THE COUNCIL FOR NEAR-INFRARED SPECTROSCOPY

NEWSLETTER *issue #4* ***February, 1988***

AT THE PITTSBURGH CONFERENCE

ASTM E13.03.03 NIR TASK GROUP MEETING: Mon., Feb 22, 1988, 5:30-8:00 pm, Oakley Room, Sheraton Hotel, All are invited to attend.

COUNCIL FOR NEAR INFRARED SPECTROSCOPY-OPEN MEETING: Tues., Feb 23, 5:30-7:30 pm, Rosedown Room, New Orleans Hilton Hotel, All are invited to attend.

Report from the INTERNATIONAL COMMITTEE for NEAR INFRARED SPECTROSCOPY (ICNIRS)

Spurred on by the success of the Spectroscopy Across the Spectrum conference in Norwich, UK last July, the International Committee has planned several activities for 1988 and 1989. ICNIRS has designated the "4th International Diffuse Reflectance Conference" to be held in the US in Chambersburg, PA, August 12-18 as the major meeting that it will support for 1988 and has provided $500 for the purpose of expanding publicity. The 1988 Committee meeting will be held during this conference.

Dr. Mutsuo Iwamoto has confirmed that the Japanese Society of Food Science and Technology (JSFST) will support the 2nd ICNIRS Near Infrared Spectroscopy Conference to be held for 5 days, from May 29 through June 2, 1989 at a conference center just outside of Tokyo. A conference committee is being set up under JSFST and the first circular is being prepared. Transportation arrangements are being investigated with the hope of making reduced cost airfares available.

Dr. Vadim Krischenko, co-chairman of ICNIRS, has arranged a NIR Symposium for Quality Control During Production sponsored by the USSR Institute of Agricultural Research (VASChNIL), to be held in Moscow April 13-15, 1988. An international delegation of scientists affiliated with ICNIRS has been invited to participate in the conference to be held at a newly built facility dedicated to the use of near-infrared in the USSR.

Dr. Christian Paul reports that the next German NIRS users meeting is planned for late September or early October 1988 at Braunschwieg, Federal Republic of Germany. Based on the success of the previous meeting, up to 250 people are expected from all NIRS users' fields. This promises to be an excellent opportunity for European users who may be unable to attend the Chambersburg meeting to get together.

Edward Stark Chairman/ICNIRS

Report from ASTM TASK FORCE ON NIR

The ASTM task force on near-infrared was formed as a sub-group, E13.03.03 on near-infrared spectroscopy to focus on the development of standards and definitions unique to this area of spectroscopy. Over the past two years, the committee has served to define the terms and the mathematics inherent to NIR analysis. It has reviewed and supported JCAMP data transfer format. Current goals include the development of a series of recommended instrument tests and NIR standards. For more information contact:

Ed Stark, KES Analysis (chairman)
tel. no. (212) 595-7046 or
Janet Casciero, Hunter Labs (secretary) tel. no. (703)471-6870

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NEW PRODUCTS

All the major manufacturers of NIR equipment were contacted in an attempt to learn of the new products we could look forward to seeing at this years' Pittsburgh Conference. These were the responses we received.

Dickey-John has rewritten their software to be run on an IBM PC, XT or compatible computer. Software features include:

1. Automatic, interactive and manual regression methods.
2. All possible, stepwise, forward and backward regression order.
3. Filter select levels (F to enter, F to delete).
4. Residual plotting - Automatic & manual scaling
5. Predicted vs. Actual plotting - Automatic and manual scale setting.
6. Automatic outlier identification.
7. Real-time predictions.
8. Prediction statistics include: R, R^2, S.E.P., Skew, Bias, F ratio, coefficient of variation, range, n
9. Correlation matrix screen
10. Regression statistics include: n, SEC, R^2, SUMK, RSSK, F ratio, Mean Range, S.D. of range
11. Calibration and data storage.
    Options include:
    a. Lotus 123
    b. QC charting

Bran+Luebbe's new software utilizes the PS/2 series of IBM computers. All the standard possible combinations, and step-up searches have been included plus a new repack error program. A bias and skew program for transferring calibrations between instruments has been added. Available programs:

RECON: written by D. Honigs, enables the analyst to reconstruct the "spectrum" of the wavelengths which are changing during a calibration. The spectrum can be of a component or a composite of various peaks of several components which embody the greatest spectral changes.

PICKS: scans a large number of samples and then provides software algorithms to choose those samples with significant spectral differences. These samples will have the most significant chemical differences and thus, are the samples chosen to be chemically analyzed thereby reducing lab work.

PRISM: Developed in the UK by Glaxo, Ltd., is a spectral identification program which builds on the existing discriminant analysis program, DSCRIM. A material is identified in two stages. First by dscrim and then by a point by point comparison with a reference spectrum of the material, providing a statistical match. Principal components program will be introduced with details at the Pittsburgh conference.

LT Industries is on the move with new hardware and software. Featured at Pittcon is the Quantum 12001, the industrial version of the Quantum 1200 VIS/NIR analyzer which has been hardened for use in hazardous environments. Complementing the Quantum 1200 Analyzer is the SpectraMetrix software packages with "fan-out" regression and a PLS/PCA module. A new patented fiber optic multiplexer which accommodates the full line of LT cables has been added to the LT line of fiber optic cables and probes. Our cable line has been expanded to provide several packed bundles of single fiber up to a high density cable to accommodate varying application needs. An additional enhancement to Quantum's on-line capabilities is a selection of standard and special condition (high temp, high pressure, and pH varying) probes all on display at this conference.

Pacific Scientific is introducing an easy-to-use Coffee Testing System for fast, accurate analysis of green and roasted beans. The system uses either a Model 4250 or Model 6250 NIR Scanning Sensor and the Color Machine™ which is a visible array spectrophotometer; an IBM PC/XT-AT™ or PS/2-50™ provides computing power; a printer and software provided by Infrasoft. The Model 4250 is a "tilting filter" instrument which generates the desired segments of the NIR spectrum in a routine testing environment. Whereas the Model 6250, a grating monochromator measures complete NIR spectral scans and is the instrument of choice for most researchers and central laboratories.

To meet the applications needs of forage and feed producers, Pacific Scientific offers a selection of third party software packages for use with the Model 4250 and Model 6250. Numerous mixed feed and feed ingredient calibrations can be purchased with these systems. These calibrations were developed by Infrasoft International; founded by Dr. John S. Shenk as a result of his work with the National

Near-Infrared Reflectance Network, the USDA and Pennsylvania State University. Calibrations are available for: hay, haylage, corn silage, corn grain, soymeal, mixed poultry feed, grains, total mixed ration, wheat, barley, oats, distillers' grain, brewers' grain, meat and bone meal, corn gluten, fishmeal, wheat midds, concentrates, whole soybeans, soybean hulls, and small grain silage.

The following are specific INFRASOFT INTERNATIONAL PROGRAMS: A Horse Nutrition Program, written by Mark O. Westerhaus for Infrasoft, provides least-cost ration formulation for all breeds, bodyweights, stages of growth and lactation states. The equine nutrition information was supplied by Dr. John Baker of the University of Kentucky. A Dairy Nutrition Program, in consultation with Dr. Richard Adams of The Pennsylvania State University, allows the user to predetermine exactly what supplements which must be added to the forage to formulate a complete feed for the dairy cow.

Council Co-Sponsorship of a 3 Day NEAR-INFRARED COURSE

The Council for Near-Infrared Spectroscopy has joined with the educational activities section of the AACC, American Association of Cereal Chemists to co-sponsor an expanded version of their near-infrared short course on May 10-12, 1988 in St. Louis. This course, now in its third year will be taught by three scientists who not only pioneered the industrial use of near-infrared instrumentation but continue as active contributing innovators to the current state of the technology, Karl Norris, William Hruschka (both from the USDA instrumentation laboratory in Beltsville MD) and Edward Stark (formerly VP of Technicon Industrial Systems and now an independent consultant). This co-sponsorship between the Council and the AACC will allocate a portion of the profits to the Council for Near-Infrared Spectroscopy to be used as seed money to further the success of future NIR conferences, newsletters, spectral and bibliographic libraries, as well as other activities to promote the use and general awareness of the benefits of near-infrared quantitative and qualitative analyses.

This Tuesday through Thursday course, May 10-12 will cover basic physical and chemical theory, instrumentation design, calibration mathematics and statistical interpretation of data, familiarization with and interpretation of near-infrared spectra, sample preparation, and hands-on use of major manufacturer's instrumentation.

Although co-sponsored with the AACC, the course covers principles and applications throughout the entire range of NIR uses. Also included in this course will be consultation time devoted to individual and specific participant applications. Students are encouraged to bring their own data and experimental problems for expert and group discussion.

For further information contact Dotty Ginsburg of the AACC at (612) 454-7250.

Other 1988 Short Courses for NEAR-INFRARED

"Near-IR Analysis: A New Industrial Tool" Pittsburgh Conference, New Orleans, LA, Sat-Sun, Feb 20-21, 1988, faculty; D. Bums, P. Cooper, E. Ciurczak. Sponsored by the ACS.

This two-day short course covers the history, theory, instrumentation, and applications of industrial near-infrared. Theoretical and practical applications will be covered in this course.

Pittsburgh Conference, New Orleans, LA, Friday, February 26, 1988, faculty E. Stark, K. Luchter sponsored by Pittsburgh Conf. This one day survey will give an overview of vibrational spectroscopy, NIR instrumentation, method's development, and applications with an emphasis on industrial uses. For further information contact the Pittcon office at the conference.

ELECTRONIC BULLETIN BOARD

The Society for Applied Spectroscopy (SAS) and the Council for Near-Infrared Spectroscopy (CNIRS) are setting up a combined electronic bulletin-board system based on an IBM PC AT-compatible computer. The equipment (currently on order and scheduled to be delivered in early January) will be online by the end of January, and will be accessible by calling (812) 334-2839. The system will receive calls at 300, 1200, and 2400 baud, and can be used to send and receive electronic mail as well as to upload and download files of interest to spectroscopists. Online conferences can be set up to serve special interests of the users, and notices can be posted for all users to read. For more information, contact: Robert Lodder, Chem. Dept. Indiana University, (812) 335-7905.

COMPUTER BASED BIBLIOGRAPHY
of NEAR-INFRARED ARTICLES

The first version is finished and ready to run on any IBM or compatible with 384K RAM and 2 double sided floppy drives or 1 floppy and a hard disk. PC-File+ by ButtonWare is the versatile database used. The program and 234 page users manual is included with the initial purchase price of the NIR bibliography. This library contains over a 1000 journal, book and patent references, spanning the period from 1950-1987. Each entry includes the full title of the article, the author list, journal, issue, date and page number. More than 150 entries also include an abstract of the article. New additions will be added with abstracts and older entries will have abstracts added as they become available. Because you will own the database software, you can add and or customize your reference files. Among a multitude of other attributes this program will search, sort, generate reference statistics, transfer between programs, and even help you search for a name you don't know how to spell (see the soundex program). If this library meets with a successful reception from the near-infrared community additional updates will be provided and a second library of talks and abstracts of talks will be considered.

Purchase price for PC-FILE+, the manual, and 1.6 megabytes of bibliographic material is $150 for Council members, $200 for non-members. If you already own the PC-FILE+ software, the respective prices are reduced by $50. After purchase of the initial reference database, periodic updates will be for sale at reduced prices to cover typing, search and material costs.

We thank David Honigs for turning an idea into a reality and we hope that he will continue to expand and improve this library.
For information and bibliography orders write to:
Council for Near-Infrared Spectroscopy
attn. David Honigs
Dept. of Chemistry BG-10
University of Washington
Seattle, WA 98195

4th INTERNATIONAL DIFFUSE REFLECTANCE CONFERENCE: CHAMBERSBURG, Pennsylvania: Aug. 12-18,1988
Theme: Diffuse Reflectance Spectroscopy: Analyses in situ

The 4th International Diffuse Reflectance Conference, the "Chambersburg Conference", will be held August 14-19, 1988 at Wilson College, Chambersburg, PA, USA. Initially patterned after the Gordon Conferences, the International Diffuse Reflectance Conference has become a forum for researchers confronted with problems on diffuse reflectance. The 1988 Conference will convene researchers from all over the world to exchange technical information and experiences in near infrared Spectroscopy as well as ultraviolet, visible, infrared, fluorescence, and remote sensing.

The Conference will meet as one session in the morning and one session in the evening. With the afternoon set aside for informal discussions, poster sessions, exhibits, committee meetings, and physical exercise (jogging, volleyball, golf, tennis, swimming, etc.) A hospitality suite will be provided following the evening sessions, providing a comfortable ambience for scientific conversation with session speakers as well as furthering fellowship with old friends. Thursday evening will be devoted solely to the banquet and speaker.

CONTRIBUTIONS FOR POSTER SESSIONS ARE REQUESTED. Conference enrollment is limited, so early registration is recommended. Mailing for registration will follow shortly.

WHERE WE MEET - Nestled in the foothills of the Appalachian Mountains, Chambersburg is near the center of the turning point of the Civil War. The Battlefields of Gettysburg (30 miles away) and Antiem (45 miles away), the Pennsylvania Dutch country, and the chocolate town of Hershey, PA make nice side trips. The 119 year old Wilson College campus, on 300 acres of lush Cumberland Valley land is approximately 88 miles from Washington, DC and 76 miles from Baltimore, MD; both eastern cultural centers.

HOUSING - You are encouraged to live in the Wilson College dormitories, as their convenience adds to the time available for scientific and social interactions with the other conference participants. However, for those who wish more lavish accommodations and can afford it, a block of rooms will be set aside at the Chambersburg Holiday Inn.

COSTS: Registration	Before July 1,1988	After July 1,1988
Short course[1]	$200.00	$225.00
Full Conference[1]	$265.00	$290.00
Student[1]	$175.00	$200.00
Meals Only[2]	$100.00	$125.00
Registration only[3]	$35.00	$ 60.00
Campus Housing Only[4]	$130.00	$155.00

[1] Includes room, meals, and registration
[2] Does not include room and registration
[3] Meals and housing not included
[4] Meals and registration not included

For the first time we will have a short course on "Statistics in Diffuse Reflectance Spectroscopy" which will be held prior to the actual conference (Aug. 13-14).

SHORT COURSE: Statistics in Diffuse Reflectance Spectroscopy Aug.13-14
Instructor: Dr. Steven M. Buco, President
Statistical Resources Incorporated
Department of Experimental Statistics
Louisiana State University Baton Rouge, LA
Topics: Sample selection, linear regression, multiple linear regression, effects of multicollinearity on regression, Fourier analysis, principal component analysis, partial least squares, discriminant analysis, statistical calibration methods including problems associated with small sample sets, randomization statistics and other topics. Dr. Buco was previously with the Department of Experimental Statistics, Louisiana State University.

To register, for conference and/or short course, contact: Dr. W.F. McClure, Conference Chairman, 4th International Diffuse Reflectance Conference, North Carolina State University, Box 7625, Raleigh, NC 27695-7625.

CONFERENCE PROGRAM (AUG 14-19)

August 14 Sunday
Inaugural Session (PM):
Diffuse Reflectance Spectroscopies
Chairperson: Dr. David Wetzel, Dept. of Chemistry Kansas State University, Manhattan
INFRARED - Dr. Peter Griffiths, Univ. of California, Riverside

NIR/RAMAN - Dr. David Honigs, Pacific Scientific
NMR/NIR - Dr. Franklin E. Barton, USDA/ARS Athens, Georgia

August 15 Monday
Session 2 (AM): Interaction of Light and Matter
Chairperson: Dr. Gerald Birth, USDA, ARS Athens, Georgia
Session 3 (PM): On-Line Spectroscopies
Chairperson: Ms. Lois Weyer, Hercules Research Center, Wilmington, Delaware

August 16 Tuesday
Session 4 (AM): New Software in Diffuse Reflectance Spectroscopy
Chairperson: Mr. A.M.C. Davies, Oxford Instruments, Abingdon, England
Session 5 (PM): Spectroscopies of Water
Chairperson: Dr. Robert Windham, ARS, USDA Athens, Georgia

August 17 Wednesday
Session 6 (AM): Diffuse Reflectance Infrared Fourier Transform Spectroscopy
Chairperson: Dr. Peter Griffiths, Univ. of California, Riverside, California.
Session 7 (PM): Standardization of Instruments
Chairperson: Mr. K.H. Norris, ARS, USDA Beltsville, Maryland

August 18 Thursday
Session 8 (AM): NIR Band Assignments
Chairperson: David Honigs, University of Washington, Seattle, Washington.
Session 9 (PM): Banquet
Speaker: William G. Fateley, Kansas State University, Manhattan

August 19 Friday
Session 10 (AM): New Hardware in Diffuse Reflectance Spectroscopy
Chairman: Dr. Philip C. Williams, Canadian Grain Commission, Winnipeg, Canada

COMMUNICATIONS CORNER

Questions of Interest:

"What spectral features not related to composition are observed when dark colored samples are scanned? What can be done to maximize chemical information in spite of these effects?" ***Lois Weyer***

Suggestions and Tips:

"Statistical designs are useful for minimizing the number of samples needed to be prepared and scanned for calibrations. Twenty samples may suffice for multicomponent mixtures, as long as inter-correlations between components are avoided and the full composition ranges are evenly covered. If you lack the luxury of being able to prepare your own samples, simple linear regressions of your constituent data may help you minimize the number of samples needed to be scanned before you begin."

"Inexpensive, background resident, keyboard macro programs have proved useful for situations requiring a repetitive sequence of key strokes in the course of running a computer operated NIR instrument. We have used Prokey™ to scan and record to disk any number of repeat noise runs or repeat sample runs. The macros are easy to create using non-programming language and will allow interactive pauses from the key board. Different macros can be strung together or accessed sequentially by pressing the alt. key and a letter key. There are newer programs available still well under the $100 price that have the ability to provide timing parameters.

Karen Luchter

BOOK REVIEWS

'Near Infrared Diffuse Reflectance/Transmittance Spectroscopy," Proceedings of the International NIR/NIT Conference, Budapest, Hungary, 12-16 May, 1986, J. Hollo, K.J. Kaffka, J.L Gonczy, Akedemai Kiado, Budapest 1987 (Distributed by H. Stillman Publishers, 21405 Woodchuck Lane, Boca Raton, FL 33428, (305) 482-6343).

Although this is a conference proceeding, it serves as a useful text for near infrared reflectance/transmittance technology. It is well organized into theory, methodology, instrumentation, and applications sections with chapters that include fundamental aspects of NIR written by principal investigators. For example, lan Murray discusses the spectra of homologous series of organic compounds, A.M.C. Davies and W.F. McClure write about the use of Fourier transforms in NIR, T. Naes and Harold Martens explain bilinear modeling, and Ed Stark describes nonlinear compensation. The applications are primarily for agriculture and the food industry, but the techniques employed are applicable to other fields. This book is a good review of topics important to the modern practice and is recommended to those presently working in the field as well as newcomers.

Lots Weyer

A similar set of proceedings are being published for the University of East Anglia Conference this past July **"Spectroscopy Across the Spectrum'.** For further information contact AMC Davies, Oxford Instruments Ltd., 20 Nuffield Way Abingdon, Oxon, OX 14-1TX, UK

Textbooks and Monographs for Near-Infrared Spectroscopy: NIR is finally coming into its own with the first two of what we hope will be a library of textbooks and monographs.

"Near-Infrared Technology in the Agricultural and Food Industries" Ed. by P. Williams, K. Norris, American Association of Cereal Chemists, lnc. 1987

This hard cover, 8 1/2" by 11" of 246 pages, plus 328 spectra and close to 1000 reference bibliography is an attractively arranged text. The first 7 chapters deal with physics, chemical principles, wavelength selection methods and multivariate calibrations by data compression, instrumentation, and variables effecting analysis. The remaining 8 chapters discuss NIR applications by geographical location with one chapter devoted to the analysis of whole seeds. The last section contains 328 NIR spectra (8 to a page) in which all but 56 inorganic spectra are biological chemicals or natural or processed foods. This is an attractive book worth reading. ***Karen Luchter***

"Near-Infrared Spectroscopy in Food Analysis" B. G. Osbome, T. Fearn, Longman Scientific and Technical. co-publ. by John Wiley & Son 1986

Of nine chapters only one is solely devoted to food. The history, instrumentation and theory of NIR are well presented and are of general interest. Several good size tables of band assignments are available as well general equations for calculating the NIR overtones of the mid-IR fundamental bands. Two chapters are devoted to data handling and calibration techniques. The volume is replete with examples, explanations and copious citations of earlier works. It reads more like a text book or instruction manual than a dry reference book.

JCAMP-DX. A STANDARD FORM FOR EXCHANGE OF INFRARED SPECTRA IN COMPUTER READABLE FORM

Selections from a final draft written for Applied Spectroscopy written by: Robert S. McDonald and Paul A. Wilks, Jr. 9 Woodside Dr., Burnt Hills, NY 12027 and General Analysis Corp., 140 Water St., Norwalk, CT 06856

ABSTRACT: JCAMP-DX is a standard file form for exchange of infrared spectra and related chemical and physical spectrometer data systems of different manufacture, main-frame time-sharing systems, general purpose lab computers, and personal computers. It is compatible with all media: telephone, magnetic and optical disk, magnetic tape, and even the printed page (via optical reader). All data is stored as labeled fields of variable length using printable ASCII characters. A JCAMP-DX spectrum is a text file which can be viewed, corrected, and annotated with a text editor. The present focus is on infrared spectra, but JCAMP-DX can easily accommodate Raman, UV, NMR, Mass and other types of spectra, X-ray powder patterns, chromatograms, thermograms, and other plots which require the capability of representing contours as well as peak position and intensity. JCAMP-DX also provides for combining adequate information about the sample and method of observation with its spectrum.

Howard Mark

COUNCIL MEMBERSHIP APPLICATION

Because the Council For Near Infrared Spectroscopy is now affiliated with the Society of Applied Spectroscopy, SAS, the Council is providing a $5.00 discount for combined Council and SAS membership fee. SAS membership includes a one year subscription to the Journal of Applied Spectroscopy. as well as the SAS news bulletin published quarterly. Please check the appropriate category:

Regular Membership - Council only [$25 N.Amer./$40 other] ()
discounted Council/SAS combined membership [$50 N. Amer./ $65 other] ()

Student Membership - Council only [$10] () discounted Council/SAS combined Membership [$15] ()

Sponsoring Membership [$250] () Please make checks payable to The

Council For Near Infrared Spectroscopy. Thank you.

Name
Mailing Address

zip

Company/School
Area of Interest

please return this Membership Application to:
Patrick Cooper (treasurer) Council for Near-Infrared Spectroscopy Pacific Scientific, 2431 Linden Lane, Silver Spring MD 20910

for We wish to thank the following companies becoming sponsoring members of the Council:

Bran+Luebbe
Dickey-john
LT Industries
Pacific Scientific

THE PfTTSBURGH CONFERENCE & EXPOSITION

on Analytical Chemistry & Applied Spectroscopy

February 22-26, 1988 - New Orleans Convention Center, New Orleans, Louisiana

Monday Afternoon, Room 13/15, NOCC The Tomas Hirschfeld Award in NIRA - Pres. to Rob Lodder

258 **Award Address** - R. Lodder

259 **Fourier Self-Deconvolution of Near-Infrared Spectra of Chemically Complex Samples** - W.F. McClure, North Carolina State University

260 **The Use of Mahalanobis and Normalized Distances to Match Spectra with Calibration Equations: Introducing 'Smart" Near-Infrared Reflectance Analysis** - J. Workman, Technicon Industrial Systems, H. Mark

261 Comparison of Various Mathematical Data Transformations on Near Infrared (NIR) Spectra- F.A. DeThomas, Pacific Scientific

262 **ART and Science: Adaptive Resonance Theory and NIRA** - R.A. Lodder, Indiana University, G.M. Hieftje

263 **Evaluation and Normalization of Instrument Response for Near Infrared (NIR) Spectrophotometers** - P.J. Cooper, Pacific Scientific Instrument

264 **An Investigation of Reflectance in the Near Infrared Region Using a Series of Synthetic Samples**- L.P. McDermott, Technicon Industrial Systems

265 **The Effect of Noise on the Choice of Wavelengths During Automatic Computerized Wavelength Searches** - H. Mark, Technicon Industrial Systems, J. Workman

266 **Near Infrared Spectral Library** - C.W. Brown, University of Rhode Island, S. C. Lo

267 **Matrix Effects on Band Intensity in the Near and Mid infrared for Diffuse Reflectance Spectrometry** - J.M. Olinger, University of California-Riverside, P.R. Griffiths

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308 **Matrix Effects in NIR Diffuse Reflectance Spectrometry** - P.R. Griffiths, University of California-Riverside, J.M. Olinger

309 **NIR Spectroscopy of Aqueous Solutions of Inorganic and Organic Materials** - E.W. Stark, KES Analysis, K. Luchter

310 **Compensation for Unknown Chemical and Physical Interferences by Multivariate Calibration** -H. Martens, Norwegian Computing Center

311 **NIR Measurements Over a Single Fiber Optic Using an FTIR** - D.E. Honigs, University of WA

312 **Analysis of Aqueous Ethanol Amines** - E.H. Baughman, Amoco Corporation

Tuesday Afternoon. Room 7/9, NOCC

571 **Fiber Optic Accessory for NIRA: I. Hardware** - D.A. Burns, Bran + Luebbe/Technicon Industrial Systems, R. Carroll

572 **NIR and Fiber Optics Ideal for Laboratory and On-Line Measurement and Control** - I. Landa, LT. Industries, Inc.

573 **The Effect of Sample Motion in Near-Infrared Analysis to Provide Data for Process Analysis**-G. Kemeny, Technicon Industrial Systems, R. Rachlis, H. Mark, J. Workman

574 **Quantification of the Moisture and Fat Content in Foods Using a Partial-Least-Squares Method of Data Analysis in the Near Infrared** - R.T. Carl, Nicolet Instrument Corporation

575 **Near Infrared (NIR) Qualitative Analysis of Inorganics Using a Spectral Search and Match Algorithm** - F.A. DeThomas, Pacific Scientific

576 **Determination of Cholesterol and Other Blood Constituents by Near-Infrared Reflectance Analysis** - R.A. Lodder, Indiana University, W. Moorehead, S. Robertson, G.M. Hieftje

577 **Mechanism of the Association Between Cotton Fiber Quality Parameters and Near Infrared Spectroscopy** - J.G. Montalvo, Jr., U.S. Dept. of Agriculture, S. Faught, S.M. Buco

578 **Analysis of Drug Substances in Unknown Matrices Using Near Infrared (NIR) and the Method of Standard Additions** - E.W. Ciurczak, College of Saint Elizabeth, D.E. Honigs, J. Sze

579 **Reaction Kinetics of Drug Substances via Near Infrared (NIR) Spectroscopy** - D. Zylinski, College of Saint Elizabeth, E.W. Ciurczak

580 **Use of Near Infrared (NIR) Detector for Analytical and Preparative Scale LC of Amino Acids and Polymers** - I.M. Vance, College of Saint Elizabeth, E.W. Ciurczak