



JOURNAL OF THE BRAZILIAN CHEMICAL SOCIETY

Editors

Angelo da Cunha Pinto
Universidade Federal do Rio de Janeiro
Brazil

Jailson B. de Andrade (coordinator)
Universidade Federal da Bahia
Brazil

Maria D. Vargas
Universidade Federal Fluminense
Brazil

Roberto M. Torresi
Universidade de São Paulo
Brazil

Ronaldo Aloise Pilli
Universidade Estadual de Campinas
Brazil

Watson Loh
Universidade Estadual de Campinas
Brazil

Editorial Advisory Board

Alejandro J. Arvia
Universidad de La Plata
Argentina

C. N. R. Rao
J. N. C. for Advanced Scientific Research
India

Clayton H. Heathcock
University of California at Berkeley
USA

Fernando Galembeck
Universidade Estadual de Campinas
Brazil

Henry Taube
Stanford University
USA

G. Jeffery Leigh
University of Sussex
UK

Jean-Marie Lehn
Université Louis Pasteur
France

José Manuel Riveros
Universidade de São Paulo
Brazil

Miguel de la Guardia
Universidad de Valencia
Spain

Otto Richard Gottlieb
Fundação Instituto Oswaldo Cruz
Brazil

Richard G. Weiss
Georgetown University
USA

Roberto Sanchez-Delgado
Instituto Venezolano de Investigaciones Cientificas
Venezuela

Editorial Manager: Elizabeth Magalhães

Electronic Consultant: Pedro A. M. Vazquez

Former Editor (1990-1993): Eduardo M. A. Peixoto

Former members of the Editorial Board (1990-1994): Armi W. da Nóbrega, Gerardo G. B. de Souza and Jaswant R. Mahajan

Former Editors (from 1994): Fernando Galembeck, Henrique E. Toma, Luis A. Avaca, Luiz Carlos G. Freitas, Marco-Aurélio De Paoli and Oswaldo L. Alves

Former members of the Editorial Advisory Board (from 1990): Giuseppe Cilento†, Jaswant R. Mahajan, Linus Pauling†, Hitoshi Ohtaki, Isabella Karle, Klaus Hafner, Kozo Kuchitsu, Russell A. Bonham, Vicente G. Toscano and Jerome Karle

The *Journal of the Brazilian Chemical Society* is published every two months by the Sociedade Brasileira de Química
SBQ Periodicals Coordinator: Paulo C. Vieira

Editorial and Publishing Office:

Instituto de Química, UNICAMP, CP 6154, 13084-971 Campinas - SP, Brazil
Tel/Fax: +55 19 3788-3151; E-mail: office@jbcs.sbq.org.br

Subscriptions and Advertising Office:

Sociedade Brasileira de Química, CP 26037, 05513-970 São Paulo - SP, Brazil
Tel: +55 11 3032-2299; Fax: +55 11 3814-3602; E-mail: sbqsp@iq.usp.br

The *Journal of the Brazilian Chemical Society* serves its readers as a forum for information related to the advancement of chemistry. The *Journal* is devoted to the publication of research papers in all fields of chemistry, except education, philosophy and history of chemistry

Information for authors: Full details of how to submit material for publication in *Journal of the Brazilian Chemical Society* are given in "Instructions for Authors" published in Vol. 15, No. 1 or World Wide Web <http://jbcs.sbq.org.br>

Proofs and Reprints: Galley proofs and reprint order forms are sent by the Editorial Office to the author who submitted the manuscript. Proofs should be checked and returned as soon as possible (preferably within 48 hours)

Subscription Rates - 2004. Members of the Sociedade Brasileira de Química: R\$47,00 (Brazil) and US\$50 (other countries). Non-members: R\$125,00 (Brazil), US\$50 (Latin America) and US\$100 (other countries). Institutions: R\$125,00 (Brazil) and US\$150 (other countries). See also World Wide Web <http://jbcs.sbq.org.br/about/subscription.php>

Back issues. Back issues of all previously published volumes are available directly from the Subscriptions Office

Copyright © 2004 Sociedade Brasileira de Química

It is a condition for publication that manuscripts submitted to this journal have not yet been published and will not be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the Sociedade Brasileira de Química (SBQ) if and when the article is accepted for publication. The copyright covers the exclusive rights to reproduce and distribute articles, including reprints, photographic reproductions, microform or any other reproductions of a similar nature, including translations. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, whether electronic, electrostatic or mechanical, nor by photocopying, recording, magnetic tape or otherwise, without written permission from the copyright holder.

While every effort is made by the SBQ, editors and editorial board to see that no inaccurate or misleading data, opinions or statements appear in this journal, they wish to make it clear that the contents of the articles and advertisements published herein are the sole responsibility of the contributors or advertisers concerned. Accordingly, the SBQ, the editorial board and editors and their respective employees, officers and agents accept no responsibility or liability whatsoever for the consequences of any such inaccurate or misleading data, opinion or statement.

Photocopying information for users in the USA. The Item-Fee Code for this publication indicates that authorization to photocopy items for internal or personal use is granted by the copyright holder for libraries and other users registered with the Copyright Clearance Center (CCC). Transactional Reporting Service provided the stated fee for copying beyond that permitted by Section 107 and 108 of the United States Copyright Law is paid. The appropriate remittance of \$ 6.00 per copy per article is paid directly to the Copyright Clearance Center Inc., 222 Rosewood Drive, Danvers, MA 01923, USA

Permission for other use. The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific written permission must be obtained from the Publisher for such copying

The Item-Fee Code for this publication is: 0103-5053 \$6.00 + 0.00

Printed on acid-free paper

Indexed in the following databases: Science Citation Index®, Science Citation Index expanded (SciSearch®), ISI Alerting Services, Chemical Abstracts – CA Plus, Chemistry Citation Index®, Current Contents®/Physical, Chemical and Earth Sciences and SciELO

Financial support:



and



Printed in Brazil