fundamental Science, Statistics and Bioinformatics. Massey University, Hamilton, New Zealand, March 19, 2014.
 376. Esbensen, K.H. (2014) *Process sampling in the geosciences: TOS variographics.* Université de Quebec à Chicoutimi, Science de la Terre, March 4, 2014.
 375. Esbensen, K.H. (2014) *The critical role of representative sampling in medical geology studies and environmental services.* 2. National & 1. International Geosciences Congress. Tehran-Rascht, Iran. Feb. 16-19 2014.
 374. Esbensen, K.H. (2014) *Sampling for analytical purposes – a field of many challenges: Theory of Sampling.* Isfahan University of Technology, Dept. of Chemistry, Iran. Feb. 15 2014.
 373. Esbensen, K.H., McDonald, I. & Johansson, L. (2014). *Whole rock geochemistry and zircon geochronology of the central Finnefjeld tonalite gneiss from the Maniitsoq impact structure, Western Greenland.* 31. Nordic Geological Winter Meeting, Lund, Sweden. Jan. 8-10, 2014.
 372. Esbensen, K.H. & Minnitt, R. (2014). *Chemometric verification of the geochemical evolution of the dual igneous-lava rock suites in the Richtersfeld Hiab province, Namibia.* 31. Nordic Geological Winter Meeting, Lund, Sweden. Jan. 8-10, 2014
 371. Esbensen, K.H., Holding, M., McDonald, I. & Johansson, L. (2014). *Evaluating the handheld XRF (hXRF) – Is there a wider application horizon?* 31 Nordic Geological Winter Meeting, Lund, Sweden. Jan. 8-10, 2014.
 370. Esbensen, K.H. & Lars P. Julius (2014). *“DS 3077 Horizontal” – new standard for representative sampling in science, technology and industry.* 31. Nordic Geological Winter Meeting, Lund, Sweden. Jan. 8-10, 2014.
 369. Tellesbø, H. & Esbensen, K.H. (2013). *Practical use of variography to find root causes to high variances in industrial production processes – I. Exclay (LECA).* 6.th World Conference on Sampling and Blending (WCSB6), Lima, Peru. Nov. 19-22, 2013.
 368. Tellesbø, H. & Esbensen, K.H. (2013). *Practical use of variography to find root causes to high variances in industrial production processes – II. Premixed mortars.* 6.th World Conference on Sampling and Blending (WCSB6), Lima, Peru. Nov. 19-22, 2013.
 367. Esbensen, K.H., Holding, M. & Johansson, L. (2013). *Portable XRF vs. the geo-analytical laboratory – first assessment of sampling errors.* 6.th World Conference on Sampling and Blending (WCSB6), Lima, Peru. Nov. 19-22, 2013.
 366. Wagner, C. & Esbensen, K.H. (2013). *Final evaluation of 1/3-scale model sampler for horizontal pneumatic particulate material streams.* 6.th World Conference on Sampling and Blending (WCSB6), Lima, Peru. Nov. 19-22, 2013.
 365. Esbensen, K.H. (2013). *History and achievements of the World Conference on Sampling and Blending in the decade 2003-2013.* 6.th World Conference on Sampling and Blending (WCSB6), Lima, Peru. Nov. 19-

22, 2013.

- 364. Esbensen, K.H. (2013). *Quantifying 1- and 2-dimensional heterogeneity for reliable bulk analysis, process monitoring and multivariate calibration*. Sept. 9, 2013. Conferencia Chemometrica, September 9-12, 2013. Sopron, Hungary.
- 363. Esbensen, K.H. (2013). *It is not only about NIR, it is just as much about what comes before: Representativity (TOS) to the fore!* Keynote lecture, NIR 2013, June 2-7, 2013, la Grande Motte, France
- 362. Esbensen, K.H. (2013). *Theory of Sampling – for valid Process Data Analysis*. Invited guest lecture, CAMO user Group Meeting, April 18.th 2013. Berlin.
- 361. Esbensen, K.H. (2013). *Theory of Sampling (TOS). 3-day Ph.D. course* (Research School, Aalborg University, Faculty of Science and Engineering). April 10-12, 2013. GEUS. Copenhagen.
- 360. Esbensen, K.H. (2013). *“Validering – Everything you ever wanted to know, but were afraid to ask your mother about”*. Guest lecture, Telemark University College, HIT/TF, April 9, 2013. Porsgrunn.
- 359. Esbensen, K.H. (2013). *Theory of Sampling (TOS) – an Introduction*. Nordisk Allerginätverk, Möte 14. March 2013. Göteborg.
- 358. Esbensen, K.H. (2013). *Udtagning af jordprøver – en Russisk Roulette? Bidrag fra Theory of Sampling (TOS)*. 6. Marts, 2013. ATV Jord og Gurndvanmds Årsmøde. Vingsted Centeret, Vingsted.
- 357. Esbensen, K.H. (2013). *Introduction to Representative Sampling (TOS)*. 1-day shortcourse. February 18.th, 2013. University of Umeaa, Sweden
- 356. Appel, P. W. U., Hansen, B.G. & Esbensen, K. H. (2013): *Medical Geology – Contributions from Scandinavia*. 24.th Colloquium of African Geology (CAG24) Addis Abeba, Ethiopia, Jan. 10-14, 2013. Addis Abeba.
- 355. Esbensen, K.H. (2012). *The variogram – the missing link in Process Analytical Technology (PAT)*. AFRODATA 2012, Stellenbosch Institute of Advanced Research (STIAS), Stellenbosch, South Africa, November 19-23, 2012.
- 354. Esbensen, K.H. (2012). *Theory of Sampling - Representative Sampling in Practise*. Nelson Mandela Metropolitan University, Port Elisabeth, South Africa, Oct. 23-25, 2012.
<https://dl.dropbox.com/u/13542010/NMMUposterTOScourse2012.doc>
- 353. Esbensen, K.H. (2012). *Theory of Sampling – from field to aliquot*. “Fieldomics” (Ph.D. course), Swedish Agricultural University, Alnarp, Sweden. October 16, 2012.
- 352. Esbensen, K.H. (2012). *Counteracting Heterogeneity in Sampling and Analysis – Theory of Sampling (TOS) vs. Measurement Uncertainty (MU)*. 8.th International Conference on Analysis of Geological and Environmental Materials (GEOANALYSIS 2012). September 16-20, 2012, Buzios, Brazil
- 351. Esbensen, K.H. (2012) *The critical role of representative sampling*. Keynote Address, SAMPLING 2012, Aug. 21-22. Perth. The Australian Institute of Mining and Metallurgy (AusIMM)
- 350. Esbensen, K.H. (2012). *Theory of Sampling – an overview*. Workshop on Chemo-metrics and Experimental Design, INSTANT (Innovative Sensors for Fast Analysis of Nanoparticles) 7.th EU Framework Programme. Univ. Thübingen, May 31, 2012
- 349. Esbensen, K.H. (2012) *Representative Sampling – HOW TO?* 2-day course. May 22-23, 2012. Kasteel Valsbroek. MTSE (Micro Traces Services Europe).
- 348. Esbensen, K.H. (2012). *Replication – ending Decades of Confusion*. 2.nd South African Chemometrics Society (SACS) Meeting, Irene, Pretoria, May 9-11, 2012.
- 347. Esbensen, K.H. (2012) *Data Quality; Representative Sampling; Proper Validation: A holy Trinity in Chemometrics*. 2-day course 2.nd South African Chemometrics Society (SACS) Meeting, Irene, Pretoria,

May 7-8, 2012.

- 346. Esbensen, K.H. (2012). *Replication – ending decades of Confusion*. Keynote lecture, 15.th ANISG Conference, April 17-18, 2012 Queenstown, New Zealand.
- 345. Esbensen, K.H. (2012). *Theory of Sampling – for NIR*. 2-day introductory course. 15.th ANISG Conference, April 15-16, 2012 Queenstown, New Zealand.
- 344. Esbensen, K.H. & P. Appel (2012). *Medicinsk Geologi i Danmark – Perspektiver*. ånsk geologisk Årsmøde, 24.03.2012, GEUS, Kbh.
- 343. Esbensen, K.H. (2012). *Theory of Sampling-Introduction and applications*. CRA-WCenter for Agricultural Valuation, Wallonie, Belgien. March 13-15, 2012.
- 342. Esbensen, K.H. (2012). *Replication – ending decades of confusion*. 8.th Winter Symposium on Chemometrics: WSC-8, Park Drakino (Moscow). 27/2-2/3, 2012.
- 341. Esbensen, K.H. (2012). *Principles of Representative sampling: Theory of Sampling*. AAU research School: Ph.D. course. GEUS, Copenhagen. Feb. 15-16 & 23-24, 2012
- 340. Esbensen, K.H. (2012). *Representative Sampling – a comprehensive introduction*. [3d course] Reinwald-Westphal Technisches Hochschule (RWTH), Jan. 16-18, 2012
- 339. Esbensen, K.H. (2011). *L'échantillonnage représentatif du terrain à l'analyse (Representative sampling from field to analysis)*. Centre du savoir sur mesure (CESAM), Université Quebec à Chicoutimi (UQAC), Canada, Nov. 29-30, 2011
- 338. Esbensen, K.H. & P. Minkinen (2011). *Illustration sampling standards – how to guarantee complete understanding and TOS-compliance?* 5.th World Conference of Sampling and Blending (WCSB5) October 25-28, 2011, Santiago de Chile.
- 337. Esbensen, K.H. (2011). *Introduction to representative sampling – from field to laboratory* [2-day course]. Reutlingen Universität, Germany. October 14-15 2011.
- 336. Esbensen, K.H. (2011). *Theory and practise of representative sampling (TOS)*. [4-day course]. ELKJEM SOLAR, Kristiansand, Norway. 21-22.09; 18-19.10, 2011
- 335. Esbensen, K.H. (2011). *Introduction to process sampling in Process Analytical Sampling (PAT)*. Q-Interline seminar, Dublin, Ireland. Sept. 14, 2011
- 334. Esbensen, K.H. (2011). *Introduction to representative sampling – from field to laboratory*. Swedish Agricultural University (SLU), Alnarp, September 8, 2011
- 333. Esbensen, K.H. (2011) *Introduction to Chemometrics* [4-day Ph.D. course]. Institute of Chemical Engineering, Norwegian University of Science and Technology (NTNU), May 23-26, 2011
- 332. Esbensen, K.H. & A. Larsen (2011). *Optimising NIR method development: Get the sampling and spectroscopy right*. [1-day course]. 15. International Conference on Near Infrared Spectroscopy (NIR2011), Cape Town, May 14, 2011
- 331. Esbensen, K.H. (2011). *Hvordan prøvetage heterogent material – i praksis? Introduktion til Theory of Sampling*. Food Diagnostics (seminar), Grenå, 04.05.11 Esbensen, K.H. (2011). *Theory of Sampling (TOS) – Criteria and Methods for Representative Sampling*. First Seminar on MICROTRACER Analytical Techniques Nettetal, Germany, March 22, 2011
- 330. Esbensen, K.H. (2010) *Representative sampling: Unified principles at all scales (Theory of Sampling, TOS)* Sciences de la Terre, Université Quebec, Chicoutimi (UQAC), Nov. 19, 2010
- 329. Esbensen, K.H. (2010) *Representative sampling in the geo-analytical laboratory*. Contributing lecture: Colorado School of Mines (outreach programme). Golden, Colorado, USA. Nov. 04, 2010

328. Esbensen, K.H. (2010) *Reliable assessment of Total Errors in sampling of large kernel lots (GMO and trace constituents): Variographic analysis (Theory of Sampling)*. 10.th Danish Symposium in Analytical Chemistry, University of Copenhagen. August 17-18, 2010.
327. Esbensen, K.H. (2010) *Representative Process Sampling (Theory of Sampling, TOS) – the missing link in PAT*. Invited Guest lecture, American Chemical Society, Delaware Section / Society of Applied Spectroscopy, June 21 2010. Delaware.
326. Esbensen, K.H. (2010) *HORIZONTAL – A matrix-independent Generic Sampling Standard*. Keynote Address, SAMPLING 2010, May 11-12, 2010. Perth. The Australian Institute of Mining and Metallurgy (AusIMM).
325. Esbensen, K.H. (2010) *Representative Process Sampling (Theory of Sampling, TOS) – the missing link in PAT*. Keynote lecture, Advances in Process Analytics and Control Theory (APACT10), April 28-29, 2010. Manchester
324. Esbensen, K.H. (2010) *Cross-validation – a chemometric dinosaur going extinct*. 7.th Winter School on Chemometrics (WSC7), February 15-19, 2010. St. Petersburg
323. Esbensen, K.H. (2010) *Theory of Sampling – a comprehensive introduction: basic principles and typical applications in the GMO laboratory*. Micro-sampling seminar, February 4-5, 2010. EU Joint Research Center (JRC), Ispra, Italy.
322. Esbensen, K.H. (2009) *Theory of Sampling (TOS) – a comprehensive approach to representative sampling*. Telemark University College. December 7-9, 2009.
321. Esbensen, K.H. (2009) *Introduction to representative sampling in science, Technology and Industry: Theory of Sampling – an indispensable tool*. Rand Refineries Ltd. (RRL). Johannesburg. Nov. 30, 2009
320. Esbensen, K.H. (2009) *Introduction to representative sampling: Theory of Sampling (TOS)*. Sciences de la Terre, Université Quebec, Chicoutimi (UQAC), Nov. 16, 2009
319. Esbensen, K.H. (2009) *Representative sampling in the geo-analytical laboratory*. Contributing lecture: Colorado School of Mines. Nov. 12, 2009
318. Esbensen, K.H. (2009) *Sampling Theory (TOS) – an introduction*. Biological and Agricultural Engineering Depart. University of California, Davis. Nov. 10, 2009
317. Esbensen, K.H. Paoletti, C. Minkinen, P. & Pitard, F. (2009) *Developing meaningful international standards – where do we stand today? The world's first horizontal(matrix-independent) sampling standard – first foray*. 4.th World Conference on Sampling and Blending (WCSB4), Cape Town, Oct. 21-23, 2009
316. Minkinen, P.O. & Esbensen, K.H. (2009) *Simulating sampling of aggregate materials with significant spatial heterogeneity- mapping the influence of sampling uncertainty factors: analyte concentration, lot heterogeneity, sampling mode and sample size*. 4.th World Conference on Sampling and Blending (WCSB4), Cape Town, Oct. 21-23, 2009
315. Esbensen, K.H. Minkinen, P.O. & Paoletti C. (2009) *Reliable assessment of total errors in sampling large kernel lots: a new variographic approach (Theory of Sampling)*. Keynote lecture: 4.th World Conference on Sampling and Blending (WCSB4), Cape Town, Oct. 21-23, 2009
314. Tellesbø, H & Esbensen, K.H. (2009) *Exclay process and product quality control – Variographic analysis of kiln bulk density*. 4.th World Conference on Sampling and Blending (WCSB4), Cape Town, Oct. 21-23, 2009
313. Esbensen, K.H. (2009) *Cross-validation – a chemometric dinosaur becoming extinct?* Invited lecture. Conferentia Chemometrica 2009. Siófok, Balaton, Hungary September 27-30 2009
312. Esbensen, K.H. (2009) *Representative sampling – a Unified Approach from Field to Laboratory: Theory of Sampling (TOS)*. Geoanalysis 2009 (Internal Association of Geoanalysts), Champagne Sports Resort, Drakensberg, South Afrika. 7-11 September, 2009.

311. Esbensen, K.H. (2009) *Principles of representative process sampling – II: TOS, a missing link in PAT*. PFAFF (FL Schmidt), Wuppertal. August 25-26, 2009.
310. Esbensen, K.H. (2009) *Representative Process Sampling: Theory of Sampling (TOS) – A missing link in Process Analytical Technologies (PAT)*. 11.th Scandinavian Symposium on Chemometrics (SSC11). Loen, Norway. 8-11 June, 2009.
309. Esbensen, K.H. (2009) *Representative Sampling – general principles: Theory of Sampling(TOS)*. Danish Air Quality Society, Annual Meeting, Copenhagen May 18.th, 2009.
308. Esbensen, K.H. *Representative Sampling – a necessary tool for analysis (laboratory, plant, field): General principles of process sampling*. NOVIA University of Applied Sciences, Vasa. April 28-29. 2009
307. Esbensen, K.H. (2009) *Principles of representative process sampling – I: General Principles*. PFAFF (FL Schmidt), Wuppertal. April 14-15, 2009.
306. Esbensen, K.H. (2009) *Chemometrics and Representative sampling: Necessary pillars for analytical chemistry, PAT and Molecular Biology*. Institute of Wine-Biotechnology, Stellenbosh University, South Africa, February 16-20, 2009.
305. Esbensen, K.H. (2009) *Process Data Quality & Representative Process Sampling – Theory of Sampling (TOS) in Process Analytical Technology (PAT)*. Nordic Process Control Workshop (NPCW09). Telemark University College, Porsgrunn. Jan. 29-30, 2009.
304. Esbensen, K.H. (2008) *Process sampling: Theory of Sampling (TOS) – a missing link in Process Analytical Technologies (PAT)*. Chemometrics Symposium: SACS 2008. South African Chemometrics Symposium, Institute of Wine Biotechnology, Stellenbosh University, December 1-5, 2008.
303. Esbensen, K.H. (2008) *Theory of Sampling – a comprehensive introduction*. School of Mining Engineering. Witwatersrand University, Johannesburg, South Africa & GASA (Geostatistical Association of South Africa). Aug. 4-8, 2008.
302. Esbensen, H.H. (2008) *Macro-, Meso- and micro-scale application of principles of bed-Blending - Representative sampling and mass-reduction in science, technology and the geochemical laboratory*. GASA (Geostatistical Association of South Africa), Aug. 7.th, 2008.
301. Esbensen, K.H. (2008) *AMT (Angle Measure Technique) – resolution of 10 years' of method confusion*. Computers in Chemistry (CAC2008), Montpellier, June 30 – July 4.th, 2008.
300. Esbensen, K.H. (2008) *Reliable and representative sampling of GMO – Introducing the Theory of Sampling*. Invited keynote speaker: First Global Conference on GMO detection and analysis. Cernobbio, Laggio di Como, July 24-27, 2008.
299. Esbensen, K.H. (2008) *Process Analytical Technology in Industrial Biotechnology – Bioenergy – Biorefinery*. European Biorefinery Symposium, Flensburg 9-11 April, 2008.
298. Esbensen, K.H. (2008) *AMT (Angle Measure Technique) – a new global texture transform*. 3.rd interdisciplinary seminar on Applied Mathematics. Aalborg University, 17 April, 2008.
297. Esbensen, K.H. (2008) *Representative sampling – an overview of the Theory of Sampling*. Q-Interline expert course. Roskilde, Denmark. March 22, 2008.
296. Esbensen, K.H. (2008) *Introduksjon til kjemometrisk test set validering*. Telemark University College (HIT), Porsgrunn. March 6, 2008.
295. Esbensen, K.H. & M. Swanepoel. (2008) *PLS-discrimination reveals systematic sampling deficiencies re. representative sampling at the winery weighbridge*. Annual Meeting of the Norwegian Chemometrics Society, Voss, March 3-5, 2008.
294. Esbensen, K.H. (2008) *Chemometric Data Analysis – a holistic process with many elements*. Invited lecture: 6.th Winter Symposium on Chemometrics (WSC-6), Bi-annual Meeting Russian Chemometrics

Society, Kazan State University of Architecture and Engineering, Kazan. February 18-22, 2008.

293. Esbensen, K.H. (2008) *Introduction to representative sampling of bulk materials and process streams*. February 13, 2008. Cape Initiative in Materials and Manufacturing (CIMM), Cape Town, South Africa.
292. Esbensen, K.H. (2008) *Quo vadis kemometri? – Eksplorative visioner/filosofi*. Plenary lecture. Dansk kemometri konference, 10-11 januar, 2008. Nyborg Strand.
291. Esbensen, K.H. (2008) *Representative sampling in the geo-sciences – how well are we coping?* Plenary lecture. 28.th Nordic Geological Winter Meeting, Jan. 7-10, 2008, Aalborg University, Aalborg.
290. Esbensen, K.H. & H.D. Zimmermann. (2007) *Representative sampling and mass reduction in geochemistry and in the mineral industry – a laboratory test: Rønne and Hellets granites, Bornholm*. 28.th Nordic Geological Winter Meeting, Jan. 7-10, 2008, Aalborg University, Aalborg.
289. Swanepoel, M. & K.H. Esbensen (2007) *Representative sampling at the weighbridge – a critical issue for the wine industry: Reliable characterization of intake grape juice*. 3.rd World Conference on Sampling and Blending (WCSB3), Porto Alegre, October 20-24, 2007.
288. Nørmark, E, H. Lykke-Andersen H. & K. H. Esbensen (2007). *Influence of surface conditions on reflection seismic data - A joint study of reflection seismic data in Denmark*. “Near Surface 2007” - 13. European Meeting of Environmental and Engineering Geophysics, Istanbul, September 3-5, 2007
287. Esbensen, K.H. & M. Swanepoel (2007) *PLS-discrimination reveals systematic sampling deficiencies re. representative sampling at the winery weighbridge*. PLS'07: 5.th International PLS Symposium: Causalities explored by indirect observation. MATFORSK, Ås, Norway, September 5-7, 2007
286. Esbensen, K.H. (2007) *Representative sampling for NIR multivariate calibration and PAT monitoring*. Plenary lecture NIR2007: 13.th International Conference on Near Infrared Spectroscopy, Umeå-Vasa, June 15-21, 2007
285. Esbensen, K.H. (2007) *The AMT consortium: resolving two generations of Angle Measure Technique confusion*. 10.th Scandinavian Symposium on Chemometrics (SSC10), Lappeenranta, Finland, June 11-15, 2007.
284. Esbensen, K.H. & Kucheryavski, S. (2007). *Optimal corrections for digitalization and quantification effects in Angle Measure Technique (AMT) texture analysis*. 10.th Scandinavian Symposium on Chemometrics (SSC10), Lappeenranta, Finland, June 11-15, 2007.
283. Esbensen, K.H. (2007). *“Representative sampling of heterogeneous materials: Theory of Sampling (TOS) – the missing link in chemical analysis, quality control and food diagnostics”*. Analysis de Micotoxinas. R-Biopharm, Rhône seminar, Madrid June 6.th, 2007
282. Esbensen, K.H. (2006) *“Theory of Sampling (TOS)”*: Den komplette praksis baggrund for sampling af alle typer heterogene materialer – Redegørelse for en konsekvent horisontal, matrice-invariant tilgang til repræsentativ prøvetagning. DANSK STANDARD, Forum for Prøvetagning, 5. December, 2006 (Charlottenlund).
281. Esbensen, K.H. (2006) *Multivariate Image Analysis & Angle Measure Technique (AMT)* South African Spectroscopic Society, Nov. 24, 2006. University of South Africa (UNISA), Muckleneuk Campus, Pretoria. South Africa.
280. Esbensen, K.H. (2006) *Representative sampling: vinyard, winemaking & wine quality control*. 3.rd International Enology & Viticulture Conference. Nov. 14, 2006, Somerset West. South African Society for Enology and Viticulture.
279. Osborne C. & Esbensen, K.H. (2006) *Identification of wine produced by genetically modified organisms (GMO): A new approach using mid-infrared spectroscopy and chemometrics*. 3.rd International Enology & Viticulture Conference. Nov. 14, 2006, Somerset West. South African Society for Enology and Viticulture.

278. Esbensen, K.H. (2006) "*Theory of Sampling (TOS) – the missing link in chemical analysis and quality control*". Invited lecture: FOOD DIAGNOSTICS seminar, Nov. 9, 2006. Nasjonalt Folkehelseinstitutt, Oslo.
277. Esbensen, K.H. (2006) "*Sampling food – without tasting it*". *An introduction to the Theory of Sampling (TOS) for food science*. Invited guest lecture at Graduate School, KLV (Royal Veterinary University of Denmark), Copenhagen September 21, 2006.
276. Esbensen, K.H. (2006) *Chemometrics & Representative Sampling – Advanced issues*. Invited lectures/Ph.course: Universität für Bodenkultur, Wien, Institut für Umweltbiotechnologie, Tulln, Austria, August 28-30, 2006.
275. Esbensen, K.H. (2006) *Representative sampling in analytical chemistry, industry and science – Theory of Sampling (TOS)*. Invited lecture: "Representative Sampling" Symposium. South African Spectroscopic Society (SASS); Tswane University of Technology, Pretoria, July 27, 2006.
274. Esbensen, K.H. (2006) *Representative sampling: the missing link in the evolution of analytical chemistry and chemometrics*. Guest lecture: First Annual Meeting of South African Chemometrics Society (SACS1), Institute of Wine-Biotechnology, Stellenbosch University, Stellenbosch, July 21, 2006.
273. Esbensen, K.H. (2006) *Multivariate data Analysis: PLS-regression*. 2-day course/workshop South African Spectroscopic Society (SASS), University of South Africa (UNISA) & Tswane University of Technology (TUT); Pretoria, July 28 & 30, 2006.
272. Esbensen, K.H. (2006) *Theory of Sampling (TOS). The missing link in chemical analysis, process monitoring and quality control (PAT)*. Invited lecture: 2nd European User Meeting on Multivariate Analysis ("Camo@Como"), Como, Italy, June 21-23, 2006.
271. Esbensen, K.H. (2006) *Introduksjon til representativ prøvetaking*. Høgskolen i Telemark (HIT), Avdelingen for Teknologiske Fag (ATF), Porsgrunn. 6. juni, 2006.
270. Esbensen, K.H. (2006) *Introduksjon til Angle Measure Technique (AMT)*. Høgskolen i Telemark(HIT), Avdelingen for Teknologiske Fag (ATF), Porsgrunn. 6. juni, 2006.
269. Esbensen, Kim H. (2006) *Hvordan prøvetage heterogent materiale – i praksis? Lille introduktion til en stor teori, Theory of Sampling (TOS)*. Food Diagnostics.Seminar, Grenå, May 23, 2006
268. Esbensen, K.H. (2006) *Theory of Sampling (TOS) – the missing link in chemical analysis, process monitoring and quality control (PAT)*. Invited plenary lecture, AnalyticaConference, ANALYTIKA 2006, München, April 26 2006.
267. Esbensen, K.H. (2006) *Introduktion til TOS, Theory of Sampling*. 2-dages Ph.D. kursus, Forskerskolen AAU, Esbjerg (AAUE) March 29-30, 2006.
266. Esbensen, K.H. (2006) *Introduksjon til representativ prøvetaking & kjemometrisk test set validering*. Telemark University College (HIT), Porsgrunn. March 23-24, 2006.
265. Esbensen, Kim H. (2006) *ACABS (Applied Chemometrics, Analytical Chemistry, AppliedBiotechnology, Bioenergy & Sampling research group) 2001-2006 – scope and main results*. 18 Norske Kjemometrisymposium, Hafjell, 20-22 March 2006.
264. Esbensen, Kim H. (2006) *Chemometrics – a powerful tool for multivariate data analysis: General principles and typical applications*. Institute of Geochemistry, Russian Academy of Sciences (RAS), Siberian Branch, Irkutsk. Feb. 27, 2006.
263. Esbensen, Kim H. (2006) *Representative sampling of geological, geochemical, ecological materials and CRM's: Theory of Sampling (TOS)*. Institute of Geochemistry, Russian Academy of Sciences (RAS), Siberian Branch, Irkutsk. Feb. 26, 2006.
262. Esbensen, K.H. (2006) *Introduction to representative sampling: TOS*. Institute of Wine Biotechnology, Stellenbosch University, Stellenbosch, South Africa. Feb. 9, 2006.

261. Esbensen, K.H. (2006) *Advanced Chemometrics* (3-day course). Institute of Wine Biotechnology, Stellenbosch University, Stellenbosch, South Africa. Feb. 6-8, 2006.
260. Esbensen, K.H. (2006) *Introduction to Chemometrics* (3-day course). Institute of Wine Biotechnology, Stellenbosch University, Stellenbosch, South Africa. Feb. 1-3, 2006.
259. Esbensen, K.H. (2006) *Chemometrics & Representative Sampling – introductions*. Invited lectures/Ph.course: Universität für Bodenkultur, Wien, Institut für Umweltbiotechnologie, Tulln, Austria, Jan. 13-15, 2006.
258. Esbensen, K.H. (2006) *Angle Measure Technique (AMT) & Acoustic Chemometrics (a.c.) Introductions*. Invited lectures/Ph.D. course: Lappeenranta University of Technology, Lappeenranta, Finland. Jan. 9, 2006.
257. Esbensen, K.H. (2005) *Theory of Sampling (TOS) - the missing link in product characterisation, process monitoring and quality control*. Invited lecture: European Commission, DG Joint Research Centre (JRC); Institute for Health and Consumer Protection (IHCP), Ispra, Italy. Dec. 5, 2005
256. Esbensen, K.H. (2005) *Introduction to TOS – Theory of Sampling*. Institute of Wine Biotechnology, Stellenbosch University, Stellenbosch, South Africa. Nov. 17, 2005.
255. Esbensen, K.H. (2005) *Introduction to Chemometrics* (3-day course). Institute of Wine Biotechnology, Stellenbosch University, Stellenbosch, South Africa. Nov. 7-9, 2005.
254. Esbensen, K.H. (2005) *Prøvetagning – ikke bare ligetil*. Dansk Veterinær og Hyologisk Selskab Årsmøde 2005. Scanticon, Kolding, Nov. 3, 2005.
253. Esbensen, K.H. (2005) *TOS (theory of Sampling) - the missing link in PAT*. Merck and Co, Inc. Pharmaceutical Analysis and Control. West Point, PA. USA. Oct. 31, 2005.
252. Esbensen, K.H. (2005) *Acoustic chemometrics - a new PAT modality*. Merck and Co, Inc. Pharmaceutical Analysis and Control. West Point, PA, USA. Oct. 31, 2005.
251. Esbensen, K.H. & Peter Paasch-Mortensen. (2005) *Proper Reference Sampling – the critical PAT success factor*. ISPE Nordic PAT Workshop: PAT & Manufacturing Science. Copenhagen, Oct. 28, 2005.
250. Esbensen, K.H. (2005) *Reference sampling for Process Analytical Technologies (PAT) – Theory of Sampling (TOS)*. Invited lecture: 32 FACSS/51 ICASS (Federation of Analytical Chemistry & Spectroscopic Societies - International Conference on Analytical Sciences & Spectroscopy Society for Applied Spectroscopy National Meeting). Quebec city, Canada, October 9-13, 2005.
249. Esbensen, K.H. (2005) *Reference Sampling for Process Analytical Technologies (PAT) - Theory of Sampling (TOS)*. Guest lecture: Working group for spectroscopy, Dept. of Mathematical Sciences and Technology. Norwegian University of Life Sciences (UMB) & MATFORSK, Ås. Sept. 30, 2005.
248. Esbensen, K.H. (2005) *AMT: Angle Measure Technique – konsept, metodikk og applikasjoner fra naturvidenskap, bildeanalyse og teknologi* (2 dagers kurs). 29-30 Sept. Dept. of Mathematical Sciences and Technology. Norwegian University of Life Sciences (UMB), Ås.
247. Esbensen, K.H. (2005) *Multivariate tolerance: At what stage of sampling error do samples loose their statistical detectable multivariate interdependence?* (invited lecture). Sampling workshop. De Beers Mining Resource Management Research Group (MRM), Wells, UK, Sept. 13-16, 2005.
246. Esbensen, K.H. (2005) *Theory of Sampling & representative mass reduction: necessary tools for reliable trace concentration determinations*. NKS Seminar: "Sampling i krisesituationer". RISØ 26 aug. 2005.
245. Esbensen, KH, Halstensen, M. & de Bakker, P (2005): *Acoustic chemometric PAT monitoring of a granulation production process*. 9th Scandinavian Symposium on Chemometrics (SSC9), Reykjavik, Aug. 21-25, 2005.
244. Esbensen, K.H. & Halstensen, M. (2005) *Introduksjon til akustisk kjemometri*. Telemark University

College (HIT), Porsgrunn. June 2-3, 2005.

243. Esbensen, K.H. (2005). *Sampling in practise: a TOS toolbox of unit operations*. Baltic Biorefinery Symposium (BBS), May 26-28. AAUE, Esbjerg.
242. Mortensen, P.P. & Esbensen K.H. (2005). *Optimisation of an image analytical system for bulk materials using the Theory of Sampling*. 2nd World Conference on Sampling and Blending (WCSB2), May 12-15, 2005. Brisbane.
241. Esbensen, K.H. (2005). *A multivariate perspective on Gy's Theory of sampling – first foray*. 2nd World Conference on Sampling and Blending (WCSB2), Brisbane, Australia. May 12-15, 2005.
240. Esbensen, K.H. (2005). *Proper reference sampling – the last challenge for reliable NIR analysis*. Short course (1-day). AgResearch, Ruakura, Hamilton. April 25, 2005, New Zealand.
239. Esbensen, K.H. (2005). *Proper reference sampling – the last challenge for reliable NIR analysis*. Short course NIR2005, April 9-15, 2005. Auckland, New Zealand.
238. Esbensen, K.H. (2005). *Validering av multivariate modeller*. Guest lecture, Telemark University College, HIT/TF, Norge. March 18, 2005.
237. Esbensen, K.H. (2005). *IBION Sampling-kurs: TOS*. MATFORSK, Ås, Norge. March 17, 2005.
236. Esbensen, K.H. (2005). *Introduction to Multivariate Data Analysis – relationships to TOS*. De Beers, Mining Resource Management Group, Wells, United Kingdom. Feb. 26-28, 2005.
235. Esbensen, K.H. & Petersen, L. (2005). *Introduksjon til Prosess-sampling*. 2-daycourse: TEKNA (Norwegian Engineering Association), Oslo. Feb. 09-10, 2005.
234. Esbensen, K.H. & Petersen, L. (2005). *Introduktion til proces-sampling* F.L. Smidth Automation, Valby. Jan. 6, 2005.
233. Esbensen, K.H. (2004): *Is geochemical analysis reliable?* GOLDSCMIDT 2004, Copenhagen, June 6-9 2004.
232. Esbensen, K.H. (2004): *Vandbestemmelse og TOS (Theory of Sampling)*. ACABS – Moisture workshop, 14.05.04. AUE.
231. Esbensen, K.H. (2004): *Introduktion til TOS, Theory of Sampling*. 2-dages kursus, landbrugsrådet (LU), Axelborg, Kbh. May 11-12, 2004.
230. Esbensen, K.H. (2004): *Representativity, Sampling Analysis, Metrology & Chemometrics – the GRAND overview*. Indlæg ved: "Prøvetagning, metrologi, kemometri – den STORE sammenhæng". Dansk Kemometrisk Selskab May 04, 2004. IDA Copenhagen.
229. Esbensen, K.H. (2004): *Empiriske, multivariate dataanalysemodeller i kemi: Kemometri*. Inviteret indlæg 16. RUC-modeldag. Matematisk Institut, RUC (IMFUFA). April 29, 2004.
228. Esbensen, K.H. (2004): *Theory and Practise of sampling in Geology, Geochemistry and in Environmental Sciences*. 2- day course at Vernadsky Institute of Geochemistry and Analytical Chemistry (GEOKHI), Russian Academy of Sciences (RAS), Moscow. April 26-27, 2004.
227. Esbensen, K.H. (2004): *TOS (Theory of sampling) har også en "Down-to-Earth" praktisk side! Anvendelser af TOS med relevans for XRF o.a.* Invited lecture at semi-annual meeting of DWAX (Danish Working group for Analytical XRF). Geological Institute, University of Århus. April 23, 2004.
226. Esbensen, K.H. (2004): *All you ever wanted to know about validation – and then some* Guest lecture at HIT, Porsgrunn, Norway. March 25, 2004.
225. Esbensen, K.H. (2004): *Reliable sampling, reliable chemical analysis and Reliable chemometric data analysis*. Invited opening lecture at 3.rd Winter School of Chemometrics (WSC-3), Pushkinskiye Gory,

Russia. February 14-20, 2004.

224. Esbensen, K.H. (2004):
Taking chemometrics into practise
Synoptic summary of interrelationships between representative sampling, dataanalytical modeling/calibration and validation
When can we trust analytical chemical results?
Introduction to AMT (Angle Measure Technique)
Introduction to MIA (Multivariate Image Analysis)
Guest lectures, Ph.D. School: "Multivariate Methods in Analytical Chemistry"
Lappeenranta University of Technology (LUT), Finland. Jan. 12-16, 2004.
223. Esbensen, K.H. (2003): *Prøvetagning – nå også i Norge*. 2-dages seminar NFS (Norske Sivilingeniørers Forening), Aker Brygge, Oslo. November 6-7, 2004.
222. Esbensen, K.H. (2003): *Introduction to sampling*. 1-day seminar/course. FOSS ELECTRIC hq. Hillerød. September 29, 2004.
221. Esbensen, K.H. (2003): *Multivariat data analyse – klinisk biokemi o.a.* 4-dages kursus. Centralsygehuset Esbjerg-Varde, CEV. September 22-23, Nov. 25 & Dec. 03, 2003.
220. Esbensen, K.H. (2003): *Proper reference sampling– the critical success factor*. Invited short-course at 5.th European Symposium on NIR spectroscopy, Comwell, Kolding, DK. Sept. 15-17, 2004.
219. Esbensen, K.H. (2003): *Multivariabel dataanalyse*. 4-dages kursus, GEUS: Danmarks og Grønlands geologiske Undersøgelser, København. September 9-10 & October 20-21, 2004.
218. Sidelman, J., Gram, J, Jespersen, J. & Esbensen, K.H. (2004): *On the in-vivo ex-vivo threshold – significant IPE in blood sampling*. First World Conference on Sampling and Blending, WCSB1. Aalborg University Esbjerg (AUE). Esbjerg, August 19-22, 2004.
217. Heydorn, K. & Esbensen, K.H. (2004): *Sampling in Metrology - first foray*. First World Conference on Sampling and Blending, WCSB1. Aalborg University Esbjerg (AUE). Esbjerg, August 19-22, 2004.
216. Esbensen, K.H. (2003): *Nature's own sampling: TOS – with a little help from multivariate data analysis*. First World Conference on Sampling and Blending, WCSB1. Aalborg University Esbjerg (AUE). Esbjerg, August 19-22, 2004.
215. Esbensen, K.H. (2003): *Prøvetagning (sampling)*. 3-dages kursus, GEUS: Danmarks og Grønlands geologiske Undersøgelser, København. August 13-14 & September 11, 2004.
214. Esbensen, K.H. (2003): *New approaches for reliable industrial sampling and chemometric data analysis quality*. SSC8: 8th Scandinavian Symposium on Chemometrics, Mariehamn, Åland, Finland, June 14-18 2003.
213. Esbensen, K.H. (2003):
Analytiske prøvers repræsentativitet og pålidelighed
Optimal felt sampling, f.eks. vedr. forureningsundersøgelser
Prøvetagning – den største fejl i resultatet. Inviterede foredrag. 1-day Workshop, DANAK/
EUROLAB, København. May 21, 2003.
212. Esbensen, K.H. (2003): *Anvendt teknisk-kjemometri – belyst ved udvalgte applikasjoner*. Norges Teknisk Naturvitenskapelige Universitet (NTNU), Institutt for Kjemisk Prosessteknologi, Trondheim. May 16, 2003.
211. Esbensen, K.H. (2003): *Sampling of heterogenous systems*. Ph.D. course, "Forskerskolen" Ålborg Universitet, Nat. Fak (også eksternt industri kursus). (4 ECTS). March 27-28 & April 24-25, 2003.
210. Esbensen, K.H. (2003): *Introducing chemometrics and sampling in the process technology arena - industrial biotechnological applications*. Poznan University of Technology (PUT), Poznan, Poland. April 11. 2003.

209. Esbensen, K.H. (2003): *Possibilities for using correct sampling and chemometrics in power plant systems fired by complex mixes of energy sources of biomasses, fossil fuels and/or MSW*. Large and Medium Scale Solid Biofuel, Co-generation and Waste Incineration. IB2-seminar, SDU. 02.04.03.
208. Esbensen, K.H. (2003): *Alt hva du alltid ønsket å vite om **validering***. Guest lecture at Telemark University College, Porsgrunn 24.03.03.
207. Esbensen, K.H. (2003):
Multivariate data Analysis in practice – industrial applications
Relationships between sampling, chemical analysis, chemometrics
Angle Measure Technique (AMT) – a power full transformation
Proper validation: a most important issue in multivariate calibration
 Invited lectures at WSC-2 (2.nd Russian Winter School in Chemometrics), Barnaul/Belokuriga, Altai State, Sibiria. 28.02 – 04.03, 2003.
206. Esbensen, K.H. (2003): *PLS – metode, applikationer & validering*. Guest lecture, Department of Statistics and Demography, University of Southern Denmark (SDU), Feb. 25, 2003, Odense.
205. Esbensen, K.H. (2003): *Introduction to chemometrics*. Poznan University of Technology (PUT), Poland. Feb. 11, 2003.
204. Esbensen, K.H. (2003): *Acoustic Chemometrics: 1-day introduction*. Tembec, Corporate HQ research division, Témiscaming, Ontario, Canada. Feb. 6, 2003.
203. Esbensen, K.H. (2003). *Sampling: 3-day advanced course*. Tembec, Corporate HQ research division, Témiscaming, Ontario, Canada. Feb. 3-5, 2003.
202. Esbensen K.H. (2003): *Introduksjon til kjemometri (2-day course)*, NVE (Norsk Vassdrags og Energidirektorat), Oslo Jan. 23-24, 2003.
201. Esbensen, K.H. (2003): *Sampling aspects of bioprocess scale-up*. IB2 Seminar/Workshop: Scale-up of Bioprocess. Jan. 17, 2003, Esbjerg.
200. Esbensen, K.H. (2002): *Introduction to sampling of complex systems – introduction to the Theory of Sampling (TOS)*. Geological Institute, University of Århus. 9 Dec.
199. Esbensen, K.H. (2002): *Sampling: 2-dages introduktionskursus*. Novozymes AS, Kalundborg. 4-5 Dec. 2002.
198. Esbensen, K.H. (2002): *Sampling-forhold mellem sampling, analytisk kemi og kemometri*. Inviteret dobbeltforelæsning: 4. brugerseminar Dansk NIR Forum: "Sampling eller gambling?". Vingstedcentret. 3-Dec. 2002.
197. Esbensen, K.H. (2002): *AMT: an image "global texture" characterisation tool*. Invited lecture: On-line Imaging for Process Monitoring and Control. McMaster Advanved Control Consortium workshop, Oct. 17, 2002. McMaster University, Hamilton, Canada.
196. Esbensen, K.H. (2002): *Multivariate Image Analysis (MIA) methods*. Invited lecture: On-line Imaging for Process Monitoring and Control. McMaster Advanved Control Consortium workshop, Oct. 16, 2002. McMaster University, Hamilton, Canada.
195. Esbensen, K.H. (2002): *Acoustic chemometrics – Introduction and application examples*. 2-day course: Acoustic Chemometrics, Biotechnological Institute & Ålborg University Esbjerg (ACACSRG), Biotechnological Institute, Kolding 2-3.10.02.
194. Esbensen, K.H. (2002): *Teknisk-Industriell Kemometri*. 3-dages kursus. AUE & Bioteknologisk Institut, Kolding. 27-29.08.02.
 1) *Introduktion til kemometrisk data analyse*
 2) *PCA – Principal Component Analysis*
 3) *PLS – Partial Least Squares regression*
 4) *Validation*.

193. Esbensen, K.H. (2002): *Relationships between sampling, analytical chemistry and chemometrics*. Inviteret foredrag: DANSAK7 (7. Danske Symposium i Analytisk Kemi), Københavns Universitet, 20-21 august 2002.
192. Esbensen, K.H. (2002): *Korrekt sampling – er NIR det endelig svar?* Indlæg på ”Temagruppe NIR”, Bioteknologisk Institut, Kolding. 23 Maj, 2002.
191. Esbensen, K.H. (2002): *Angle Measure Technique (AMT)*. Indlæg på ”Temagruppe NIR”, Bioteknologisk Institut, Kolding. 23 Maj, 2002.
190. Esbensen, K.H. (2002): *Validering – det vigtigste element ved multivariat kalibrering*. Gæsteforelæsning HIT/TF, Porsgrunn. 18.04.02.
189. Esbensen, K.H. (2002): *Center for Industriel Bioteknologi (CIB)* – Indlæg. Børsen Gazellemøde, Syddansk Universitet, Esbjerg. 03.04.02.
188. Esbensen, K.H. (2002): *Drushbametris-1. First Russian winter school on Chemometrics: Modern methods of data analysis*. Kostroma, Feb. 11-14 2002. *Introduction to chemometrics Multivariate Statistical Process Control (MSPC)*.
187. Esbensen, K.H. (2001): *Videregående emner indenfor industriel kemometri: Korrekt sampling, AMT & validering*. Inviteret foredrag, FOSS Hq, Hillerød, Denmark, Dec. 7, 2001.
186. Esbensen, K.H. (2001): *Advanced Chemometrics. 3-day Ph.D. course*. S-SENCE Applied Physics, Dept. Physics and Measurement Technology. Linköpings Universitet, Linköping, Sweden. Nov. 21-23, 2001.
185. Esbensen, K.H. (2001): *Advanced Chemometrics. 3-day Ph.D. course*. St. Petersburg University, Dept. of Chemistry. Russia. October 23-27, 2001.
184. Esbensen, K., Waskaas, M & Matveyev I.H. (2001): *Optimisations in the hydropower industry by EMF-induced headloss friction reduction*. Poster. SSC7 (7.th Scandinavian Symposium on Chemometrics), Copenhagen. Aug. 19-23, 2001.
183. Jørgensen, P, Pedersen, J, Jensen, E & Esbensen, K. (2001): *On-line batch fermentation process monitoring – Prediction of ”biological time”*. SSC7 (7.th Scandinavian Symposium on Chemometrics), Copenhagen. Aug. 19-23, 2001.
182. Ergon, R. & Esbensen, K. (2001): *Static PLSR optimization based on Kalman filtering theory and noise covariance estimation*. SSC7 (7 Scandinavian Symposium on Chemometrics), Copenhagen. Aug. 19-23, 2001.
181. Esbensen, K.H. (2001): *Development of on-line image analytical industrial process monitoring calibrated against structurally correct sampling of heterogeneous materials*. SSC7 (7 Scandinavian Symposium on Chemometrics), Copenhagen. Aug. 19-23, 2001.
180. Esbensen, K.H (2001): *Multivariate Image Analysis/Multivariate Image Regression*. Invited lecture GRC: Gordon Research Conferences, Statistics in Chemistry and Chemical Engineering, Williamstown, MA, July 22-27, 2001.
179. Esbensen, K.H. (2001): *Procesanalytisk kemometri: Produkt- og procesovervågning: udnyttelse af hurtigmetoder i industriprocesser*. Dansk NIR Forum. Scanticon Comwell, Kolding. 9-10 maj 2001
178. Esbensen, K.H. (2001): *Image analytical AMT (Angle Measuring Technique) in Food Science & Technology*. Swedish Powder network meeting at Höganäs AB April 25, 2001.
177. Esbensen, K.H. (2001): *Acoustic chemometrics in Powder Science & Technology*. Swedish Powder network meeting at Höganäs AB April 25, 2001.
176. Esbensen, K.H. (2001): *Validering - en fenomenologisk introduksjon*. 13. Norske Kjemometrisymposium, Highland Hotel, Geilo 19-21 mars 2001.

175. Esbensen, K.H. (2001): *Tak til kjemometri Norge for 18 år - En svanesang*. 13. Norske Kjemometrisymposium, Highland Hotel, Geilo 19-21 mars 2001.
174. Esbensen, K.H. & Hagen, S.T. (2001): *Introduksjon til forsøksdesign og data analyse*. 2-day course: Norske Skog, Union, Skien, Jan. 25-26, 2001.
173. Esbensen, K.H. (2000): *Multivariat billedanalyse: MIA - nye resultater: MIR*. Gæsteforelæsning Ålborg universitet, Esbjerg, dec. 04, 2000
172. Esbensen, K.H. (2000): *Grafisk dataanalyse - et felt med store faldgruber!* Gæsteforelæsning Ålborg Universitet, Esbjerg, Nov. 30, 2000.
171. Esbensen, K.H. (2000): *Hvad er grunden til kemometriens store succes?* Keynote: "Den Store kemometridag", IDA, Copenhagen, Nov. 7, 2000.
170. Esbensen, K.H.: *Pierre Gy's "Theory of Sampling" – introduktion til verdens mest oversete polytekniske uddannelseselement*. Gæsteforelæsning Ålborg Universitet, Esbjerg, Oct. 05, 2000.
169. Esbensen, K.H. (2000): *To akustisk kemometriske industrielle applikationer: 1) Indvendig inspektion af olie/gas rørledninger; 2) Overvågning af farmaceutiske blandingsprocesser*. Gæsteforelæsning: Ålborg Universitet, Esbjerg, Oct 04, 2000.
168. Esbensen, K.H. (2000): *Multivariate billeder versus billeder af multivariate relationer*. IDA: "Datavisualisering med multivariate briller", Copenhagen., Sept. 11, 2000.
167. Esbensen, K.H. (2000): *Introduktion til datavisualisering - Hvad er god/dårlig grafisk kommunikation?* IDA: "Datavisualisering med multivariate briller", Copenhagen, Sept. 11, 2000.
166. Esbensen, K.H. (2000): *Acoustic chemometrics*. "Other analytical techniques for on-line measurements". Short course: 4th European Symposium on (NIR) Spectroscopy, Biotechnol. Institute, Kolding, Denmark, May 10-12, 2000.
165. Esbensen, K.H. (2000): *Applications of AMT (Angle Measure Technique) in image analysis*. Technical University of Denmark (DTU), Inst. of Biotechnology, Lyngby, June 13, 2000.
164. Esbensen, K.H.: *"Kemometri a la carte - akustisk kemometri, AMT m.m.m."* Keynote: Foss Electric (Kemometricentret), Hillerød, May, 9, 2000.
163. Esbensen, K. H. (2000): *Principles of proper validation (PPV)*. Center for Integreret Multivariat Analyse (CIMA), Levnedsmiddelcentret, KVL, Copenhagen, March 29.
162. Esbensen, K.H. (2000): *PLS-DISCRIM som klassifikationsværktøj*. IDA: "Identifikations-prøvning. Kemometriske metoder til kontrol af råvarer og produkter". Copenhagen, March 21, 2000.
161. Esbensen, K.H. (2000): *Principles of proper validation (PPV) - in spectroscopy as well as ANYWHERE*. 4th NIR NORD midwinter meeting: "NIR and Calibration in academic and industrial use". University of Umeå, (Hällnäs), Sweden, Feb. 15-16, 2000.
160. Esbensen, K.H. (2000): *Hvad lærebøgerne ikke fortæller om forsøgs-planlægning*. IDA, Cph. "Forsøgsplanlægning - the chemometric way", Feb. 03, 2000.
159. Esbensen, K.H. (1999): *Kjemometri og pulverteknologi*. POSTEC (Powder Science and Technology), Tel-Tek, Årsmøte, Hotel VIC, Porsgrunn, Nov. 01, 1999.
158. Esbensen, K.H. (1999): *Acoustic chemometric monitoring of particle/gass processes*. Norsk Hydro Agri Research Centre Sluiskil: "Fluid Bed Research Seminar", Sluiskil, The Netherlands, Oct. 27-28, 1999.
157. Esbensen, K.H. & Lied, T.T: *PLS as multiple-alternative pre-processing selector. Examples from industrial/technological image analysis*. "Les Methodes PLS – Symposium International PLS'99", CISIA–CERESTA, Jouy-en-Josas (France), Oct. 5-6, 1999.

156. Esbensen, K.H. (1999): *Introducing "Camera-X", a new multispectral, 1-D scanning camera for virtual imaging – with compositional, textural and process monitoring applications*. SSC6 (6th Scandinavian Symposium on Chemometrics), Porsgrunn, Aug. 15-19, 1999.
155. Esbensen, K.H., Torgimsen, T. & Hansteen I.-L. (1999): *Kjemometri som statistisk verktøy i arbeidsmedisin. Ny analyse av gamle data*. Arbeidsmedisinsk Årsmøte, Høyers Hotel, Skien. May 10-11, 1999.
154. Esbensen, K.H. (1999): *PLS – the great evaluator of advanced problem-specific pre-processing alternatives in multivariate calibration*. 11. Norske Kjemometriker-symposium (10-års jubileum), Highland Hotel, Geilo, march 22-24, 1999.
153. Esbensen, K.H. (1999): *Kjemometri ved HIT-TF 1995-2000, og videre...* 11. Norske Kjemometrikersymposium (10-års jubileum), Highland Hotel, Geilo, March 22-24, 1999.
152. Esbensen, K.H. (1999): *Advanced methods for problem-specific pre-processing in multivariate calibration*. 12th UUC, Refnes Gods, Jeløya, Norway March 8-10, 1999.
151. Esbensen, K.H.: *Akustisk procesanalyse – At-line målinger*. Danmarks Mejeritekniske Selskab: "Nye procesmålingsmetoder ved fremstilling af mejeriprodukter" Brædstrup, Feb. 23, 1999.
150. Esbensen, K.H.: *Fra støy til informasjon: Akustisk kjemometri for prosessovervåking og produktkarakterisering*. "Kursdagene 1999", NTNU/NT, Trondheim, Jan. 7-8, 1999.
149. Esbensen, K.H.: *Nyere metoder inden og uden for kemometrien. Hvad sker der i fremtiden?* "Den Store Kemometridag" IDA, Kemometri. Ingeniørhuset, København. 26 november 1998.
148. Esbensen, K.H.: *Kemometri inden for teknologi og ingeniørvidenskab*. Keynote: "Den Store Kemometridag" IDA, Kemometri, Ingeniørhuset, København. 26 Nov. 1998.
147. Esbensen, K.H.: *Akustisk prosessanalytisk kjemometri*. Norsk Kjemisk Selskap, Faggruppe for Analytisk Kjem: Prosessanalytisk seminar, Nycomed Imaging A/S, Oslo, Oct. 29, 1998.
146. Esbensen, K.H.: *Acoustic chemometrics in proces monitoring*. 25th annual Conference of the Federation of Analytical Chemistry and Spectroscopy Societies (FACSS) 1998, Austin, TX, Oct. 11-15. 1998
145. Esbensen, K.H., Lied, T.T., Halstensen, M. & Huang, J. (1998): *Recent developments in acoustic chemometrics for process monitoring*. 2nd International Chemometrics Research Meeting (2ICRM), Veldhoven, the Netherlands, May 22-24, 1998.
144. Esbensen, K.H. (1998): *On-line kjemometrisk prosessanalyse: akustisk - og bildeanalytisk kjemometri*. Joint Biotechnological Institute(DK)/MATFORSK FoU-seminar, MATFORSK, Ås, April 29, 1998.
143. Esbensen, K.H. (1998): *Dobbelt teknologisk spektroskopi: bildeanalyse av "underlapped imagery"* 10. Norske Kjemometrikersymposium, NKS, Geilo, March 25-27, 1998.
142. Esbensen, K.H. (1997): *Akustisk karakterisering av prosesser og materialer*. Guest lecture: "C-kurs - processkemometri", Kemiska Institutionen, University of Umeå, Dec. 12, 1997.
141. Esbensen, K.H. (1997): *Prosesskjemometri - eksempler på anvendt kjemometri*. Guest lecture: "C-kurs - processkemometri", Kemiska Institutionen, University of Umeå, Dec. 12, 1997
140. Esbensen, K.H. & Hagen, S.T. (1997): *Introduksjon til forsøksdesign og data analyse*. 2-day course: Bang & Olufsen Research, Struer, Denmark, Oct. 22-23, 1997.
139. Esbensen, K.H. (1977): *Acoustic chemometrics in process monitoring*. Keynote lecture: 5.th Scandinavian Symposium on Chemometrics (SSC5), Lahti, Finland, Aug. 17-21, 1997.
138. Esbensen, K.H.: *Introduction to Multivariate Image Analysis (MIA)*. IDA, Meeting on Image Analysis, Copenhagen, June, 10, 1997.

137. Esbensen, K.H. (1997): *Recent developments in acoustic chemometrics for process monitoring*. Pharmacia & Upjohn, R&D Seminar, Uppsala, March 27, 1997.
136. Esbensen, K.H. & Narindar Singh (1997): *Praktiske eksperimentelle designstrategier i forbindelse med multivariat kalibrering av et fem-komponent-system*. Årsmøte. Faggruppe for Kjemometri, NKS, Voss, April 7-9, 1997.
135. Esbensen, K.H. (1997): *Validering - bort med al forvirringen*. Årsmøte. Faggruppe for Kjemometri, NKS, Voss, April 7-9, 1997.
134. Esbensen, K.H. (1997): *Acoustic chemometric process monitoring - an introduction*. Graduate School in Chemical Engineering (GSCE), Lappeenranta, Finland 7-8, March, 1997
133. Esbensen, K.H. (1997): *Multivariate Image Analysis - an introduction*. Graduate School in Chemical Engineering (GSCE), Lappeenranta, Finland 7-8, March, 1997.
132. Esbensen, K.H. (1997): *AMT - A method for characterising the complexity of measurement series*. Graduate School in Chemical Engineering (GSCE), Lappeenranta, Finland 7-8, March, 1997.
131. Esbensen, K.H. (1997): *Kjemometrisk Forskningsgruppe (KF) ved Høgskolen i Telemark, Avdeling for Teknologiske Fag (HIT/TF): Oversikt over aktuelle FoU-aktiviteter*. Symposium i Anvendt Kemometri, DTU, København, Jan. 28-29, 1997.
130. Esbensen, K.H. (1997): *Multivariat dataanalyse*. 2-day course (6 lectures): Institutt for Energiteknikk (IFE), Kjeller, Jan. 20-21, 1997.
129. Esbensen, K.H. (1996): *20 år med kemometri - hvad sker der i fremtiden?* "Den Store Kemometridag 1996". Dansk Forening for Kemometri, Nov. 26, 1996.
128. Esbensen, K.H. (1996): *Akustisk kemometri & AMT - nyere FoU resultater*. "Den Store Kemometridag 1996". Dansk Forening for Kemometri, Nov. 26, 1996.
127. Esbensen, K.H. (1996): *Alt hvad man behøver at vide: RIGTIG VALIDERING!* Guest lecture: Kemometrigruppen, KVL, Sept. 27, 1996.
126. Esbensen, K.H. (1996): *Introduksjon til multivariat dataanalyse*. 2-day course (4 lectures): SINTEF, Material Science, Trondheim, Aug, 20-21, 1996.
125. Esbensen, K.H. (1996): *FoU-resultater for Kjemometrisk Forskningsgruppe, HIT/TF*. Årsmøte. Faggruppe for Kjemometri, NKS, Geilo, April 17-19, 1996.
124. Esbensen, K.H. (1996): *Prosessanalytisk kjemometri (PAC)*. Guest lecture: Kemiska Institutionen, Universitetet i Umeå, March 28-29, 1996.
123. Esbensen, K.H. (1996): *AMT - en ny kraftfull preprosesseringssteknikk*. Guest lecture: Kemiska Institutionen, Universitetet i Umeå, March 28-29, 1996.
122. Esbensen, K.H. (1996): *Introduksjon til multivariat kalibrering, FEW*. 2-day course (6 lectures): RESLAB/SAGA Petroleum, Stavanger March 18-19, 1996.
121. Esbensen, K.H. (1995): *Industriell anvendt NIR-spektroskopi: Aluminiums-elektrolyse ved Karmøy Fabrikker*. Umeå Universitet (Kemisk Institut) Dec. 13, 1995.
120. Esbensen, K.H. (1995): *AMT - ny kraftfull metodikk for kompleksitetsanalyse innen kjemometrisk kalibrering*. Umeå Universitet (Kemisk Institut) Dec. 13, 1995.
119. Esbensen, K.H. (1995): *Avanserte teknikker og preprosessering av data i on-line måleteknikk v. bruk av bildeanalyse*. On-line Seminar: MATFORSK, Ås, Dec. 6, 1995.
118. Esbensen, K.H. (1995): *Problem(re-)formulation - the **most** important element in multivariate calibration?* UUC Meeting, Refnes Gods, Moss, Nov. 29-30, 1995.

117. Esbensen, K.H. (1995): *Multivariate data analytical methods for characterising variability (PCA, PLS, AMT)*. Nordic Symposium on variability in polluted soils and groundwater ("GUESS-I"), Ås, June 19, 1995.
116. Esbensen, K.H. (1995): *The AMT revolution in chemometrics - I: Inaugural conceptualisation and first forays*. SSC4 (4.th Scandinavian Symposium on Chemo-metrics), Lund, June 12-16, 1995.
115. Esbensen, K.H. (1995): *20 år med kjemometri - hva skjer i fremtiden?* Årsmøte Kjemometrisk Faggruppe, Norsk Kjemisk Selskap, Gol, April 3-4, 1995.
114. Esbensen, K.H. (1995): *Interpretation of active and passive observations using multivariate analysis*. UUC95, Grobbendonk, Belgium, Feb. 9-10, 1995.
113. Esbensen, K.H. (1995): *AMT - a new preprocessing approach within acoustic chemometrics and image analysis*. ASTRA R&D, Göteborg, Sweden, Feb. 2, 1995.
112. Esbensen, K.H. (1994): *AMT-revolusjon innen dataanalysen*. Guest lecture: Institute of Chemistry, University of Umeå, Sweden, Nov. 2, 1994.
111. Esbensen, K.H. (1994): *20 år med kemometri - både inden og uden for kemi. Hvad sker i fremtiden?* "Den Store Kemometridag 1994". K-gruppen, IDA, Dansk Forening for kemometri, Copenhagen, Oct. 25, 1994.
110. Esbensen, K.H. (1994): *Process chemometrics - theory and applications*. UUC1994, Refnes Gods, Jeløy, Norway, Oct. 17-19, 1994.
109. Esbensen, K.H. (1994): *Advanced multivariate data analysis*. COMETT: Advanced Multivariate Data Analysis, Düsseldorf, BRD, Oct. 13-14, 1994.
108. Esbensen, K.H. (1994): *Applications of Parallel Coordinates to a Norwegian pyrometallurgical electrolytic Mn-refinement process*. "STUMLAD" (Tri-annual meeting of International Chemometricians), Reykjavik, Iceland, Aug. 15-19, 1994.
107. Esbensen, K.H. (1994): *Multivariate Image Analysis (MIA) and Multivariate Image Regression (MIR)*. MATFORSK, Ås, Feb. 28, 1994.
106. Esbensen, K.H. (1994) & Inselberg, A. (1994): *Visualizing multi-dimensional geometry and applications to multivariate problems*. Course: SIGGRAPH94 (21.st International Conference on Computer Graphics and Interactive Techniques). Orlando, Florida, July 24-29, 1994.
105. Esbensen, K.H. (1994): *Kjemometri og forsøksdesign*. Norsk Legemiddel-industriforenings industrikollokvium, NYCOMED, Oslo, June 23, 1994.
104. Esbensen, K.H. (1994): *Parallelle koordinater - et nytt dataanalytisk konsept*. Norsk kjemometrisk Faggruppe, Årsmøte, Geilo, March 23-25, 1994.
103. Esbensen, K.H. (1993): *Multivariabel dataanalyse og kjemometri - sentrale verktøy for miljø-, produkt- og prosessbeskrivelse*. Guest lecture: Telemark Engineering University (TMIH), June 8, 1993.
102. Esbensen, K.H. (1993): *Akustisk kjemometri - applikasjoner med potential innen farmasøytisk industri*. Invited lecture: ASTRA, R&D, Södertälje, Nov. 17, 1993.
101. Esbensen, K.H. (1993): *Akustisk Kjemometri*. "Kjemometriseminar for industrien", SINTEF, Trondheim, March 25, 1993.
100. Esbensen, K.H. (1993): *Parallel Coordinates - A new complementary data analysis methodology for process monitoring and control*. Norsk Forening for Automatisering (NFA), Temamøte: "Kjemometri - nye muligheter innen måleteknikk og prosessregulering", Soria Moria, Oslo, April 20-21, 1993.
99. Esbensen, K.H. (1993): *Les application industrielles de la teledetection*. Guest lecture: Université Laval, Quebec, Canada, Dec. 10, 1993.

98. Esbensen, K.H. (1993): *Interpretation of active and passive observations in multivariate data analysis*. Keynote: 6.th UUC, Langesund, Nov. 2-4, 1993.
97. Esbensen, K.H., Westad, F., Vigerust, B. & Hope, B. (1993): *Forays into acoustic chemometrics: First results of non-invasive on-line acoustic calibration*. 3.rd Scaninavian Symposium on Chemometrics (SSC3), Jutland Technological Institute, Århus, June 13-17, 1993.
96. Esbensen, K.H., Edwards, G. & Eldridge, G. (1993): *Multivariate image analysis in forestry involving high resolution airborne imagery*. 8th. Scandinavian Conference in Image Analysis, May 25-28, Tromsø.
95. Esbensen, K.H. (1993): *Multivariat bildeanalyse - praktiske applikasjoner*. Guest lecture: Norsk Hydro, Research Center, Bergen, May 25, 1993.
94. Esbensen, K.H., Kristiansen, J.I. & Scheie, Aa. (1993): *Permeability prediction and optimisation of core plug sampling*. 15.th European Formation Evaluation Symposium: "Integrated field studies and reservoir monitoring". SPWLA, May 5-7, 1993. Stavanger, May 5-7, 1993.
93. Esbensen, K.H. (1993): *Multivariate data analysis of drug misuse classifications*. 11.th Cologne Workshop in Drug Analysis, Köln, BRD, March 7-12, 1993.
92. Esbensen, K.H. & Kvaal, K. (1993): *NIR/VIS video multivariate image analysis and texture characterisation - new tools for industrial applications*. 2nd. NIR European Symposium on NIR Spectroscopy - aspects on industrial use. BI, Kolding, Aug. 21-22, 1993.
91. Esbensen, K.H. & Geladi, P. (1993): *Soft three-way data analysis and image analysis*. TRIC: First International Symposium on three-way data analysis. Espe, the Neherlands, Aug. 23-25, 1993.
90. Esbensen, K.H. & Norli, H.. (1992): *Kan kjemometrien avsløre dopingmisbrukere?* Temadag: "Kjemometri - nye muligheter innenfor analyse". SI, Oslo, Oct. 29, 1992.
89. Esbensen, K.H. (1992): *Spatial analysis and intercorrelation of disjoint sets of remote sensing imagery (VIS, IR, SAR) using MIA/MIR*. Invited lecture: Canada Center of Remote Sensing (CCRS), Ottawa, Oct. 22, 1992.
88. Esbensen, K.H. (1992): *Multivariate Image Analysis (MLA) and Multivariate Image Regression (MIR) - Data analysis for an integrated remote sensing environmental monitoring system for the Baltic - and Scandinavian regions*. Guest lecture: St. Petersburg State Electrical Engineering University, St. Petersburg, June 5-7, 1992.
87. Esbensen, K.H. (1992): *Outliers - and validation of multivariate calibration models*. CAMO UUC, Kolbotn, Nov. 2-4, 1992.
86. Esbensen, K.H. (1992): *MIA/MIR: Recent developments*. Guest lecture: ERDAS, Inc. Atlanta, April 7, 1992.
85. Esbensen, K.H. (1992): *Multivariate Image Analysis (MLA) and Multivariate Image Regression (MIR) - Introduction*. Guest lecture: St. Petersburg State Electrical Engineering University, St. Petersburg, Jan. 23-24, 1992.
84. Esbensen, K.H. (1992): *Anvendt multivariabel data analyse: Applikasjonseksempler fra kjemisk prosessindustri*. Guest lecture: University of Umeå, Sweden, Feb.19, 1992.
83. Esbensen, K.H. (1992): *Anvendelse av multivariat kalibrering*. Workshop: "Praktisk bruk av multivariabel data analyse", SI, Oslo, April 28-29, 1992.
82. Esbensen, K.H. (1992): *"Regression des images multivariables"*. Guest lecture: Université Laval, Quebec, Canada, Oct. 13, 1992.
81. Esbensen, K.H. (1992): *"Analyses et regression des images multivariables"*. Guest lecture: Université Laval, Quebec, Canada, Oct. 7, 1992.

80. Esbensen, K.H. (1991): *Kjemisk billedanalyse*. Temadag: "Kjemometri i Prosess-industrien", SI, Oslo, Nov. 11, 1991.
79. Esbensen, K.H. (1991): *Bildeanalyse med PLS-strategi for multivariat bilderegresjon*. CAMO UUC, Kolbotn, Oct. 04, 1991.
78. Esbensen, K.H. (1991): *Multivariate Image regression (MIR) - principal component regression for modeling and prediction*. 2nd Scandinavian Symposium on Chemo-metrics (SSC2), Bergen, May 28-31, 1991.
77. Esbensen, K.H. (1990): *Multivariabel Data Analyse*. 2-dagers spesial kurs. Fiskeriteknisk Forskningsinstitutt (FTFI), Tromsø, January 19-20, 1990.
76. Esbensen, K.H. (1990): *Strategi for kemometri innen geokjemi m.v.* Guest lecture: Institute of Chemistry, University of Bergen, Feb. 2, 1990.
75. Esbensen, K.H. (1990): *Multivariat bilde analyse (MIA)*. Guest lecture: Institute of Informatics, University of Oslo, Feb. 22, 1990.
74. Esbensen, K.H. (1990): *Geokemiska applikationer av kemometri*. Gjesteforelesning University of Umeå, March 6, 1990.
73. Esbensen, K.H. (1990): *Kemometri i metallurgisk processkontroll*. Gjesteforelesning University of Umeå, March 7, 1990.
72. Esbensen, K.H. (1990): "GRAFIKK - presentasjon, data analyse, kommunikasjon". 3-dagers spesialseminar (10 lectures). SAGA Petroleum, Oslo, March 14-16, 1990.
71. Esbensen, K.H. (1990): *Praktisk bruk av multivariate estimerings- og data analytiske metoder*. NIF-kurs: "Avanserte målesystemer for industrien", March 26-27, 1990.
70. Esbensen, K.H. (1990): *Måleteknikk for Aluminium elektrolyse. Statusrapport for NTNf-programmet: IT i prosessindustrien (IPI)*. NTNf, Oslo, May 23, 1990.
69. Esbensen, K.H. (1990): *MIA - Multivariate Image Analysis*. Presentation: "Computer General", Oslo, Aug. 16, 1990.
68. Esbensen, K.H.: *MIA - Multivariate Image Analysis*. Lecture: "GIS and remote sensing for natural resource management. Norsk Regnesentral (NR), Sept. 24, 1990.
67. Esbensen, K.H. (1990): *Introduksjon til multivariabel data analysefilosofi og programpakker - med geologiske applikasjoner*. Seminar/kurs NGU, Dec. 28, 1990.
66. Esbensen, K.H. & Geladi, P. (1989): *"Multivariate Image Analysis (MIA) - Præsentation af koncept og software demonstration"*. Symposium i Anvendt Statistikk, ÅU, Århus, Jan. 23-25, 1989.
65. Esbensen, K.H. (1989): *Multivariate problemstillinger krever multivariat data-analyse*. Seminar: Fiskeriteknisk Forskningsinstitutt (FTFI), Tromsø, Feb. 14, 1989.
64. Esbensen, K.H. (1989): *Kjemometri i billedanalyse*. Konstituerende møte: "Kjemo-metrisk Faggruppe. Norsk Kjemisk Selskap", Øystese, Hardanger, May 23-24, 1989.
63. Esbensen, K.H. (1989): *Strategy of Multivariate Image Analysis (MIA)*. Foredrag "NOBIM Års-konferanse 1989", Skjetten, Oslo, May-29-30, 1989.
62. Esbensen, K.H. (1989): *Prosessindustrielle satsningsområder ved Norsk Regnesentral*. Foredrag: "Informasjonsteknologi for Prosessindustrien. Sandvika, Oslo, Sept. 18-20, 1989.
61. Esbensen, K.H. & Martens, H. (1989): *Forsøk på innføring av prosesskjemometrisk IT i norsk prosessindustri i 1986-1988. Erfaringer fra NTNf-prosjektet: "Multivariat Kalibrering"*. Foredrag: "Informasjonsteknologi for Prosessindustrien. Sandvika, Oslo, Sept. 18-20, 1989.

60. Esbensen, K.H. & Geladi, P.(1989): *Multivariate Image Analysis, or "How to analyze an image you have never seen?"* ERDAS UGM, Atlanta, Oct. 9-13, 1989.
59. Esbensen, K.H., Geladi, P., Martens, H. & Martens, M. (1988): *Multivariate Interlaboratory Calibration*. Symp. Anvendt Statistik, Kbh., Jan. 25-27, 1988.
58. Esbensen, K.H. (1988): *Spatial interpolation of multivariate data - bilinear modeling before kriging*. Guest lecture: Environmental Protection Agency (EPA), Corvallis, Oregon, May 9, 1988.
57. Esbensen, K.H. (1988): *Chemometrics in Geochemistry*. V.M. Goldschmidt Memorial Conference, Washington D.C., May 11-13, 1988 (includes. poster session)
56. Esbensen, K.H. (1988): *Muligheter/begrensinger i multivariabel kalibrering*. Lecture at NIF/NFA course: "Effective Data Analysis - for better process control and quality assessment", Oslo May 31-June 2, 1988.
55. Esbensen, K.H. (1988): *PCA/PLS - geometrisk introduksjon*. Lecture at NIF/NFA course: "Effective Data Analysis - for better process control and quality assessment", Oslo May 31-June 2, 1988.
54. Esbensen, K.H. (1988): *Informasjoninnholdet i data*. Lecture at NIF/NFA course: "Effective Data Analysis - for better process control and quality assessment", Oslo May 31-June 2, 1988.
53. Esbensen, K.H. (1988): *Multivariabel data analyse*. Lecture at NIF/NFA course: "Effective Data Analysis - for better process control and quality assessment", *ibid*.
52. Esbensen, K.H. & Geladi, P. (1988): *Multivariate image analysis in chemistry*. EUCHEM Conference on chemometrics in organic and bio-organic chemistry. Trieste, June 19-26, 1988.
51. Esbensen, K.H. (1988): *Multivariate prediction (PLS-regression) in resource exploration*. IAMG-COGEODATA Symposium: "Computer applications in resource exploration". Espoo (Helsinki), July 21-23, 1988.
50. Esbensen, K.H. (1988): *Eksplorativ data analyse med UNSCRAMBLER (outliers, modelplott etc.) - viktigheten av problemorienteret tolkning*. UUC (Unscrambler User Club), Seminar, Trondheim, Sept. 29-30, 1988.
49. Esbensen, K.H. (1988): *Strategy of Multivariate Image Analysis (MIA): 2-D and higher-order image decompositions*. First Scandinavian Symposium on Chemometrics (SSC1), Lappeenranta, Finland, Oct. 6-8, 1988.
48. Esbensen, K.H. (1988): *Multivariat dataanalyse og - kalibrering*. Guest lecture at TMIH: Telemark Engineering University (in Norwegian), Nov. 1988.
47. Esbensen, K.H. (1988): *Analyse av måledata for prosesskontroll og produktkontroll*. Lectures at NIF/NFA course: Use of personal computers for measurement data capture and - analysis (Norwegian), NTH, Trondheim, Dec. 6-7, 1987.
46. Esbensen, K.H. (1988): *Metoder og krav til målingene*. Lectures at NIF/NFA course: Use of personal computers for measurement data capture and - analysis (Norwegian), NTH, Trondheim, Dec. 6-7, 1987.
45. Esbensen, K.H. (1988): *Hva er analyse av måledata?* Lectures at NIF/NFA course: Use of personal computers for measurement data capture and - analysis (Norwegian), NTH, Trondheim, Dec. 6-7, 1987.
44. Esbensen, K.H., Wold, S. & Geladi, P. (1987): *Relationships between higher-order data array configurations and problem formulations in data analysis*. Symposium on Applied Statistics, University of Århus, Jan. 26-28, 1987.
43. Esbensen, K.H. (1987): *Romlig anomaliseparasjon i geokjemi*. Oljedirektorates Informasjonsmøte, Stavanger, Feb. 9-10, 1987.
42. Esbensen, K.H. & Steenfelt, A. (1987): *Geochemical prospecting in complex sample media - multivariate data analysis of indirect observations*. 12.th International Geochemical Exploration Symposium - 4.th

Symposium on Geochemical Prospecting. Orleans, April 22-26, 1987.

41. Esbensen, K.H. (1987): *Edle mineraler søkes*. Norske Sivilingeniørers Forening, Kurs: "Bruk av PC for å bedre måledata og prosessinformasjon", NIF, Studiesentret, Oslo, May 5-7, 1987.
40. Esbensen, K.H. (1987): *Outlier-problemer og klassifikasjon*. Norske Sivilingeniørers Forening, Kurs: "Bruk av PC for å bedre måledata og prosessinformasjon", NIF, Studiesentret, Oslo, May 5-7, 1987.
39. Esbensen, K.H. (1987): *Flervariabel data analyse*. Norske Sivilingeniørers Forening, Kurs: "Bruk av PC for å bedre måledata og prosessinformasjon", NIF, Studiesentret, Oslo, May 5-7, 1987.
38. Esbensen, K.H. (1987): *PLS-regressionens videnskapsteoretiske og praktiske problemstillinger - et data analytisk synspunkt*. Seminar: "Data Approximation by PLS Methods", Norwegian Computing Center (NR), May 19, 1987.
37. Esbensen, K.H., Martens, H., Geladi, P. & Martens, M. (1987): *Multivariate interlaboratory calibration and rapid quality control*. EURO FOOD CHEM. IV: Rapid analysis in food processing and food control. Loen, Norway, June 1-4, 1987.
36. Esbensen, K.H. (1987): *Analysis of multi-way tables*. Seminar: ASTMULD (Analysis of Scientific and Technological MULTivariate Data), Hältnäs, Sweden, June 8-12, 1987
35. Esbensen, K.H. (1987): *Multivariate data modelling in geochemistry: Interface with geostatistics*. Guest lecture: Dipartimento de Chimica, laboratorio de Chimica Organica, Universita di Perugia, Oct. 16, 1987.
34. Esbensen, K.H. (1987): *Multivariate data modelling in geochemistry: Interface with geostatistics*. Guest lecture: ENIRICHERCHE, Milano, Oct. 14, 1987.
33. Esbensen, K.H. (1987): *Chemometrics in Geochemistry*. Plenary lecture: Colloquium Chemiometricum Mediterraneum. Barcelona, Nov. 9-11, 1987.
32. Esbensen, K.H., Geladi, P. & Wold, S. (1986): *Relationships between data array configuration, problem formulation and conceptual models in data analysis*. III CAC Meeting of the Chemometrics Society. Lerichi, Italy, May 25-30, 1986.
31. Esbensen, K.H., Geladi, P. & Wold, S. (1986): *Bilinear analysis of multivariate image data (BAMID)*. Nordic Symposium on Applied Statistics, Cph. Jan. 27-29, 1986.
30. Esbensen, K.H. (1986): *Bilinear Modelling (BLM)*. Seminar: "Bilinear Modelling", Norwegian Computing Center (NR), Oslo, Feb. 10 & 14, 1986.
29. Esbensen, K.H. (1986): *Multivariate data analysis in geochemical prospecting*. Multi-variate Statistical Workshop for Geochemists and Geologists. Ulvik, June 2-5, 1986.
28. Esbensen, K.H. & Martens, H. (1986): *Petrophysical parameter prediction from well-logs by PLS*. Multivariate Statistical Workshop for Geochemists and Geologists. Ulvik, June 2-5, 1986.
27. Esbensen, K.H. (1986): *Applications of chemometrics at the Norwegian Computing Center*. Guest lecture: "First Meeting of the Finnish Chemometricians". Lappeenranta, Oct. 25, 1986.
26. Esbensen, K.H. (1986): *Geokjemi, Miljøkjemi og Kjemometri*. University of Umeå: Temadager: Tillämpningar av Kemometri inom Kemisk Analys, Nov. 25-26, 1986.
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