The Geochemical News

Newsletter of the Geochemical Society

Number 86 Spring 1994

Inquiries and announcements regarding *Geochemical News* should be sent to S.B. Shirey, Carnegie Institution of Washington, 5241 Broad Branch Rd., NW, Washington, DC 20015 USA. Rapid submission of material by facsimile (202-364-8726) or electronic mail (shirey@dtm.ciw.edu) is encouraged.

In this issue:

UPCOMING MEETINGS OF INTEREST TO GECHEMICAL SOCIETY MEMBERS

May 15-18, 1994: *Geological Association of Canada and Mineralogical Association of Cannada Annual Meeting*, Waterloo, Ontario. Contact: Alan V. Morgan, Dept. of Earth Sciences, University of Waterloo, Ontario N2L 3G1, Canada. Tel: (519)885-1211 ext 3231, Fax: (519)746-7484.

May 19-21, 1994: *PACROFI V - Pan American Current Research in Fluid Inclusions*, Morelo, Mexico. Contact: Georgina Izquierido M., Dept. de Geotermia, Instituto de Investigaciones Electricas, Apdo. Postal 475, Cuernavaca 62000, Morelo, Mexico. Tel: (73)183811 ext 7321, Fax: (73)182526.

May 23-27, 1994: *American Geophysical Union, Geochemical Society and Mineralogical Society of America Spring Meeting*, Baltimore, Maryland. Information: AGU Meetings Dept., 2000 Florida Ave., N.W., Washington, DC 20009, (202)462-6900, fax(202)328-0566, email: dsolomon@kosmos.agu.org. (Abstract deadline: March 3, 1994.)

May 30-June 3, 1994: *Annual Meeting of the American Society of Limnology and Oceanography and the Society of Wetland Scientists*, Edmonton, Alberta Canada ASLO/SWS 1994 Conference, Environmental Research and Studies Center, University of Alberta, CW-401L Bio Sciences Bldg., Edmonton, Alberta, Canada TG6 2E9.Fax: 405-492-8610

June 5-11, 1994: *8th International Conference on Geochronology, Cosmochronology and Isotope Geology (ICOG-8)* Berkeley, California.Garniss H. Curtis, Chairman, Institute of Human Origins-Geochronology Center, 2453 Ridge Road, Berkeley CA 94709Tel: 415-845-4003Fax: 415-845-9453. (see more detailed advertisement below)

Aug 8-12, 1994: *SEDI 94: Studies of the Earth's Deep Interior*, Whistler Mountain, British Columbia. SEDI94 Secretariat, Dept. Earth and Planetary Scinces, McGill University, 3450 University St., Montreal, Quebec, Canada H3A 2A7 Tel: (514) 398-4886 Fax: (514) 398-4680 email: sedi94@erda.geophys.mcgill.ca.

Aug 14-19, 1994: *International Symposium on the Physics and Chemistry of the Upper Mantle*, Sao Paolo. Brazil Wilson Teixeira, Instituto de Geociencias, Iniversidade de Sao Paolo, PO Bx 20899, 01489-970 Sao Paolo, Brazil Tel: 55-11-8138777 ext 3987 Fax: 55-11-2104958 email: brenha@iag.usp.br.

Aug 21-26,1994: *Fall American Chemical Society Meeting*, Washington, D.C., USA, 21-26 August 1994. For information, contact M.A. Vairavamurthy (phone 516-282-5337).
Aug 29-Sept 1, 1994: *Namibia '94: International Conference on Proterozoic Crustal and Metallogenic Evolution*, Windhoek, Namibia. G.I.C. Schneider, Geological Society of Namibia, PO Box 699, Windhoek, Namibia Tel: 264-61-37240 Fax: 264-61-228324
Aug 29-Sept 2, 1994: *4th V.M. Goldschmidt Conference: An International Conference for the Advancement of Geochemistry*, Edinburg, UK.Contact: Peter Symms, Dept. of Geology and Geophysics, The University of Edinburg, Edinburg EH9 3JW, UK. (see back of Newsletter).
Sept 4-9, 1994: *International Mineralogical Association (16th Meeting of the IMA).* Pisa, Italy. Contact: Prof. Stefano Merlino, Organizing Committee IMA' 94, Dipartimento di Scienze della Terra, Universita di Pisa, Via S. Maria, 53, I-56126 Pisa, Italy. Fax: 39 (0)5040976, email: IMA94@MN.CNUCE.CNR.IT
Sept 25-30, 1994: *The Society for Organic Petrology, 11th Annual Meeting*. Jackson, Wyoming, USA, Ron Stanton (e-mail rstanton@ncrds.usgs.er.gov; fax 703-648-6419; phone 703-648-6462).
Oct 24-27, 1994: *Geological Society of America*, and affiliated societies, annual meeting, Seattle, WA (Vanessa George, GSA, Box 9140, Boulder, Colo. 80301. Ph: 303 447-2020)
Dec 5-9, 1994: *American Geophysical Union Fall Meeting.* San Francisco, California. Information: AGU Meetings Dept., 2000 Florida Ave., N.W., Washington, DC 20009, (202)462-6900, fax(202)328-0566, email: dsolomon@kosmos.agu.org.
May 15-19, 1995: *17th International Geochemical Exploration Symposium: Exploring the Tropics*, Townsville, Queensland, Australia. Russel Myers, 171GES, National Key Centre in Economic Geology, James Cook University, Townsville, Queensland 4814, Australia. Tel: 077-814486. Fax: 61-77-815522.
May 24-26, 1995: *5th V.M. Goldschmidt Conference*, The Pennsylvania State University, University Park, PA, USA. Technical Program Chair, Mike McKibben, Phone: 909-7873444, FAX: 909-787-4324, Email: McKibben@UCRACl.UCR_EDU, or one of General Chairs, Hu Barnes or Peter Deines, via Phone 814-865-7573, Fax 814-863-2001, or Email Barnes@GEOSC.PSU.EDU.
Aug 7-12, 1995: *Sixth International Kimberlite Conference.* Novosibirsk, Russia.
Contact: Dr. N.P. Pokhilenko, Secretary, Sixth International Kimberlite Conference, United Institute of Geology, Geophysics, and Mineralogy, Russian Academy of Sciences, Siberian Branch, 630090 Novosibirsk-90 Russia. Abstract Deadlines Sept 1, 1994 (500 words); March 1, 1995 (3 page, extended) Telex: 133123 KORA SU, Fax: 007-3832 352692, email: chief@diamond.nsk.su
Sept 4-8, 1995: *International Symposium on Environmental Biogeochemistry*, Rio de Janeiro, Brazil. Symposium Secretariat, Prof. Luis Henrique Melges (e-mail iseb@bruerj; fax 55-(0)21-248-4870).

GEOCHEMICAL SOCIETY SESSIONS AT GSA AND AGU MEETINGS NEEDED

Theme Session and Symposia ideas and organizers are needed for the 1995 Geochemical Society meetings, at the Spring AGU in Baltimore, May 1995, and at the GSA Annual Meeting in New Orleans, LA, November, 1995. Your Society encourages you to take advantage of these opportunities to directly influence the scientific and technical content of these meetings. Members are encouraged to formulate Special Session topics they would like to convene for the Spring 1995 AGU meeting, and convey the information outlined above to Geochemical Society's Program Committee by mid-December, 1994 (although later submissions can be accommodated and added to the list of Special Sessions after the initial publication in EOS). Your Program Committee is ready and willing to help in any way needed. For further information, please contact the Program Committee's representative to the Spring Meeting: L. Peter Gromet, Department of Geological Sciences, Brown University, Providence, RI 02912-1846, Phone: (401) 863-1920, FAX: (401) 863-2058, E-mail: lpg@avalon.geo.brown.edu. For the GSA meeting, the Geochemical Society is soliciting topics for its symposium and for theme sessions. If you have an idea for a topic or would like to be an advocate for a theme session under the geochemistry category, please contact Ted Labotka at the Department of Geological Sciences, University of Tennessee, Knoxville 37996-1410, 615-974-2366, Fax 615-974-2368, E-Mail LABOTKA@TLXRAY.DNET.UTK.EDU. If you are interested in advocating a theme session, he can send you the necessary information and forms. The deadline for submitting symposium and theme session proposals is by the end of December, 1994.

In Memorium
ROGER G. BURNS
1937-1994

Roger G. Burns, Professor of Mineralogy and Geochemistry in the Earth, Atmospheric and Planetary Sciences Department at the Massachusetts Institute of Technology (MIT) died of cancer in Cambridge, Massachusetts on January 7, 1994. He was well-known and highly respected because of his major role in developing the field of mineral spectroscopy, and as the author of a very influential, now classic, book "Mineralogical Applications of Crystal Field Theory." Roger was born in Wellington, New Zealand in 1937 and received B.Sc. (1959, Chemistry and Geology) and M.Sc. (1961, 1st class Honors in Chemistry) degrees from Victoria University of Wellington and a Ph.D. from the University of California, Berkeley (1965, Geochemistry). As he continued his graduate studies in the United States, Roger recognized that there was much to be learned in applying the instrumental and theoretical capabilities of chemistry to geology. His 1965 University of California (Berkeley) Ph.D. thesis "Electronic Spectra of Silicate Minerals: Application of Crystal-Field Theory to Aspects of Geochemistry", supervised by a fellow New Zealander, Professor W.S. Fyfe, was a breakthrough in using chemical principles to understand the bonding environment of transition metals in silicate minerals. In particular, Roger was a pioneer in using absorption spectra to study minerals. In this technique the selective absorption of light with different wavelengths reveals the location and atomic coordination of transition metals in minerals.

Following his Ph.D. thesis, Roger spent four exciting years in England and New Zealand, first as a Senior Research Visitor at Cambridge University, then a Senior Lecturer in Geochemistry at Victoria University of Wellington and finally as Lecturer in Geochemistry at Oxford University. From 1966 to 1970 Roger and colleagues developed a new research approach for understanding the structure of minerals by applying a variety of spectroscopic techniques, including Mössbauer spectroscopy, to rock-forming minerals. Important advances were made, not only in the specialized field of crystal chemistry, but also in understanding the causes of color in minerals and gems, an aspect of his research that has significance beyond the realm of science. Roger clearly had made a transition from chemist to mineralogist. He rapidly gained international recognition with publications resulting from this early research and particularly the 1970 publication of his book "Mineralogical Applications of Crystal Field Theory". This book, addressed to students and a wide range of earth and planetary scientists, showed clearly how laboratory study of minerals interpreted in the context of Crystal Field Theory leads to an understanding of mineral structure that could not be obtained by other research techniques. The first edition was soon translated into Japanese, Chinese and Russian, and a revised second edition was published in 1993.

Roger joined the faculty at MIT in 1970 as Associate Professor of Geochemistry and within two years he was promoted to Professor of Mineralogy and Geochemistry. At MIT his expertise in mineralogy and geochemistry and rapport with students led to innovative research. In addition to his energetic pursuit of the application of spectroscopic techniques to mineralogical problems, Roger broke new ground in several areas of earth and planetary science. In the 1970's, Roger and his wife, Virginia, were instrumental in characterizing and understanding the ubiquitous formation of manganese rich minerals on the seafloor. His efforts were in part motivated by a desire to pursue research that would have positive societal impact. In recent years Roger continued his interest in directly relevant research by evaluating the reactivity of zeolites in proposed repositories for high-level nuclear waste. Throughout his career he was an active consultant in diverse specialities ranging from the Battery Products Division of Union Carbide to a manufacturer of synthetic gems to the Nevada nuclear waste isolation program.

Also in the 1970's Roger collaborated with experimental mineralogists to obtain spectroscopic data while minerals were subjected to very high pressures and temperature in a diamond cell; a press whose "jaws" are millimeter-size diamonds. Because the diamonds are transparent, measurements can be made while the mineral is at high pressure and temperature. With this device Burns and his students were among the first to observe atomic coordination changes in silicate minerals at high pressure. Roger was also interested in the oxidation states of planetary interiors and how they might be recorded by transition metals in magmas generated within planetary interiors. He applied spectroscopic techniques to determine the redox state of the lunar interior as recorded in small glass spheres erupted in volcanic fire fountains on the moon's surface.

Roger was instrumental in melding together the previously diverse fields of planetary science and mineralogy, because he quickly recognized that spectral profiles of sunlight reflected from planetary surfaces combined with measured spectra of minerals in the laboratory could be used to identify the minerals on planetary surfaces and the presence of specific transitional metal ions. Together with MIT planetary scientists, Roger developed the techniques for using remote-sensed reflectance spectra to identify transition metal-bearing minerals on the surfaces of distant planets, and the recently published second edition of his book has an entire chapter devoted to the topic of determining the compositions and mineralogy of planetary surfaces by remote sensing. Beginning in the early 1980's he made major contributions to understanding the composition and mineralogy of the Martian surface. These efforts culminated in 1993 with his contributions to and editorial handling of a special section of *Geochimica et Cosmochimica Acta* devoted to papers presented at a 1992 workshop titled "Chemical Weathering on Mars". Roger's last words on this fascinating subject are in an abstract for the 1994 Lunar and Planetary Science Conference. While much of his career focused on understanding the major rock-forming minerals, he also delighted in understanding the exotics; e.g. this 1994 abstract focuses on schwertmannite and a 1991 American Mineralogist paper is on babingtonite, the state mineral of Massachusetts. In recent years Roger and associated students have also been using Mössbauer spectroscopy to characterize Fe+3-bearing minerals in meteorites with the objectives of understanding how meteorites are affected by the terrestrial environment and providing evidence for pre-terrestrial oxidative processes.

Roger was also an enthusiastic teacher who was popular with the undergraduate and graduate students. Each semester at MIT he devoted considerable effort to teaching and his courses in "Chemistry and Physics of Minerals and Rocks" and "Geochemistry of the Transition Elements" were taken by many generations of MIT students. Undoubtedly, many MIT graduates will remember Roger bringing several minerals and rocks to their General Exam and asking them to identify objects ranging from an iron meteorite to quartz. During his career Professor Burns supervised 23 Ph.D. and 10 M.S. theses, published more than 140 research papers, served as an editor for several journals and books, and received additional degrees, many honors, awards and fellowships, including a M.A.. in geology and a D.Sc. in mineralogy from Oxford and a prestigious Guggenheim Fellowship in 1991. The presentation of the 1975 Mineralogical Society of America award to Roger Burns showed that his leadership and impact in mineralogy were recognized early in his career. He was a Life Fellow of the Mineralogical Society of America, a member of the Mineralogical Society of Great Britain, American Geophysical Union, Geochemical Society and the New Zealand Geochemical Group.

Roger had many non-scientific interests which included opera and the rocky coast of Maine which reminded him of New Zealand. Many of us will also remember him as a dedicated distance runner; running was not only a means for commuting to MIT from his Cambridge home, but he also was a frequent finisher of the Boston Marathon. Finally, and most importantly, Roger Burns was a caring and genuinely kind human being who will be missed by his wife Virginia, who was a frequent research collaborator, his sons Kirk and Jonathan, his faculty and research colleagues and his many students from MIT, Harvard University and Wellesley College.

Prepared by F.A. Frey and T.L. Grove (MIT)

OGD SYMPOSIUM ON "PYROLYSIS TECHNIQUES FOR SOURCE ROCK EVALUATION -- TWENTY YEARS LATER"

Pyrolysis techniques for the routine evaluation of source rocks were first described in 1974, and are now widely used for establishing maturity, organic matter type, and kinetic parameters. Twenty years of applications have produced a wide range of analytical techniques as well as many imaginative applications. Symposium papers will describe contemporary techniques and applications. The Organic Geochemistry Division of the Society will sponsor this Annual Symposium on Sunday, October 23, 1994, at the Seattle GSA meeting. The symposium will be organized by Colin Barker and Steve Larter. For more information, contact Dr. Barker at 918-631-2517.

ORGANIC GEOCHEMISTRY DIVISION ANNOUNCEMENTS

Paul Philp is seeking organizers for symposia to be held at the 1995 Spring ACS Meeting, in Anaheim, California. If interested, please contact Dr. Philp at 405-325-4469.

OGD members should note the numerous sessions of interest at the 1994 Fall ACS meeting Washington, D.C., USA, 21-26 August 1994. GEOCHEMICAL TRANSFORMATIONS OF SEDIMENTARY SULFUR (contact M.A. Vairavamurthy phone 516-282-5337), AMBER, RESINITE AND FOSSIL RESINS (contact K.B. Anderson phone 708-420-3734; fax 708-420-3698), NEW DEVELOPMENTS IN THE GEOCHEMISTRY OF OIL AND GAS GENERATION FROM SOURCE MACERALS, KEROGENS AND COALS (contact F. Acholla phone 609-737-4329; fax 609-737-5217), PORPHYRIN GEOCHEMISTRY (contact D. Freeman phone 301-405-1849; fax 301-314-9192), MOLECULAR MODELING IN GEOCHEMICAL SCIENCES (contact P. Hatcher phone 814-865-7838), QUANTITATION IN ORGANIC GEOCHEMISTRY, (contact R. Requejo phone 490-690-0095; fax 409-690-0059)

Joe Curiale is seeking ideas/organizers for the 1995 OGD 1-day symposium to be held at the New Orleans GSA meeting, 6-9 November 1995. If you are interested, please call me at 714-577-2312.

The OGD is giving out a new, what will be come a yearly, award for the best student paper in organic geochemistry consisting of a one-year membership in the Geochemical Society with all rights and privileges, including a GCA subscription. Nominations are hereby solicited according to the following guidelines: 1) the paper must be published in the year prior to the award (for this first award the paper must bear a 1993 publication date), 2) the paper can be submitted by the faculty advisor, a student, or other reader, 3) the nomination must be received by the OGD secretary by July 1 of the year in which the presentation is to be made (for this first award, this will be July 1, 1994), 4) the student MUST be first author on the publication, and MUST be enrolled as a student AT THE TIME OF SUBMISSION (not publication). If the student has graduated, the date of graduation should be included in the nomination letter. Members-at-Large on the Executive Committee will serve as judges.

Are you interested in joining the electronic community of organic geochemists? Bryn Jones of the University of Newcastle manages an electronic mail distribution list to provide instant communication among geochemists worldwide. Over 120 organic geochemistry now subscribe to this list -- all you need to join is access to e-mail. Details will be listed in the next Geochemical Society Newsletter. In the meantime, for those of you already using e-mail, contact Bryn Jones at bryn.jones@newcastle.ac.uk

ORGANIC GEOCHEMISTRY 1994 GORDON RESEARCH CONFERENCE

Applications will be mailed out in March. Contact Michael Lewan for information, USGS, Denver Federal Center, Box 25046, MS977, Denver, CO 80225. Phone: 303/236-9391 - Fax: 303/236-3202. To be held August 14-19, 1994, Holderness School, New Hampshire

Environmental Issues Related to Organic Geochemistry

Mahlon C. Kennicutt, II, *Geochemistry & Environmental Research Group, Texas A&M Univ.*

- **Petroleum Exploration Geochemistry Applied to Environmental Studies of the Exxon Valdez Oil Spill.** Ted Bence, *Exxon Company USA*
- **In Vitro and In Vitro Bioassays for Exposure of Marine Living Systems to Hydrocarbons** Steven Safe, *Department of Veterinary Medicine, Texas A&M University*
- **Concepts and Directions in Bioremediation: Field and Laboratory Applications** P. H. Pritchard, *U.S. Environmental Protection Agency*

Petroleum-Rock-Water Interactions

Steve R. Larter, *Fossil Fuels & Environmental; Geochemistry Institute, University of Newcastle*

- **Petroleum-Rock-Water Interactions: Chemical Constraints on Geological Processes** Steve R. Larter, *Fossil Fuels & Environmental Geochemistry Institute*
- **Possible Anaerobic Crude Oil Biodegration in Reservoirs: Laboratory and Geological Evidence** Jacques Connan, *Elf Aquitane Production*

Sediment Microbial Processes and the Organosulfur Cycle

Jean Whelan, *Woods Hole, Oceanographic Institute*

- **–Studies of Sulfur Oxidation Pathways in Anoxic Sediment**
  Hendrik Fossing, *Max Planck Institute for Marine Microbiology*
- **–Inorganic Sulfur Species: Metal Complexes and Mineral Formation versus Organic Sulfur Formation in Marine Systems** George Luther, *College of Marine Studies, University of Delaware*
- **–Distribution and Biogeochemical Significance of Bacteria in Deep Sediment Layers in the Pacific Ocean** R. John Parkes, *Department of Geology, University of Delaware*

Ancient Deoxyribonucleic Acid (DNA)

Marilyn L. Fogel, *Carnegie Institution of Washington, Geophysical Laboratory*

- **–The Challenge of Ancient DNA: PCR Techniques and Contamination**
  Bryan Sykes, *Institute of Molecular Medicine, University of Oxford*
- **–Molecular Preservation in Bones, Birds, and Brachiopods**
  Noreen Turross, *Conservation Analytical Laboratory, Smithsonian Institution*

Modern Approaches towards Defining the Macromolecular Structure of Coals

Patrick G. Hatcher, *Fuel Science Program, Pennsylvania State University*

- **–Molecular Structure of Coals: Cluster Types, Functionalities, and Linkages in Large Molecules** R. E. Winans, *Chemistry Division, Argonne National Laboratory*
- **–Macromolecular Structure of Coal: Structural Role of Covalent and Noncovalent Interactions**
  John W. Larsen, *Department of Chemistry, Lehigh University*
- **–Computer Aided Molecular Modeling of Coal's Macromolecular Structure**
  Jean-Loup Paulon, *Fuel Science Department , Sandia National Laboratory*

Comparative Studies of Pyrolysis Methods and Their Relationship to Natural Hydrocarbon Generation. Michael D. Lewan, *Branch of Petroleum Geology, U.S.G.S.*

- **–Mechanisms of Kerogen Cracking During Pyrolysis in Open and Closed (Dry and Hydrous) Pyrolysis: Similarities and Differences** Francoise Behar, *Geology-Geochemistry Division, Institute Francais du Petrole*
- **–Yields and Distributions of Hydrocarbons Generated during Pressurized Pyrolysis of Organic Matter.** Raymond Michels, *CNRS-GREGU, University de Nancy*

Biomarkers as Indicators of Geological Age, Environmental, and Thermal History

Robert Alexander, *School of Applied Chemistry, Curtin University of Technology*

- **–Novel Triaromatic Steroid Hydrocarbons and Steranes Related to Depositional Environment and Geologic Age** J. Michael Moldowan, *Stanford University*
- **–New Findings about the Structure and Distribution of Ring Alkylated Steranes**
  Roger Summons, *Australian Geological Survey Organization*
- **–Elimination Reactions of Esters and Their Application to Reconstructing the Thermal History of Sediments** Robert Alexander, *Curtin University of Technology*

New Avenues in Organic Geochemistry

Michael J. Whiticar, *School of Earth and Ocean Sciences, University of Victoria*

- **–Biomolecular Archaeology - A New Route for Organic Geochemistry**
  Richard P. Evershed, *School of Chemistry, University of Bristol*
- **–Riverine Organic Matter: Its Sources and Biogeochemical Consequence**
  Fred Prahl, *College of Oceanic and Atmospheric Sciences, Oregon University*

New Development in Natural Gas Geochemistry

Martin Schoell, *Chevron Petroleum Technology Company*

- **–Kinetic Mechanisms of OIL Cracking and Gas Generation Determined by Double Isotopic Labels** Alan K. Burnham, *Lawrence Livermore National Laboratory*
- **–Effects of Thermochemical Sulfate Reduction of the Molecular and Isotopic Composition of C_1 to C_{10} Hydrocarbons in Oils** Melodye Rooney, *Mobil Research and Development Corporation*
- **–Episodic Gas Migration and Multiple Filling of Reservoirs**
  Martin Schoell, *Chevron Petroleum Technology Company*

SPRING MEETING OF GEOCHEMICAL SOCIETY BOARD OF DIRECTORS

The 1994 spring meeting of the Board of Directors of the Geochemical Society will be held Sunday, May 22, 1994 from 6:00-10:00 pm in Baltimore just prior to the AGU, GS, MSA meeting at one of the meeting hotels. Room assignment not available at press time.

5th GOLDSCHMIDT CONFERENCE TO BE HELD AT PENN STATE, 1995

The fifth annual Goldschmidt Conference will be held from May 24 to May 26, 1995 in the new Convention Center of The Pennsylvania State University at University Park, Pennsylvania. The meeting immediately precedes the Spring AGU meeting in Baltimore. For participants who want to attend both meetings, transportation from the Goldschmidt Conference to the AGU meeting is planned.

The Goldschmidt Conferences are arranged each year by the Geochemical Society and the European Association of Geochemistry. The meeting sites alternate between North America and Europe, where this year-s meeting will be held in Edinburgh, Scotland, from August 28 to September 2.

Following the tradition of the Goldschmidt Conferences, the 1995 meeting will be co-sponsored by other professional societies with geochemical interests and be organized around a series of symposia which cover a broad range of geochemical subjects. Your suggestions for symposia which address topics on the active frontiers of geochemistry are most welcome.

If you would like to contribute your ideas to the meeting please contact the Technical Program Chair, Mike McKibben, Phone: 909-7873444, FAX: 909-787-4324, Email: McKibben@UCRACl.UCR_EDU, or one of General Chairs, Hu Barnes or Peter Deines, via Phone 814-865-7573, Fax 814-863-2001, or Email Barnes@GEOSC.PSU.EDU. For general conference information contact the conference coordinator, Suzanne St. Pierre via Phone: 814-865-7557 or FAX 814-865-3749.

EXPERIMENTAL PETROLOGY MAILING LIST ON THE INTERNET

A mailing list for discussing topics related to experimental petrology and geochemistry has been established in order to foster communications between researchers. Workers in the areas of experimental petrology, experimental trace element geochemistry, experimental water/rock interactions, and related fields are encouraged to join the list. We envision the list as a forum for the discussions of topics such as recent results, experimental problems and their solutions, sources for specialized supplies and equipment, group purchases of materials, job opportunities, and so forth. In the end, the list will be what its users make of it. To join the list, you need to be able to send and receive e-mail on the Internet. To subscribe, send mail to: *majordomo@s100.es.llnl.gov* with the line: *subscribe exp-pet* as the first line of the body of the message. You will automatically receive a message confirming that your name has been added to the list. Once subscribed, all correspondence should be sent to the list itself and should be addressed to: *exp-pet@s100.es.llnl.gov* For additional information, contact Henry Shaw at shaw4@llnl.gov or James Brenan at james_brenan@esciqm.es.llnl.gov.

TWO NEW MSA SHORT COURSES FOR 1994

The Mineralogical Society of America is pleased to announce two new short courses for 1994. For further information regarding these short courses, please contact the business office of the Mineralogical Society of America: 1130 Seventeenth Street, NW, Suite 330, Washington, DC 20036. Phone (202) 775-4344, or Fax (202) 775-0018.

SILICA: PHYSICAL BEHAVIOR, GEOCHEMISTRY, AND MATERIALS APPLICATIONS

Dates: October 21-23, 1994
Location: Seattle, Washington
Conveners: P.J. Heaney, C.T. Prewitt, G.V. Gibbs

TOPICS AND SPEAKERS/AUTHORS

1. CRYSTAL STRUCTURES AND PHASE TRANSITIONS OF THE LOW-PRESSURE SILICA MINERALS - *Peter Heaney, Princeton University* 2. SILICA AT ULTRA-HIGH PRESSURES - *Charles Prewitt & Russell Hemley, Carnegie Institution of Washington* 3. STRUCTURAL CHARACTERISTICS OF OPALINE AND MICROCRYSTALLINE SILICA - *Heribert Graetsch, Universitat Bochum* 4. STUFFED DERIVATIVES OF THE SILICA POLYMORPHS - *David Palmer, Cambridge University* 5. THERMOCHEMISTRY OF CRYSTALLINE AND AMORPHOUS SILICA - *Alexandra Navrotsky, Princeton University* 6. +PHYSICS OF AMORPHOUS SILICA - Russell Hemley and Charles Meade, Carnegie Institution of Washington 7. LATTICE DYNAMICAL BEHAVIOR OF ANHYDROUS SILICA - *Gerard Dolino & Jerry Bachheimer, CNRS, Universite de Grenoble* 8. HYDROGEN SPECIATION IN QUARTZ - *Andreas Kronenberg, Texas A&M University* 9. CHARACTER OF THE SI-O BOND - *Gerald Gibbs, Virginia Polytecbnic Institute and State University* 10. ELECTRONIC STRUCTURE, DYNAMICS, AND PHASE TRANSITIONS IN HIGH-PRESSURE SIO2 - *Ronald Cohen, Carnegie Institution of Washington* 11. HIGH-SILICA ZEOLITES - *John Higgins, Mobil Research and Development Corporation* 12. ADVANCES IN SOL-GEL PROCESSING - *Keith Keefer, University of Cincinnati* 13. INDUSTRIAL APPLICATIONS OF SILICA - *George Beall, Corning Glass Works* 14. HEALTH EFFECTS OF SILICA - *David Goldsmith, Western Consortium for Public Health* 15. SOLUBILITY OF SILICA AND KINETICS OF DISSOLUTION - *Patricia Dove, Georgia Instituteof Technology and Donald Rimstidt, Virginia Polytechnic Institute and State University* 16. PETROGENESIS OF MICROCRYSTALLINE SILICA - *Paul Knauth, Arizona State University* 17. QUARTZ AS A TECTONOPHYSICAL INDICATOR - *H.R. Wenk, University of California, Berkeley and Andreas Kronenberg, Texas A&M University* 18. CHARACTERISTICS OF SILICA GEMSTONES - *George Rossman, California Institute of Technology*

VOLATILES IN MAGMAS

Dates: December 2-4, 1994
Location: Napa Valley Sheraton, Napa Valley, CA
Conveners: Mike Carroll and John Holloway

TOPICS AND INSTRUCTORS

1. MAGMATIC VOLATILES IN HIGH-TEMPERATURE VOLCANIC GASES - *R.B. Symonds and T.M. Gerlach* 2. ANALYTICAL METHODS FOR VOLATILES IN GLASSES - *P. Ihinger, R. Hervig, P. McMillan* 3. EXPERIMENTAL DETERMINATIONS OF H20 AND CO2 SOLUBILITIES AND SPECIATION IN SILICATE MELTS -*J. Blank, C.W. Burnham, J.R. Holloway, P. McMillan, E.M. Stolper* 4. SOLUBILITIES OF THE LESS ABUNDANT VOLATILE SPECIES: SULFUR, NOBLE GASES, NITROGEN, CHLORINE, FLOURINE - *M.R. Carroll and J.D. Webster* 5. THERMODYNAMIC MODELS OF VOLATILE SOLUBILITIES - *J.R. Holloway, C.W. Burnham, E.M. Stopler* 6. DIFFUSION OF DISSOLVED VOLATILES IN MAGMAS - *E.B. Watson* 7. EFFECTS OF VOLATILES ON PHYSICAL PROPERTIES OF MELTS - *R. Lange* 8. PRE-ERUPTIVE VOLATILE CONTENTS OF MAGMAS - *A.T. Anderson, M. Johnson, M.J. Rutherford* 9. PHYSICS AND CHEMISTRY OF MAGMA DEGASSING PROCESSES - *K.V. Cashman, M.T. Mangan, R.S.J. Sparks* 10. VOLCANIC GAS EMISSIONS, EARTH DEGASSING AND LARGE-SCALE GEOCHEMICAL CYCLING OF VOLATILE ELEMENTS - *A. Jambon, W. Rose*

GEOCHEMICAL SOCIETY SYMPOSIA AND SESSIONS OF INTEREST SPRING 1994 AGU, GS, MSA MEETING, BALTIMORE, MD (MAY 23-27)

GS01 (Joint with VGP)
Thermodynamic Properties of Geologic Fluids at High Pressures and Temperatures
This Special Session will provide a forum for current research results on the thermochemical properties and phase relations of geologic fluids in crustal and upper-mantle settings. The molecular thermodynamics of volatile and electrolyte species in near-critical and supercritical aqueous and carbonic fluids constitute the central theme. Focus topics include experimental and thermodynamic modeling studies. Convener: James G. Blencoe, Oak Ridge National Laboratory, P.O. Box 2008, Building 4500-S, Oak Ridge, TN 37831-6110. Phone: (615)574-7041; Fax: (615)574-4961; E-mail: jblencoe@blencoe.chem.ornl.gov

GS02 (Joint with VGP and O)
Isotopic Variations in Seawater and River Water
The isotopic records of Sr, Nd, Os, C and S in seawater and river water provide insights into a variety of geological processes. This Special Session focuses on applications of these isotopic tracers to problems concerning global tectonic processes, weathering rates, the timing of glacial epochs, crustal evolution, and ocean and atmosphere evolution. Conveners: Stein B. Jacobsen and A. Jay Kaufman, Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA 02138. Phone: (617)495-5233 Fax: (617) 495-8839 Email: jacobsen@neodymium.harvard.edu

GS03 (Joint with VGP)
Geochemistry of Mineral-Water Interfaces
Mineral-water interfaces exert strong controls on mineral reactions and fluid chemistry. This Special Session highlights a variety of approaches to the study of mineral-water interfaces, especially kinetic, sorption, and mineral dissolution studies. Convener: Dimitri A. Sverjensky, Department of Earth and Planetary Sciences, Johns Hopkins University. Phone: (410) 516-8568; Fax: (410) 516-7933; E-mail:dimitri@eve.eps.jhu.edu

Preliminary Schedule of Some Sessions of Interest at the AGU, GS, MSA Meeting

Mon AM	Room 323	Thermodynamic Properties of Fluids at High P and T I
	Room 107	Freshwater Geochemistry
Mon PM	Room 323	Thermodynamic Properties of Fluids at High P and T II
Tue AM	Room 104	Geochemistry of Mineral-Water Interfaces I
Tue PM	Room 104	Geochemistry of Mineral-Water Interfaces II
Wed PM	Hall D	Mineral-Water Interfaces Posters
Th PM		Roedder Symposium: Beyond Fluid Inclusions (Union)
Fri AM	Room 106	Isotopic Variations in Seawater and Riverwater I
	Hall D	Roedder Symposium Posters: Beyond Fluid Inclusions
Fri PM	Room 106	Isotopic Variations in Seawater and Riverwater II

SPECIAL SECTION ON THE 4th V.M. GOLDSCHMIDT CONFERENCE, EDINBURGH, SCOTLAND, U.K. 28 AUG -2 SEPT, 1994

An International Conference for the Advancement of Geochemistry

GENERAL INFORMATION

The 1994 V.M. Goldschmidt Conference will be held in Edinburgh, Scotland, from Sunday 28th August to Friday 2nd September and will be followed by a week of field excursions in the Scottish Highlands and Islands.

This will be the first time a Goldschmidt Conference has taken place in Europe, and follows from the decision of the Geochemical Society and the European Association of Geochemistry to combine their major meetings into this one major biennial international conference, which in future will alternate between European and North American locations.

As Scotland's capital city, Edinburgh has long held an important place in the history of Europe, and it is particularly renowned for the attractiveness of its natural setting as well as its historic buildings. In late August-early September, Edinburgh is particularly exciting because this is the time of Edinburgh International Festival of the Arts. Edinburgh also has a special place in the history of geoscience, being the birthplace and home of James Hutton (1726-1797) who laid the foundations of modern geological thinking. Goldschmidt visited Edinburgh and wrote much of his magnum opus on Geochemistry while residing in Scotland in 1943-1944.

CONFERENCE SESSIONS IN EDINBURGH

These will take place from Monday 29th August to Friday 2nd September inclusive, but with the Wednesday being only half a day. Lecture and poster sessions will take place in the "Central Area" of The University of Edinburgh, which is close to the city centre.

Lecture and poster sessions will be grouped into Symposia, each of which will be co-ordinated by symposium conveners. Both Symposia topics and organisers are listed overleaf, and intending participants may contact symposium conveners for further information if they wish.

Plenary lectures will be given at the end of each day's conference sessions, in which speakers will address and discuss a topic of wide scientific interest. The plenary lectures will be given by: E. Boyle (M.I.T.), S.R. Hart (W.H.O.I.), R.K. O'Nions (Cambridge University and EAG president), J.-C. Petit (C.E.A., France) and K.-H. Wedepohl (Gottingen University, and Ingerson Distinguished Lecturer of IAGC).

ACCOMMODATION AND TRAVEL

Arrangements have been made to accommodate delegates at the Pollock Halls of Residence of The University of Edinburgh. These Halls are located on the edge of Royal Holyrood Park (see map), which encompasses the ancient volcanic complex of Arthur's Seat. They are approximately 10-15 minutes walking distance from the University Central Area where the Conference Sessions will take place. This accommodation is in single rooms and the cost is £25 per night for bed and full breakfast.

For those wishing to stay in a hotel, a wide range of hotels is available. In order to have a good choice of hotels it will be essential for participants to make early bookings because of the coincidence of the conference with the last week of the Edinburgh International Festival.

Trans-Atlantic participants should note that trans-Atlantic flights go into Glasgow as well as London airports, and that there is a bus service from Glasgow airport to Edinburgh city centre, which is often more convenient and cheaper than traveling via London.

Further information may be obtained from: Edinburgh Tourist Board, 3 Princes Street, Edinburgh EH2 2QP. Tel: [44] (0)31 557 1700 *(General Enquiries)*, Tel: [44] (0)31 557 9655 *(Accommodation)*, Fax: [44] (0)31 557 5118.

SYMPOSIA

1. **Theoretical Geochemistry** - applications of theoretical mineral physics to mineral chemistry and element distribution; ab initio methods. *Conveners: G.D. Price (University College, London) -fax [44] (0)71 387 1612, A.C. Lasaga,aa (Yale University) -fax [11 203 432 3134)*
2. **Experimental Geochemistry** - laboratory experimental studies across the full spectrum of P-T conditions. *Conveners: BJ. Wood (University of Bristol) -fax [44] (0)272 253385 TJ. Falloon (University of Tasmania) at Bristol -fax [44] (0)272 253385*
3. **Cosmochemistry** - interstellar grains to proto-planets; laboratory studies of pre-and post-solar processes in meteorites. *Conveners: G. Turner (University of Manchester-fax [44] (0)61 275 3947 E. Zinner (Washington University, St. Louis) -fax [1] 314 935 4083*
4. **Weathering & Erosion, Deposition & Diagenesis** geochemical processes in low-temperature rock degradation and genesis. *Conveners:J.I. Drever (University of Wyoming) -fax [1] 307 766 6679 R. Raiswell/M. Krom (University of Leeds) -fax [44] (0)532 335259*
5. **Groundwater Chemistry and Paleohydrogeology** geochemical characterisation of groundwater systems and of timedependent hydrogeological changes, significance to palaeoenvironments, prognoses of future changes. *Conveners:A. Bath (British Geol. Survey, Nottingham) -fax [44] (0)602 363261 F. Phillips (New Mexico Tech.) -fax [1] 505 835 6436*
6. **Waste Containment and Pollutant Transport** - geochemical assessment of the controls and risks of all types of waste disposal. *Conveners:PJ. Hooker (British Geol. Survey, Nottingham) -fax [44] (0)602 363261 A.C.M. Bourg (BRGM, Orleans) -fax [33] 38 64 37 11*
7. **Ocean Composition and Fluxes during the Quaternary** high resolution documentation of changes in marine geochemistry, and geochemical indicators of recent events. *Conveners: G.B. Shimmield (University of Edinburgh) -fax [441 (0)31 668 3184 T. Pedersen (University of British Columbia) -fax [1] 604 822 6091*
8. **Ocean Palaeochemistry and the Evolution of Ocean** Basins-the geochemistry of ocean evolution in the pre-Quaternary. *Conveners: H. Elderfield (University of Cambridge) -fax 144] (0)223 333450 J. Veizer (Bochum/Ottawa) -fax [49j (0)234 7094 179 or [1] 613 564 9916 M. Kastner (Scripps Oceanographic Institute) -fax [1] 619 534 0784*
9. **Modern submarine hydrothermal processes - controls on** the geochemical reactions within sub-seafloor hydrothermal systems, and their spatial and temporal variability. *Conveners: H. Elderfield (University of Cambridge) -fax [44] (0)223 333450 S. Humphris (Woods.Hole Ocean. Inst.) -fax [1] 508 457 2175*
10. **Mechanisms of isotopic and chemical communication in crust and mantle rocks** - application of new microanalytical (ion and laser probe), numerical modelling, and experimental techniques to constrain micron to millimetre scale processes in rocks, and their relevance to macroscopic studies of mass and heat transport. *Conveners: C.M. Graham (University of Edinburg,h) -fax [44] (0)31 668 3184 D.R. Cole (Oak Ridge National Lab) -fax [1] 615 574 4961*
11. **Partition Coefficients** - new data on partition coefficients for mineral, melt, fluid phases as determined.by experiment or measurement of natural phases. *Conveners: P. Beattie (University of Cambridge) -fax [44] (0)223 333450 J. 13renan (L. Livermore National Laboratory) -fax [1] 510 422 1002*
12. **Dehydration, Partial Melting and Fluid Distribution in the crust** - covering both the geochemistry of hightemperature processes in the continental crust and the modification of crust undergoing subduction. *Conveners: MJ. Bickle (University of Cambridge) -fax [44] (0)223 333450 S.L. Harley (University of Edinburgh) -fax [44] (0)31 668 3184 BJ. Hensen (University of New South Wales) -fax [61] 2 662 1923*
13. **Magma Generation Processes** - geochemical evidence of the generation and evolution of mantle-derived melts. *Conveners:E.M. Stolper (California Inst. of Technol.) -fax [1] 818 568 0935 R. Ellam (SURRC) -fax [44] (0)3552 29898 D.H. Green (A.N.U.) -fax [61] (0)6 249 0756*

14. **Mantle Development in Space and Time** - geochemical and geophysical-mineralogical information on mantle constitution. *Conveners: A. Halliday (University of Michigan) -fax [1] 313 936 7787 A. W. Hofmann (Max-Planck Institute) -fax [49] (0)6131 371 OSI*
15. **Geochronometry and Thermal History** - quantitative thermal histories of rocks and metamorphic belts. *Conveners: R.A. Cliff / S. Inger (University of Leeds) -fax [44] 532 335259 R. Wijbrans (Vrije University, Amsterdam) -fax [311 20 646 2457*

REGISTRATION

In order to register for the Conference, please complete the Registration Form and send it to arrive in Edinburgh by May 9th, 1994; registrations received after this date will be charged an additional 33.3%. Note that May 9th is also the last day for submitting abstracts, but we particularly advise you to dispatch the Registration Form as soon as possible if you wish to take part in the field trips. Abstract fees should be included on the Registration Form even if that form and the abstracts are submitted on different dates.

Normal registration fees are £180 for ordinary delegates, £75 for bona fide students (studying for first degrees, masters and first doctoral degrees) and £50 for accompanying persons. These registration fees cover provision of programme and abstract volumes (except for accompanying persons), the receptions and Edinburgh Conference visits and supply of coffee and tea at lecture and poster venues.

If you require any further general information, please write to Ben Harte / Peter Symms, The Goldschmidt Conference Secretariat, Department of Geology and Geophysics, The University of Edinburgh, King's Buildings, West Mains Road, Edinburgh EH9 3JW, Scotland, U.K. Fax: [44] (0)31 650 8522. If you require specific information on the Symposia, then write to the appropriate Symposium Conveners (fax nos. given in listing of Symposia).

Cancellations can only be made in writing to the Conference Secretariat. For cancellations on or before July 1st 1994 a cancellation fee of 33.3% will be deducted from the registration fee. For cancellations after July 1st 1994, a 33.3% refund of the registration fee will be made after the Conference, but for cancellations received after August 1st 1994, no refunds will be made.

PRESENTATIONS AND ABSTRACTS

Participants are invited to present scientific papers in either lecture or poster sessions, which will be arranged in accord with the listed symposia. Equal importance is attached to both lecture and poster sessions. Those wishing to present papers must submit an abstract to reach Edinburgh by May 9th 1994. The official language for all presentations is English.

Abstracts will be of the extended type and will be bound into an issue of the Mineralogical Magazine, which will be circulated to libraries as well as to conference participants and will therefore form a widely available permanent record of the conference. Each abstract will consist of up to the equivalent of two printed journal pages; they may include figures and tables as well as text. All abstracts will be reviewed prior to acceptance. The abstracts should be submitted on "floppy" diskettes accompanied by paper copies. Further details on abstract preparation and submission are given below, together with an abstract submission form, which should be submitted with each abstract. You should note the appropriate symposia for your abstracts on this form. The organisers will attempt to make arrangements for any ,further special topics or an open session, if this appears desirable.

Participants will be informed of whether their abstracts have been accepted in early June. Because of the cost of the extended abstract volume an abstract fee of £10 per abstract will be charged.

Each lecture theatre v ill be equipped with a laser pointer, one overhead projector, two slide projectors (5 x 5 cm frame size), and two projection screens.

Posters should be prepared in advance and should be brought in person by the participants. Details for poster design will be sent out with confirmations of acceptance of abstracts in June.

V.M. GOLDSCHMIDT CONFERENCE 1994 REGISTRATION FORM

Complete in BLOCK CAPITALS and send this page or a xerox to
the address overleaf together with the appropriate payment.

PERSONAL INFORMATION

NAME: ....
First *Middle initial* *Surname* *Title*

ORGANISATION: .....

DEPARTMENT: .....

ADDRESS: .....

CITY: .....STATE: .....

POSTCODE: .....COUNTRY: .....

TEL: .....FAX: .....

NAME FOR BADGE: .....

Please delete **YES or NO** as appropriate; fill in answers above the lined spaces; and enter fees in £.

REGISTRATION FEES

I enclose the following registration fees:

DELEGATE (£180) .....STUDENT (£75) ..... £.....

ACCOMPANYING PERSON(S) (£50 each) ..... £.....

NAME(S): ....

If registering after May 9th increase your registration fees by 33.3%

PRESENTATIONS AND ABSTRACTS

I wish to present the following number of papers: .....

I enclose abstract fees of (£10 per abstract): £.....

The abstracts are submitted herewith: YES/NO

The abstracts will be sent later (remember they must arrive by May 9, 1994): YES/NO

ACCOMMODATION

I wish to reserve accommodation at Pollock Halls of Residence and enclose a reservation fee (£50) £.....

I will arrive (date): .....

I will depart (date): .....

I have the following special dietary requirements:

EDINBURGH MILITARY TATTOO *(Saturday, 27th August)*

I wish to reserve the following number of places: .....

I enclose payment for the tickets (£15 per ticket): £.....

BANQUET *(Thursday, Ist September)*

I wish to reserve the following number of places: .....

I enclose fees for the banquet (at £30 per head): £.....

CONFERENCE VISITS *(Free of charge)*

I am interested in taking part in the following:

A..Aspects of Edinburgh geology in Holyrood Park: YES/NO

B. Edinburgh University Department of Geology and Geophysics and British Geological Survey: YES/NO

C. A tour of the older part of Edinburgh University: YES/NO

FIELD TRIP *(3rd-llth September)*

Please reserve me the following number of places: .....

I enclose fees for the field trip (£550 per head): £.....

On the field trip I would prefer to take part in the following (answer so as to give a total of 8 days):

A. 8 days in West & Central Scottish Highlands (Ballachulish Centre) YES/NO

B. 4 days in West & Central Scottish Highlands (Ballachulish Centre) YES/NO

C. 4 days in the Isle of Skye (Sligachan Centre) YES/NO

D. 4 days in North-West Scottish Highlands (Kinlochbervie Centre) YES/NO

I am interested in visiting Barrow's regional metamorphic zones: YES/NO

PAYMENT

TOTAL FEES SUBMITTED:

EITHER:

I wish to pay by credit card (check one box): VISA [ ] MASTERCARD [ ]

Card No.....Expiry Date: .....

OR:

I enclose a bankers order (in pounds sterling), made payable to the Goldschmidt Conference, for the above fees.

Signature:.....Date:.....

Send your forms to The Goldschmidt Conference Secretariat, Department of Geology and Geophysics, The University of Edinburgh, King's Buildings, West Mains Road, Edinburgh EH9 3JW, Scotland, U.K. TEL/FAX: [44] (0)31650 8522.

CLOSING DATE FOR STANDARD REGISTRATION FEES IS MAY 9th 1994.

COMPLETE THE FOLLOWING AND SUBMIT WITH YOUR ABSTRACT BY MAY 9TH 1994.

NAME: .....

ORGANISATION: .....

FAX NO:.....

ABSTRACT TITLE: .....

.....

.....

AUTHORS: .....

.....

AUTHOR PRESENTING PAPER: .....

.....

SYMPOSIUM NO. AND NAME: .....

.....

PREFERRED PRESENTATION (check one box):

NO PREFERENCE [ ] POSTER [ ] LECTURE [ ]

Filenames on computer diskette (state if file is text, table or graphics and give format; please remember to make filenames start with your initials):

.....

.....

.....

ANY OTHER INFORMATION?

.....

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.....

If you are submitting more than one abstract, please copy this form and complete a copy for each abstract. Send your abstract(s) to The Goldschmidt Conference Secretariat, Department of Geology and Geophysics, The University of Edinburgh, King's Buildings, West Mains Road, Edinburgh EH9 3JW, Scotland, U.K. TEL/FAX: [44] (0)31 650 8522.

ABSTRACT PREPARATION & SUBMISSION

Abstracts will be published as a special part of the Mineralogical Magazine, and will be printed in the normal two column format of that magazine. The detailed formatting of abstracts will be done by the editors (as in the case of a normal journal article). The following general rules must be adhered to:

1. The abstract may consist of text (including references in Mineralogical Magazine format), tables, and black and white line , diagrams (not photographs and no colour).
2. The abstract should be written as a short scientific paper with headings (e.g. introduction, methods, results etc. as appropriate) and must begin with a title followed by a listing of authors which should include their affiliations and addresses.
3. The total length shall not exceed the equivalent of 1650 words (including tables and figures). This means, for example, that if each full line of text holds fifteen words you will be allowed the equivalent of 110 full lines in total (15 x 110 = 1650). In determining this equivalent total length you must include the space occupied by tables, diagrams and headings (including the title).

Abstracts should be submitted both on computer diskettes and on paper and the following instructions apply:

A. Submit ONE COPY of text, table and graphics computer files on IBM readable diskettes of 3.5 inch diameter and 1.44 mB or 720 kB capacity. (Text and graphics prepared on Apple Mac computers should be transferred to such diskettes.) Please begin each computer filename on your diskette with your own initials.

B. The following text file formats can be accepted: Wordperfect, TEX, Wordstar, MS Word, Multimate, Displaywrite, ASCII. Commands such as italics, bolding, superscripting and subscripting should be entered, but not layout commands (such as tabs or indents or styles). Any special characters can be written on the paper copy by hand and will be entered by the editors.

C. Tables should also be supplied on the diskette. Again layout commands (such as lines etc.) should be omitted. The table caption should be typed at the top, then any headings and then the body of the table. Any non-alphanumeric character may be used to separate columns (a single tab is most convenient).

D. The following graphics files can be accepted: EPS, GIF, Mac Pict, DXF, HPGL, Gem. EPS files produced by "Freehand" work particularly well. Remember that the whole of your diagram, with everything in the correct position, needs to be in the file (not a base diagram with other things added by hand!).

E. Also submit FOUR copies of your abstract on paper, with text, tables and figures in the layout you would prefer (though we cannot always guarantee to reproduce it). If you have kept to the length requirements, the abstract should fit easily on two sides of A4 with 12 point type and reasonable spacing.

Diagrams may be submitted in paper copy only (i.e. without a computer file), such that they can be "pasted" into the abstract after we have completed editing (please remember that you still have to comply with the total length requirements). In exceptional circumstances (where authors have great difficulty in arranging computer diskette submission), we are prepared to accept whole abstracts on paper copy only, and we shall arrange retyping. Paper copies of the abstract must be submitted under all circumstances. Abstracts which exceed the total length requirement will not be accepted for publication.

Abstract fees (£10 per abstract) should be submitted with registration fees, even if you submit abstracts and registration forms at different times. Complete the form overleaf (or a copy of it) and send it with the diskette and paper copies (4) of your abstract.