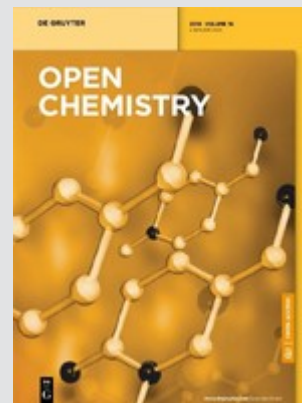


OPEN CHEMISTRY

formerly Central European Journal of Chemistry



Open Chemistry aims to publish high quality research in the following areas:

- Analytical Chemistry
- Biochemistry & Biological Chemistry
- Bioorganic Crystal Chemistry
- Biophysics
- Catalysis
- Chemical Kinetics and Reactivity
- Chemical Physics
- Coordination Chemistry
- Crystallography
- Electrochemistry
- Electrochemical Modelling
- Environmental Chemistry
- EPR Spectroscopy
- Fluorescence Spectroscopy
- Hydrogen technologies, hydrogen storage
- Inorganic Chemistry
- Macromolecules & Polymers
- Materials
- NMR Spectroscopy
- Nucleation and Growth of New Phases
- IR and Raman Spectroscopy
- Organic Chemistry
- Organometallic Chemistry
- Pharmaceutical Chemistry
- Photochemistry
- Physical Chemistry
- Physical Organic Chemistry

Online:

Open Access

Online ISSN: 2391-5420

Language of Publication: English

Subjects:

Chemistry, other
Inorganic Chemistry
Organic Chemistry

IMPACT FACTOR 2018: 1.512

5-year IMPACT FACTOR: 1.599

CiteScore 2018: 1.58

SCImago Journal Rank (SJR) 2018: 0.345

Source Normalized Impact per Paper (SNIP) 2018: 0.684

ICV 2018: 163.25

Journal

- Radiochemistry & Nuclear Chemistry
- Supramolecular Chemistry and Nanochemistry
- Solid State Chemistry
- Spectroscopy
- Surface Chemistry & Colloids
- Thermodynamics
- Biomaterials
- Natural Product Chemistry
- Medicinal Chemistry

Publication costs are covered by so called Article Processing Charges (APC), paid by authors' affiliated institutions, funders or sponsors. Starting from 2020 the APC's will be 1200 euro. Find our more [here](#).

Open Chemistry is a peer-reviewed, open access journal that publishes original research, reviews and short communications in the fields of chemistry in an ongoing way. Our central goal is to provide a hub for researchers working across all subjects to present their discoveries, and to be a forum for the discussion of the important issues in the field.

Our journal is the premier source for cutting edge research in fundamental chemistry and it provides high quality peer review services for its authors across the world. Moreover, it allows for libraries everywhere to avoid subscribing to multiple local publications, and to receive instead all the necessary chemistry research from a single source available to the entire scientific community.

Authors publishing in **Open Chemistry** benefit from:

- 2018 Impact Factor - 1.512
- transparent, comprehensive and fast peer review
- efficient route to fast-track publication and full advantage of De Gruyter's e-technology
- secure archiving by De Gruyter and the independent archiving service Portico
- no submission charges
- worldwide distribution and promotion of articles
- comprehensive abstracting & indexing e.g. SCOPUS and Web of Science
- unrestricted access for all readers
- immediate publication upon completing the publishing process
- Authors retain the copyrights
- Increased and accelerated citations



Contact us:

openchemistry@degruyter.com



Topical Issues in volume 16 and 17 (2018 and 2019):

▫

[Special Issue on the 14th Joint Conference on Chemistry \(14th JCC\)](#)

▫

[Special Issue on EMRS 2019 Fall Meeting](#)

▫

[Special Issue on Ecotoxicology & Environmental Safety](#)

Guest Editors:

Dr. Darren Jones - International Water, Air & Soil Conservation Society
INWASCON, Malaysia

Professor Dr. Ahmad Jalal Khan Chowdhury - International Islamic
University Malaysia

▫

[Special Issue on the Joint Science Congress of Materials and Polymers
\(ISCMP 2019\) - 12-14 September 2019, Kosovo](#)

▫

[Special Issue on the Recent Development of Pharmaceutical and Biomedical
Analysis](#)

▫ [Special Issue on Applied Biochemistry and Biotechnology](#)

▫ [Topical Issue on Monitoring, Risk Assessment and Sustainable
Management for the Exposure to Environmental Toxins](#)

▫ [Special Issue on the ISCMP 2018 - Joint Science Congress of Materials
and Polymers](#) - 9-12 November 2018, Durres, Albania

▫ [Special Issue on the 'Chemistry Today for Tomorrow'](#) - 01.02.2019, Sofia,
Bulgaria

[Topical Issue on Applications of Mathematics in Chemistry](#)

Guest Editor - Waqas Nazeer, Division of Science and Technology,
University of Education, Lahore Pakistan

▫ [Special Issue on the International Conference on Science, Applied](#)

Science, Teaching and Education 2019

- **Special Issue on 4th International Conference on Green Chemistry and Sustainable Engineering 2018**

- **Special Issue on the 10th Polish Conference on Analytical Chemistry (POKOCHA 2018)**

- **Special Issue on the 2nd International Conference on Chemistry, Chemical Process and Engineering (IC3PE)**

Guest Editor:

Dr. Is Fatimah, Universitas Islam Indonesia

- **Special Issue on the 13th Joint Conference on Chemistry (13th JCC)**

Guest Editor:

Adi Darmawan, Ph.D - Chemistry Department, Diponegoro University, Indonesia

- **Special Issue on the 4th International Conference on Computational and Experimental Science and Engineering (ICCESEN-2017)**

- **Topical Issue on Environmental Chemistry**

Guest Editor: [Dr. Wangxi Peng](#), Central South University of Forestry and Technology, China

- **Special Issue on the International Symposium on Materials Chemistry (ISyMC'18)**

Guest Editor: Dr. Irekti Amar, University M'hamed Bougara Boumerdes, Algeria

- **Special Issue on the International Conference on Applied Biochemistry and Biotechnology (ABB 2018)**

Guest Editor: Dr. Tingting Zheng, Peking University Shenzhen Hospital, China

- **Topical Issue on Bond Activation**

Guest Editor: [Dr. Burgert Blom](#), Maastricht University, Netherlands

- **Research for Natural Bioactive Products**

Guest Editors:

Nurhayat Tabanca, USDA ARS, United States

Antonio Evidente, University of Naples Federico II, Italy

Alessio Cimmino, University of Naples Federico II, Italy

- **Agriculture**

Guest Editor: Agnieszka Saeid, Wroclaw University of Science and Technology, Poland

- **Special Issue on the FUTURE MATERIALS 2020, Materials Science & Nanotechnology Conference - February 26-28 2020, Lisbon, Portugal**

The honored speakers of the meeting are Prof. Ada E. Yonath (Nobel Laureate 2009) and Prof. Michael Kosterlitz (Nobel Laureate 2016).

Guest Editors:

[Leonard Deepak Francis](#), International Iberian Nanotechnology Laboratory, Portugal

[Begoña Espiña](#), International Iberian Nanotechnology Laboratory, Portugal



Past Topical/Special Issues

Journal Partners:



All participants of the **2019 AIChE Annual Meeting in Orlando, FL** are welcome to submit their manuscripts in this journal on **special conditions**. For details, please visit this [website](#).

If you organize the Conference and look for the media partner, please contact the Managing Editor (Agnieszka Topolska, Agnieszka.Topolska@degruyter.com)

Editor-in-Chief

Joaquín Plumet, Complutense University, Spain

Managing Editor

Agnieszka Topolska, Poland

Associate Editors

[Darya Asheghali](#), University of Georgia, USA

[Ahmed Saif Aldein Alsaïd Ibrahim](#), Ministry of Environment, Natural Resources

and Physical Development, Khartoum, Republic of Sudan
Agnieszka Ruebenbauer, Jagiellonian University, Poland
[Navpreet Kaur Sethi](#), Zhejiang University, China
Bartosz Szyszko, University of Wrocław, Poland

Editorial Advisory Board

Metin Hayri Acar, Istanbul Technical University, Turkey
Sergei Aldoshin, Russian Academy of Sciences, Russia
Alexandru T. Balaban, Texas A&M University, USA
Roland Boese, University of Essen, Germany
Ronald Breslow, Columbia University, USA
Michel Che, Université Pierre et Marie Curie, France
Lew P. Christopher, Lakehead University, Canada
David C. Clary, University of Oxford, UK
Graham Cooks, Purdue University, USA
Elias J. Corey, Harvard University, USA
Carlos Fernandez, Robert Gordon University, UK
Karl Freed, University of Chicago, USA
[Boris Furtula](#), University of Kragujevac, Serbia
Jean-François Gérard, SGM INSA Lyon, CNRS, ECNP, France
Raquel P. Herrera, Isqch (Csic-Uz) Instituto De Síntesis Química Y Catálisis Homogénea, Spain
Janusz Jurczak, Warsaw University and Institute of Organic Chemistry, Poland
Alexei Khokhlov, Moscow State University and Nesmeyanov Institute of Organoelement Compounds, Russia
Tamas Kiss, University of Szeged, Hungary
Alexander M. Klibanov, Massachusetts Institute of Technology, USA
Jacek Klinowski, University of Cambridge, UK
Shu Kobayashi, University of Tokyo, Japan
Pavel Kratochvíl, Academy of Sciences of the Czech Republic, Czech Republic
Janusz Lipkowski, Polish Academy of Sciences, Poland
Govardhan Mehta, Indian Institute of Science, India
Marian Mikolajczyk, Centre of Molecular and Macromolecular Studies, Poland
Achim Müller, University of Bielefeld, Germany
Koji Nakanishi, Columbia University, USA
Stanislaw Penczek, Centre of Molecular and Macromolecular Studies, Poland
Chintamani Nagesa Ramachandra Rao, Jawaharlal Nehru Centre for Advanced Scientific Research, India
Thomas Rauchfuss, University of Illinois, USA
Vladimir Sklenar, Masaryk University, Czech Republic
Edward I. Solomon, Stanford University, USA
Frigyes Solymosi, University of Szeged, Hungary
Karel Stulik, Charles University, Czech Republic
[Nurhayat Tabanca](#), USDA ARS, United States
Barry Trost, Stanford University, USA
[Donald Truhlar](#), University of Minnesota, USA
Karel Ulbrich, Academy of Sciences of the Czech Republic, Czech Republic
Fosong Wang, Chinese Academy of Sciences, China
George Whitesides, Harvard University, USA

Frank Würthner, Institut für Organische Chemie & Center for Nanosystems
Chemistry, Germany
Hisashi Yamamoto, University of Chicago, USA
Yoshinori Yamamoto, Tohoku University, Japan
Jung Woon Yang, Sungkyunkwan University, South Korea
Miguel Yus, University of Alicante, Spain
Qi-Feng Zhou, Peking University, China

Editors:

Analytical Chemistry

Ebaa Adnan Azooz, University of Kufa, Iraq
[Arindam Bose](#), Harvard University, USA
[Domenico Cautela](#), Stazione Sperimentale per le Industrie delle Essenze e dei
derivati dagli Agrumi (SSEA), Italy
[Dariusz Guziejewski](#), University of Lodz, Poland
Chiara Fanali, Campus Bio-Medico University of Rome, Italy
Agata Jakóbk-Kolon, Silesian University of Technology, Poland
[Peter Knittel](#), Fraunhofer IAF, Institute for Applied Solid State Physics,
Germany
Xing Ma, Harbin Institute of Technology (Shenzhen), China
[Antonio Martin-Esteban](#), National Institute for Agricultural and Food Research
and Technology (INIA), Spain
[Waqas Nazeer](#), University of Education, Pakistan
Jorge Pereira, Analytical Chemistry and Enology Lab (ACE-lab), Madeira
University, Portugal
Francesco Siano, Consiglio Nazionale delle Ricerche (CNR) Istituto di Scienze
dell'Alimentazione (ISA), Italy
[Krishnamoorthy Sivakumar](#), SCSVMV University, India
[Constantinos K. Zacharis](#), School of Pharmacy, Aristotle University of
Thessaloniki (AUTH), Greece

Bioanalytical Chemistry

Silvana Andreescu, Clarkson University, USA
[Murali Anuganti](#), University of Nevada, USA
Jorge Pereira, Analytical Chemistry and Enology Lab (ACE-lab), Madeira
University, Portugal

Biochemistry and Biological Chemistry

[Murali Anuganti](#), University of Nevada, USA
[Arindam Bose](#) - Harvard University, USA
Dibyendu Dana, Angion Biomedical Corporation, USA
Rajat Subhra Das, Omega Therapeutics, USA
[Raj Mukherjee](#), Sanofi, CHC R&D, USA
[Atul Srivastava](#), University of Chicago, USA

Biochemistry and Biotechnology

Costel C. Darie, Clarkson University, USA
Luyun Jiang, Oxford University, UK

Biomaterials

[Murali Anuganti](#), University of Nevada, USA
Mazeyar Parvinzadeh Gashti, PRE Labs Inc, Canada
Saravana Kumar Jaganathan, Universiti Teknologi Malaysia, Johor
Xing Ma, Harbin Institute of Technology (Shenzhen), China

Biophysics and Chemical Physics in Biology

[Atul Srivastava](#), University of Chicago, USA
[Iveta Waczulikova](#), Comenius University, Slovakia

Catalysis

[Diego Alonso](#), Alicante University, Spain
Xavier Companyó, University of Padua, Italy
Tecla Gasperi, Università "Roma Tre", Italy
Awal Noor, COMSATS Institute of Information Technology, Abbottabad
Campus, Paksitan

Chemical Kinetics and Reactivity

[Khuram Shahzad Ahmad](#), Fatima Jinnah Women University, Pakistan
Sayak Bhattacharya, Galgotias University, India
Xavier Companyó, University of Padua, Italy
[Zhien Zhang](#), Ohio State University, USA

Chemical Physics

Sayak Bhattacharya, Galgotias University, India
[Mohsen Mhadhbi](#), National Institute of Research and Physical-chemical
Analysis, Tunisia
Ponnadurai Ramasami, University of Mauritius, Mauritius

Clinical Chemistry

[Arindam Bose](#) - Harvard University, USA
[Tingting Zheng](#), Peking University Shenzhen Hospital, China

Computational Chemistry, Chemometrics and QSAR

[Robert Fraczkiewicz](#), Simulations Plus, Inc., USA
Jose Gonzalez-Rodriguez, University of Lincoln, UK

Coordination Chemistry

Awal Noor, COMSATS Institute of Information Technology, Abbottabad
Campus, Paksitan

Crystallography

Awal Noor, COMSATS Institute of Information Technology, Abbottabad
Campus, Paksitan

Electrochemistry

[Dariusz Guziejewski](#), University of Lodz, Poland
Luyun Jiang, Oxford University, UK
Peter Knittel, Fraunhofer IAF, Institute for Applied Solid State Physics,

Germany

Laszlo Peter, Hungarian Academy of Sciences, Hungary

Jose Gonzalez-Rodriguez, University of Lincoln, UK

Environmental Chemistry

[Khuram Shahzad Ahmad](#), Fatima Jinnah Women University, Pakistan

[Aleksander Astel](#), Pomeranian Academy, Poland

Sayak Bhattacharya, Galgotias University, India

[Paolo Censi](#), University of Palermo, Italy

Christophoros Christophoridis, National Research Center "Demokritos", Greece

Agata Jakóbk-Kolon, Silesian University of Technology, Poland

Luyun Jiang, Oxford University, UK

[Fei Li Zhongnan](#), University of Economics and Law, China

Awal Noor, COMSATS Institute of Information Technology, Abbottabad

Campus, Paksitan

Tanay Pramanik, Lovely Professional University, India

Lakshmi Narayana Suvarapu, Yeungnam University, Republic of Korea

[Zhien Zhang](#), Ohio State University, USA

Fluorescence Spectroscopy

[Krishnamoorthy Sivakumar](#), SCSVMV University, India

Inorganic Chemistry

[Aharon Gedanken](#), Bar-Ilan University, Israel

Agata Jakóbk-Kolon, Silesian University of Technology, Poland

[Zoran Mazej](#), Jozef Stefan Institute, Slovenia

Mohsen Mhadhbi, National Institute of Research and Physical-chemical

Analysis, Tunisia

Awal Noor, COMSATS Institute of Information Technology, Abbottabad

Campus, Paksitan

Tiefeng Peng, Southwest University of Science and Technology & Chongqing

University, China

Snezana Zaric, University of Belgrade (Serbia) and Texas A&M University at

Qatar

IR and Raman Spectroscopy

Xing Ma, Harbin Institute of Technology (Shenzhen), China

[María Mar Quesada-Moreno](#), Max Planck Institute for the Structure and

Dynamics of Matter, Germany

Macromolecules and Polymers

Mazeyar Parvinzadeh Gashti, PRE Labs Inc, Canada

Saravana Kumar Jaganathan, Universiti Teknologi Malaysia, Johor

Tanay Pramanik, Lovely Professional University, India

[Christian Schmitz](#), University Hochschule Niederrhein, Germany

[Shin-ichi Yusa](#), University of Hyogo, Japan

[Szczepan Zapotoczny](#), Jagiellonian University, Poland

[Zhien Zhang](#), Ohio State University, USA

Materials

Csaba Balazsi, Centre for Energy Research, Hungarian Academy of Sciences, Hungary

[Sergio Carrasco](#), Stockholm University, Sweden

[Aharon Gedanken](#), Bar-Ilan University, Israel

[Huanhuan Feng](#), Harbin Institute of Technology, China

Mazeyar Parvinzadeh Gashti, PRE Labs Inc, Canada

Saravana Kumar Jaganathan, Universiti Teknologi Malaysia, Johor

Mohsen Mhadhbi, National Institute of Research and Physical-chemical Analysis, Tunisia

Janos Szepvolgyi, Hungarian Academy of Sciences, Hungary

Medicinal Chemistry

[Murali Anuganti](#), University of Nevada, USA

[Dr Biljana Arsic](#), University of Nis, Republic of Serbia

Dibyendu Dana, Angion Biomedical Corporation, USA

Rajat Subhra Das, Omega Therapeutics, USA

Tecla Gasperi, Università "Roma Tre", Italy

[Sravanthi Devi Guggilapu](#), University of Maryland-College Park, USA

Awal Noor, COMSATS Institute of Information Technology, Abbottabad Campus, Pakistan

Tanay Pramanik, Lovely Professional University, India

Tingting Zheng, Peking University Shenzhen Hospital, China

Natural Product Chemistry

[Khuram Shahzad Ahmad](#), Fatima Jinnah Women University, Pakistan

[Domenico Cautela](#), Stazione Sperimentale per le Industrie delle Essenze e dei derivati dagli Agrumi (SSEA), Italy

[Łukasz Cieřła](#), The University of Alabama, USA

[Przemysław Kowalczewski](#), Poznan University of Life Sciences, Poland

Chanchal Kumar Malik, Vanderbilt University, USA

[Shagufta Perveen](#), King Saud University, Kingdom of Saudi Arabia

[Riaz Ullah](#) - King Saud University Riyadh, Saudi Arabia

Francesco Siano, Consiglio Nazionale delle Ricerche (CNR) Istituto di Scienze dell'Alimentazione (ISA), Italy

Nurhayat Tabanca, USDA-ARS, Subtropical Horticulture Research Station, Miami, USA

NMR Spectroscopy

[Shagufta Perveen](#), King Saud University, Kingdom of Saudi Arabia

[Atul Srivastava](#), University of Chicago, USA

Organic Chemistry

[Anthony J. Burke](#) - University of Évora, Portugal

Eugenijus Butkus, Vilnius University, Lithuania

Xavier Companyó, University of Padua, Italy

Dibyendu Dana, Angion Biomedical Corporation, USA

Tecla Gasperi, Università "Roma Tre", Italy

[Sravanthi Devi Guggilapu](#), University of Maryland-College Park, USA

Chanchal Kumar Malik, Vanderbilt University, USA
Matthew O'Brien, Keele University, UK
Tanay Pramanik, Lovely Professional University, India

Organometallic Chemistry

Awal Noor, COMSATS Institute of Information Technology, Abbottabad
Campus, Pakistan

[Cristian Silvestru](#), Babes-Bolyai University, Romania

Lakshmi Narayana Suvarapu, Yeungnam University, Republic of Korea

Pharmaceutical Chemistry

[Arindam Bose](#) - Harvard University, USA

[Sravanthi Devi Guggilapu](#), University of Maryland-College Park, USA

[Przemysław Kowalczewski](#), Poznan University of Life Sciences, Poland

[Raj Mukherjee](#), Sanofi, CHC R&D, USA

Photochemistry

[Przemysław Kowalczewski](#), Poznan University of Life Sciences, Poland

[Krishnamoorthy Sivakumar](#), SCSVMV University, India

Physical Chemistry

Catinca Secuianu, Imperial College London, UK

[Huanhuan Feng](#), Harbin Institute of Technology, China

Luyun Jiang, Oxford University, UK

Mohsen Mhadhbi, National Institute of Research and Physical-chemical
Analysis, Tunisia

Tiefeng Peng, Southwest University of Science and Technology & Chongqing
University, China

[María Mar Quesada-Moreno](#), Max Planck Institute for the Structure and
Dynamics of Matter, Germany

[Ponnadurai Ramasami](#), University of Mauritius, Mauritius

Physical Chemistry and Physical Organic Chemistry

Sayak Bhattacharya, Galgotias University, India

Ponnadurai Ramasami, University of Mauritius, Mauritius

Phytochemistry

[Khuram Shahzad Ahmad](#), Fatima Jinnah Women University, Pakistan

Chanchal Kumar Malik, Vanderbilt University, USA

Shagufta Perveen, King Saud University, Kingdom of Saudi Arabia

[Riaz Ullah](#) - King Saud University Riyadh, Saudi Arabia

Radiochemistry and Nuclear Chemistry

Stefan Neumeier, Forschungszentrum Jülich, Germany

Solid State Chemistry

[Sofoklis Makridis](#), University of Western Macedonia & Lawrence Berkeley
National Laboratories, USA

Chanchal Kumar Malik, Vanderbilt University, USA

Mohsen Mhadhbi, National Institute of Research and Physical-chemical
Analysis, Tunisia

Spectroscopy

Xavier Companyó, University of Padua, Italy

[Huanhuan Feng](#), Harbin Institute of Technology, China

Mazeyar Parvinezadeh Gashti, PRE Labs Inc, Canada

[Krishnamoorthy Sivakumar](#), SCSVMV University, India

Supramolecular Chemistry and Nanochemistry

[Krishnamoorthy Sivakumar](#), SCSVMV University, India

Surface Chemistry and Colloids

[Huanhuan Feng](#), Harbin Institute of Technology, China

Mazeyar Parvinezadeh Gashti, PRE Labs Inc, Canada

Xing Ma, Harbin Institute of Technology (Shenzhen), China

Mohsen Mhadhbi, National Institute of Research and Physical-chemical Analysis, Tunisia

[Raj Mukherjee](#), Sanofi, CHC R&D, USA

Tiefeng Peng, Southwest University of Science and Technology & Chongqing University, China

[Christian Schmitz](#), University Hochschule Niederrhein, Germany

[Jose Luis Toca-Herrera](#), University of Natural Resources and Life Sciences, Austria

Nanochemistry

Silvana Andreescu, Clarkson University, USA

Mazeyar Parvinezadeh Gashti, PRE Labs Inc, Canada

Omkar Singh Kushwaha, Chemical Engineering Department, Indian Institute of Technology, India

[Jerzy Langer](#), Adam Mickiewicz University, Poland

Xing Ma, Harbin Institute of Technology (Shenzhen), China

[Linda Mbeki](#), VU University Amsterdam, The Netherlands

[Waqas Nazeer](#), University of Education, Pakistan

Gaweł Sołowski, Gdansk University Of Technology, Poland

[Jose Luis Toca-Herrera](#), University of Natural Resources and Life Sciences, Austria

Tingting Zheng, Peking University Shenzhen Hospital, China

Thermodynamics

Sayak Bhattacharya, Galgotias University, India

Theoretical and Computational Chemistry

Sayak Bhattacharya, Galgotias University, India

[Christiana Mitsopoulou](#), National and Kapodistrian University of Athens, Greece

Ponnadurai Ramasami, University of Mauritius, Mauritius

Language Editors

Kingsley K. Donkor, Thompson Rivers University, Canada

Emmanuel G. Escobar, University of Sheffield, UK

Marie Frusher, Defence Science & Technology Laboratory, UK

[Baljit K Ghatora](#), Kingston University, UK

Victoria Guarisco, Macon State College, USA
[Gavin Hazell](#), University of Bristol, UK
Heidi Huttunen-Hennelly, Thompson Rivers University, Canada
Kate Khan, Imperial College London, UK
Monika Marciniak, University of Washington, USA
Mayoorini Majuran, Monash University, Clayton, Australia
Monica Ramirez, Broward College, USA
Maria Reiner, Ferdinand-Braun-Institut, Leibniz-Institut für
Höchstfrequenztechnik, Germany
Andrea Renzetti, University of Cambridge, UK
[Navpreet K. Sethi](#), Zhejiang University, Hangzhou, China
Gemma Shearman, Kingston University, UK
Bryan Spiegelberg, Rider University, USA
Michael Wentzel, University of Minnesota, USA

Assistant Editors

Hatem Elmongy, Stockholm University, Sweden
Morteza Jandaghi, University of Toledo, USA
Richard Johnson, UK
Javier Moreno, Leibniz-Institut für Molekulare Pharmakologie, Germany
[Vijaykumar D. Nimbarte](#), Goethe University Frankfurt am Main, Germany
[Tomasz G. Witkowski](#), University of Ottawa, Canada

Technical Editor:

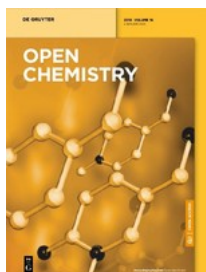
Jakub Czubik, Poland

Publisher

DE GRUYTER Poland
Bogumiła Zuga 32A Str.
01-811 Warsaw, Poland
T: +48 22 701 50 15

Editorial Contact

Agnieszka Topolska
openchemistry@degruyter.com



Open Chemistry

formerly Central European Journal of Chemistry

IMPACT FACTOR 2018: 1.512
5-year IMPACT FACTOR: 1.599

CiteScore 2018: 1.58

SCImago Journal Rank (SJR) 2018: 0.345
Source Normalized Impact per Paper (SNIP) 2018: 0.684

ICV 2018: 163.25

 OPEN ACCESS

Online

ISSN 2391-5420

 [See all formats and pricing](#) 

 [Print Flyer](#)

 [Get eTOC Alert](#) 

 [Get New Article Alert](#) 

More options

GO

 [Select Volume and Issue](#)

Volume 17, Issue 1 (Jan 2019)

 **Regular Articles**

OK

Li, Wen-Lan / Ding, Jing-Xin / Bai, Jing / Hu, Yang / Song, Hui / Sun, Xiang-Ming / Ji, Yu-Bin

Li, Wen-Lan / Ding, Jing-Xin / Bai, Jing / Hu, Yang / Song, Hui / Sun, Xiang-Ming / Ji, Yu-Bin

Page 1

Published Online: 01/08/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Efficacy of *Pyrus elaeagnifolia* subsp. *elaegnifolia* in acetic acid-induced colitis model

Ilhan, Mert / Akkol, Esra Küpeli / Taştan, Hakkı / Dereli, Fatma Tuğçe Güragaç / Tümen, Ibrahim

Page 13

Published Online: 01/08/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Anti-inflammatory and antinociceptive features of *Bryonia alba* L.: As a possible alternative in treating rheumatism

Ilhan, Mert / Dereli, Fatma Tuğçe Güragaç / Tümen, Ibrahim / Akkol, Esra Küpeli

Page 23

Published Online: 01/05/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

High efficiency liposome fusion induced by reducing undesired membrane peptides interaction

Zheng, Tingting / Chen, Yun / Shi, Yu / Feng, Huanhuan

Page 31

Published Online: 02/22/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Prediction of the Blood-Brain Barrier Permeability Using RP-18 Thin Layer Chromatography

Sobańska, Anna W. / Wanat, Karolina / Brzezińska, Elżbieta

Page 43

Published Online: 02/02/2019

Phytic Acid Extracted from Rice Bran as a Growth Promoter for *Euglena gracilis*

Zhu, Jianguyu / Hong, Dang Diem / Wakisaka, Minato

Page 57

Published Online: 03/11/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Development of a validated spectrofluorimetric method for assay of sotalol hydrochloride in tablets and human plasma: application for stability-indicating studies

Ibrahim, Fawzia A. / El-Brashy, Amina M. / El-Awady, Mohamed I. / Abdallah, Nora. A.

Page 64

Published Online: 02/23/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Topological Indices of Hyaluronic Acid-Paclitaxel Conjugates' Molecular Structure in Cancer Treatment

Zheng, Lina / Wang, Yiqiao / Gao, Wei

Page 81

Published Online: 02/22/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Thermodynamic properties of the bubble growth process in a pool boiling of water-ethanol mixture two-component system

Sattari, Mohammad / Mahdavian, Leila

Page 88

Published Online: 02/22/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

OK

Page 90

Published Online: 02/22/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Characteristics of Stable Hydrogen and Oxygen Isotopes of Soil Moisture under Different Land Use in Dry Hot Valley of Yuanmou

Han, Jiao-Jiao / Duan, Xu / Zhao, Yang-Yi / Li, Meng

Page 105

Published Online: 02/22/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Specific, highly sensitive and simple spectrofluorimetric method for quantification of daclatasvir in HCV human plasma patients and in tablets dosage form

Ali, Ramadan / Elsutohy, Mohamed M

Page 116

Published Online: 02/22/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Chromium-modified cobalt molybdenum nitrides as catalysts for ammonia synthesis

Adamski, Paweł / Nadziejko, Marlena / Komorowska, Agata / Sarnecki, Adam / Albrecht, Aleksander / Moszyński, Dariusz

Page 127

Published Online: 03/29/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Langerhans cell-like dendritic cells treated with ginsenoside Rh2 regulate the differentiation of Th1 and Th2 cells in vivo

Liu, Ying / Wu, Qian / Li, Peng / Liu, Weijie / Jin, Yongri / Li, Xuwen / Shi, Xiaolei

Page 142

Published Online: 03/29/2019

 [DOWNLOAD PDF](#)

OK

Identification of Powdery Mildew *Blumeria graminis* f. sp. *tritici* Resistance Genes in Selected Wheat Varieties and Development of Multiplex PCR

Tomkowiak, Agnieszka / Skowrońska, Roksana / Weigt, Dorota / Kwiatek, Michał / Nawracała, Jerzy / Kowalczewski, Przemysław Łukasz / Pluta, Mateusz

Page 157

Published Online: 03/22/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Computational Analysis of new Degree-based descriptors of oxide networks

Hussain, Zafar / Munir, Mobeen / Bilal, Muhammad / Ameer, Alam / Rafique, Shazia / Kang, Shin Min

Page 177

Published Online: 03/29/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

The Use Of Chemical Composition And Additives To Classify Petrol And Diesel Using Gas Chromatography–Mass Spectrometry And Chemometric Analysis: A Uk Study

Suppajariyawat, Praew / Andrade, Ana Flavia Belchior de / Elie, Mathieu / Baron, Mark / Gonzalez-Rodriguez, Jose

Page 183

Published Online: 03/29/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Minimal Energy Tree with 4 Branched Vertices

Hameed, Saira / Ahmad, Uzma

Page 198

Published Online: 04/03/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Jatropha seed oil derived poly(esteramide-urethane)/ fumed silica nanocomposite coatings for corrosion protection

OK

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Calculating topological indices of certain OTIS interconnection networks

Aslam, Adnan / Ahmad, Safyan / Binyamin, Muhammad Ahsan / Gao, Wei

Page 220

Published Online: 04/10/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Energy storage analysis of R125 in UIO-66 and MOF-5 nanoparticles: A molecular simulation study

Wang, Qiang / Tang, Shengli

Page 229

Published Online: 04/10/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Velvet Antler compounds targeting major cell signaling pathways in osteosarcoma - a new insight into mediating the process of invasion and metastasis in OS

Zhang, Zhengyao / Li, Pengfei / Li, Tie / Zhao, Changwei / Wang, Guoxiang

Page 235

Published Online: 03/29/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Effects of Azadirachta Indica Leaf Extract, Capping Agents, on the Synthesis of Pure And Cu Doped ZnO-Nanoparticles: A Green Approach and Microbial Activity

Handago, Dawit Tamire / Zereffa, Enyew Amare / Gonfa, Bedasa Abdisa

Page 246

Published Online: 04/24/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

OK

M.A., Tahoon / E.A., Goma / M.H.A., Suleiman

Page 260

Published Online: 04/24/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

A proposed image-based detection of methamidophos pesticide using peroxyoxalate chemiluminescence system

Juachon, Maria Janine / Regala, Justine Grace / Marquez, John Matthew / Bailon, Mark Xavier

Page 270

Published Online: 04/24/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Phytochemical screening and estrogenic activity of total glycosides of *Cistanche deserticola*

Li, Wen-Lan / Ding, Jing-Xin / Liu, Bing-Mei / Zhang, Da-Lei / Song, Hui / Sun, Xiang-Ming / Liu, Gui-Yu / Wang, Jing-Ya / Ji, Yu-Bin

Page 279

Published Online: 04/24/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Biological evaluation of a series of benzothiazole derivatives as mosquitocidal agents

Sever, Belgin / Altıntop, Mehlika Dilek / Özdemir, Ahmet / Tabanca, Nurhayat / Estep, Alden S. / Becnel, James J. / Bloomquist, Jeffrey R.

Page 288

Published Online: 06/07/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Chemical pretreatments of *Trapa bispinosa*'s peel (TBP) biosorbent to enhance adsorption capacity for Pb(II)

Zafar, Muhammad Nadeem / Saeed, Muzna / Nadeem, Raziya / Sumrra, Sajjad Hussain / Shafqat, Syed Salman /

OK

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Dynamic Changes in MMP1 and TIMP1 in the Antifibrotic Process of Dahuang Zhechong Pill in Rats with Liver Fibrosis

Lin, Jiayu / Deng, Chaowen / Peng, Yanzhong / Zheng, Jie / Wei, Liya / Shi, Yu / Gong, Zhenghua / Hu, Guoxin

Page 346

Published Online: 06/01/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

The Optimization and Production of Ginkgolide B Lipid Microemulsion

Wu, Xiao / Wang, Zhenpeng / Zhao, Zhenwen / Chen, Lei / Tao, Fengyun / Zhang, Qian / Zhou, Tuo / Cui, Junpu / Liu, Meng / Huo, Qing

Page 357

Published Online: 06/07/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Photodynamic Therapy Enhanced the Antitumor Effects of Berberine on HeLa Cells

Liu, Han-Qing / An, Ya-Wen / Hu, A-Zhen / Li, Ming-Hua / Cui, Guang-Hui

Page 413

Published Online: 06/12/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Chiral and Achiral Enantiomeric Separation of (\pm)-Alprenolol

Guerrero, M.M. López / Díaz, A. Navas / Sánchez, F. García / Corral, H.

Page 429

Published Online: 06/12/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

OK

Disruption among Children in an Endemic Fluorosis area in Pakistan

Zulfiqar, Sadia / Rehman, Shafiq ur / Ajaz, Humayun / Elahi, Shan / Zaman, Waheed uz / Batool, Nayyab / Yasmeen, Farhat

Page 465

Published Online: 07/01/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

A one-step incubation ELISA kit for rapid determination of dibutyl phthalate in water, beverage and liquor

Sun, Quing / Chen, Yanli / Li, Fuxue / Jia, Minghong / Shi, Guoqing

Page 392

Published Online: 07/08/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Free Radical Scavenging Activity of Essential Oil of Eugenia caryophyllata from Amboina Island and Derivatives of Eugenol

Julianus Sohilait, Hanoch / Kainama, Healthy

Page 422

Published Online: 07/08/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Effects of Blue and Red Light On Growth And Nitrate Metabolism In Pakchoi

Fan, Xiao-Xue / Xue, Feng / Song, Bo / Chen, Long-Zheng / Xu, Gang / Xu, Hai

Page 456

Published Online: 07/12/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

miRNA-199a-5p functions as a tumor suppressor in prolactinomas

Jichao, Wang / Jing, Guo / Fei, Wang / Lei, Cao / Qian, Liu / Jie, Feng / Hongyun, Wang / Hua, Gao / Yazhuo, Zhang

Page 500

OK

 OPEN ACCESS

Solar photodegradation of carbamazepine from aqueous solutions using a compound parabolic concentrator equipped with a sun tracking system

Yazdanbakhsh, Ahmadreza / Nemati, Reza / Massoudinejad, Mohamadreza / Jafari, Mohamadjavad / Dashtdar, Masoomeh

Page 477

Published Online: 08/27/2019

 DOWNLOAD PDF

 OPEN ACCESS

Influence of sub-inhibitory concentration of selected plant essential oils on the physical and biochemical properties of *Pseudomonas orientalis*

Leja, Katarzyna / Drożdżyńska, Agnieszka / Majcher, Małgorzata / Kowalczewski, Przemysław Łukasz / Czaczyk, Katarzyna

Page 492

Published Online: 07/19/2019

 DOWNLOAD PDF

 OPEN ACCESS

Preparation and spectroscopic studies of Fe(II), Ru(II), Pd(II) and Zn(II) complexes of Schiff base containing terephthalaldehyde and their transfer hydrogenation and Suzuki-Miyaura coupling reaction

Turan, Nevin / Buldurun, Kenan / Çolak, Naki / Özdemir, İsmail

Page 571

Published Online: 09/25/2019

 DOWNLOAD PDF

 OPEN ACCESS

Complex formation in a liquid-liquid extraction-chromogenic system for vanadium(IV)

Gavazov, Kiril B. / Delchev, Vassil B. / Milcheva, Nikolina P. / Toncheva, Galya K.

Page 599

Published Online: 09/25/2019

 DOWNLOAD PDF

Synthesis, characterization (IR, ¹H, ¹³C & ³¹P NMR), fungicidal, herbicidal and molecular docking evaluation of steroid phosphorus compounds

Alam, Mahboob / Kim, Youngwon / Park, Soonheum

Page 621

Published Online: 08/27/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Analysis and Biological Evaluation of Arisaema Amuremse Maxim Essential Oil

Li, Guiying / Jiang, Yueyao / Li, Yingjun / He, Tong / Wang, Ying / Ji, Tianyi / Zhai, Wanchen / Zhao, Lichun / Zhou, Xiaoping

Page 647

Published Online: 09/25/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

A preliminary assessment of potential ecological risk and soil contamination by heavy metals around a cement factory, western Saudi Arabia

El-Sherbiny, Mohsen M. / Ismail, Ali I. / EL-Hefnawy, Mohamed E.

Page 671

Published Online: 09/25/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Anti-inflammatory effect of Prunus tomentosa Thunb total flavones in LPS-induced RAW264.7 cells

Xi, Chen / Yuanyuan, Liu / Dongshuang, Zhao / Ziwei, Fan / Shuang, Cao / Jianguang, Chen / Chengyi, Zhang

Page 685

Published Online: 09/25/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Collaborative Influence of Elevated CO₂ Concentration and High Temperature on Potato Biomass Accumulation and Characteristics

OK

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Methods of extraction, physicochemical properties of alginates and their applications in biomedical field – a review

Beata Łabowska, Magdalena / Michalak, Izabela / Detyna, Jerzy

Page 738

Published Online: 10/29/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Characteristics of liposomes derived from egg yolk

Kondratowicz, Anna / Weiss, Marek / Juzwa, Wojciech / Majchrzycki, Łukasz / Lewandowicz, Grażyna

Page 763

Published Online: 09/25/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Preparation of ternary ZnO/Ag/cellulose and its enhanced photocatalytic degradation property on phenol and benzene in VOCs

Zou, Xiao-Hang / Zhao, Si-Wei / Zhang, Ji-Guo / Sun, Hui-Liang / Pan, Qing-Jiang / Guo, Yuan-Ru

Page 779

Published Online: 09/25/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Influence of Human Serum Albumin Glycation on the Binding Affinities for Natural Flavonoids

Liu, Liangliang / Liu, Yi / Xiao, Aiping / Mei, Shiyong / Xie, Yixi

Page 806

Published Online: 10/02/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

OK

a]pyrimidines

Abuelizz, Hatem A. / Taie, Hanan A.A. / Marzouk, Mohamed / Al-Salahi, Rashad

Page 823

Published Online: 10/12/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Comparative study on the antioxidant activities of ten common flower teas from China

Hu, Xiao-Fang / Ding, Zong-Bao / Chen, Yue / Luo, Jiang-Fu / He, Jian-Min / Yin, Tian-Peng

Page 841

Published Online: 10/16/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Molecular Properties of Symmetrical Networks Using Topological Polynomials

Wang, Xing-Long / Liu, Jia-Bao / Ahmad, Maqsood / Kamran Siddiqui, Muhammad / Hussain, Muhammad / Saeed, Muhammad

Page 849

Published Online: 10/29/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Synthesis of Co₃O₄ Nano Aggregates by Co-precipitation Method and its Catalytic and Fuel Additive Applications

Janjua, Muhammad Ramzan Saeed Ashraf

Page 865

Published Online: 10/16/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Phytochemical analysis, Antioxidant and Antiprotoscolices potential of ethanol extracts of selected plants species against Echinococcus granulosus: In-vitro study

Haleem, Sumbal / Niaz, Sadaf / Qureshi, Naveeda Akhtar / Ullah, Riaz / Mahmood, Hafiz Majid / Shahat, Abdelaaty A.

Page 874

Silver nanoparticles enhanced fluorescence for sensitive determination of fluoroquinolones in water solutions

Wang, Hongling / Si, Xuejing / Wu, Tunhua / Wang, Ping

Page 884

Published Online: 11/06/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Simultaneous Quantification of the New Psychoactive Substances 3-FMC, 3-FPM, 4-CEC, and 4-BMC in Human Blood using GC-MS

Bakdash, Abdulsallam

Page 902

Published Online: 10/29/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Biodiesel Production by Lipids From Indonesian strain of Microalgae *Chlorella vulgaris*

Purkan, Purkan / Nidianti, Ersalina / Abdulloh, Abdulloh / Safa, Abdillah / Retnowati, Wiwin / Soemarjati, Wiwie / Nurlaila, Hamida / Wook Kim, Seung

Page 919

Published Online: 10/29/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Miscibility studies of polystyrene/polyvinyl chloride blend in presence of organoclay

Aseeri, Jumaa / Alandis, Naser M. / Mekhamer, Waffa / Alam, Manawwer

Page 927

Published Online: 10/29/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

OK

Page 936

Published Online: 10/23/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Novel 1,8-Naphthyridine Derivatives: Design, Synthesis and in vitro screening of their cytotoxic activity against MCF7 cell line

Al-romaizan, Abeer N. / Jaber, Thoraya S. / Ahmed, Nesreen S.

Page 943

Published Online: 11/06/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Investigation of Stress Corrosion Cracking Behaviour of Mg-Al-Zn Alloys in Different pH Environments by SSRT Method

Catar, Recep / Altun, Hikmet

Page 972

Published Online: 11/06/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Various Combinations of Flame Retardants for Poly (vinyl chloride)

Çetin, Ayşe / Erzençin, S.Gamze / Alp, F. Burcu

Page 980

Published Online: 11/06/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Phenolic compounds and biological activities of rye (*Secale cereale* L.) grains

Kulichová, Katarína / Sokol, Jozef / Nemeček, Peter / Maliarová, Mária / Maliar, Tibor / Havrlentová, Michaela / Kraic, Ján

Page 988

Published Online: 10/31/2019

 [DOWNLOAD PDF](#)

Oxidative degradation of gentamicin present in water by an electro-Fenton process and biodegradability improvement

Arhoutane, Mohamed Réda / Yahya, Muna Shueai / Karbane, Miloud El / Kacemi, Kacem El

Page 1017

Published Online: 11/13/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Optimizing Suitable Conditions for the Removal of Ammonium Nitrogen by a Microbe Isolated from Chicken Manure

Zhang, Yan / Fu, Chun-Yan / Li, Xin-Hua / Yan, Pei-Pei / Shi, Tian-Hong / Wu, Jia-Qiang / Wei, Xiang-Fa / Liu, Xue-Lan

Page 1026

Published Online: 11/13/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Anti-inflammatory, antipyretic, analgesic, and antioxidant activities of Haloxylon salicornicum aqueous fraction

Ullah, Riaz / Alsaïd, Mansour S. / Alqahtani, Ali S. / Shahat, Abdelaaty A. / Naser, Almoqbil A. / Mahmood, Hafiz Majid / Ahamad, Syed Rizwan / Al-Mishari, Abdullah A. / Ahmad, Shabir

Page 1034

Published Online: 11/13/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

The anti-corrosion behaviour of *Satureja montana* L. extract on iron in NaCl solution

Pilić, Zora / Dragičević, Ivan / Martinović, Ivana

Page 1087

Published Online: 12/10/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Interleukin-4, hemopexin, and lipoprotein-associated phospholipase A2 are significantly increased in patients with unstable carotid plaque

OK

Page 1105

Published Online: 12/06/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

A comparative study of the crystal structures of 2-(4-(2-(4-(3-chlorophenyl)piperazine-1-yl)ethyl) benzyl)isoindoline-1,3-dione by synchrotron radiation X-ray powder diffraction and single-crystal X-ray diffraction

Zhou, Jin-Hui / Shi, Mao-Jian / Ding, Lin / ShangGuan, Guo-Qiang / Xu, Jun

Page 1116

Published Online: 12/06/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Conceptual DFT as a Novel Chemoinformatics Tool for Studying the Chemical Reactivity Properties of the Amatoxin Family of Fungal Peptides

Flores-Holguín, Norma / Frau, Juan / Glossman-Mitnik, Daniel

Page 1133

Published Online: 12/10/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Occurrence of Aflatoxin M1 in Milk-based Mithae samples from Pakistan

Naz, Narjis / Abbas, Mateen / Rubab, Anam / Kanwal, Kinza

Page 1140

Published Online: 12/18/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Kinetics of Iron Removal From Ti-Extraction Blast Furnace Slag by Chlorination Calcination

He, Siqi / Peng, Tongjiang / Sun, Hongjuan / Luo, Dongshan / Xiao, Qing / Geng, Qian

Page 1146

Published Online: 12/18/2019

Increasing the activity of DNAzyme based on the telomeric sequence: 2'-OMe-RNA and LNA modifications

Kosman, J. / Żukowski, K. / Juskowiak, B.

Page 1157

Published Online: 12/19/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Exploring the optoelectronic properties of a chromene-appended pyrimidone derivative for photovoltaic applications

Assiri, Mohammed A.

Page 1167

Published Online: 12/18/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Effect of He Qi San on DNA Methylation in Type 2 Diabetes Mellitus Patients with Phlegm-blood Stasis Syndrome

Shufang, Chu / Yinan, Zhou / Huilin, Li / Hengxia, Zhao / Deliang, Liu / Xuemei, Liu

Page 1213

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Cyclodextrin potentiometric sensors based on selective recognition sites for procainamide: Comparative and theoretical study

AlRabiah, Haitham / Homoda, Atef / Bakheit, Ahmed / AE Mostafa, Gamal

Page 1222

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Nonisothermal Cold Crystallization Kinetics of Poly(lactic acid)/Bacterial

OK

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Enhanced adsorption of sulfonamide antibiotics in water by modified biochar derived from bagasse

Qin, Pinzhu / Huang, Dawei / Tang, Rong / Gan, Fangqun / Guan, Ying / Lv, Xiaoxiao

Page 1309

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Study on the Mechanism of Shugan Xiaozhi Fang on Cells with Non-alcoholic Fatty Liver Disease

Xing, Yufeng / Zhang, Chuantao / Zhai, Fenfen / Zhou, Tianran / Cui, Xiang / Han, Zhiyi / Peng, Deti / Tong, Guangdong

Page 1328

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Comparative Effects of Salt and Alkali Stress on Antioxidant System in Cotton (*Gossypium Hirsutum* L.) Leaves

Guo, Huijuan / Hu, Zhiqiang / Zhang, Huimin / Min, Wei / Hou, Zhenan

Page 1352

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Optimization of chromatographic systems for analysis of selected psychotropic drugs and their metabolites in serum and saliva by HPLC in order to monitor therapeutic drugs

Wróblewski, K. / Petruczynik, A. / Tuzimski, T. / Prajsnar, K. / Przygodzka, D. / Buszewicz, G. / Karakuła-Juchnowicz, H. / Róg, J. / Moryłowska-Topolska, J. / Waksmundzka-Hajnos, M.

Page 1361

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

Electrocatalytic Properties of Ni-Doped BaFe₁₂O₁₉ for Oxygen Evolution in Alkaline Solution

Khotib, Mohammad / Soegijono, Bambang / Mas'ud, Zainal Alim / Sutriah, Komar

Page 1382

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Phytochemistry and toxicological assessment of Bryonia dioica roots used in north-African alternative medicine

Bourhia, Mohammed / Bari, Ahmed / Ali, Syed Saeed / Benbacher, Laila / khlil, Naima

Page 1403

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Topical Issue on Applications of Mathematics in Chemistry

Zagreb Connection Number Index of Nanotubes and Regular Hexagonal Lattice

Ye, Ansheng / Qureshi, Muhammad Imran / Fahad, Asfand / Aslam, Adnan / Jamil, Muhammad Kamran / Zafar, Asim / Irfan, Rida

Page 75

Published Online: 02/22/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

The Sanskruti index of trees and unicyclic graphs

Deng, Fei / Jiang, Huiqin / Liu, Jia-Bao / Poklucar, Darja Rupnik / Shao, Zehui / Wu, Pu / Žerovnik, Janez

Page 448

Published Online: 08/24/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

OK

Published Online: 09/25/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Computing Topological Indices for Para-Line Graphs of Anthracene

Zhang, Zhiqiang / Mufti, Zeshan Saleem / Nadeem, Muhammad Faisal / Ahmad, Zaheer / Siddiqui, Muhammad Kamran / Farahani, Muhammad Reza

Page 955

Published Online: 11/13/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Special Issue on POKOCHA 2018

Influence of Production Parameters on the Content of Polyphenolic Compounds in Extruded Porridge Enriched with Chokeberry Fruit (*Aronia melanocarpa* (Michx.) Elliott)

Oniszczyk, Tomasz / Widelska, Gabriela / Oniszczyk, Anna / Kasprzak, Kamila / Wójtowicz, Agnieszka / Olech, Marta / Nowak, Renata / Kulesza, Karolina Wojtunik- / Józwiak, Grzegorz / Hajnos, Monika Waksmundzka-

Page 166

Published Online: 03/22/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Effects of Supercritical Carbon Dioxide Extraction (SC-CO₂) on the content of tiliroside in the extracts from *Tilia L.* flowers

Pieczkolan, Aleksandra / Pietrzak, Wioleta / Rój, Edward / Nowak, Renata

Page 302

Published Online: 06/03/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Impact of xanthan gum addition on phenolic acids composition and selected properties of new gluten-free maize-field bean pasta

Widelska, Gabriela / Wójtowicz, Agnieszka / Kasprzak, Kamila / Dib, Ahlem / Oniszczyk, Tomasz / Olech, Marta /

OK

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Impact of storage temperature and time on Moldavian dragonhead oil – spectroscopic and chemometric analysis

Oniszczyk, Tomasz / Matwijczuk, Arkadiusz / Matwijczuk, Alicja / Kocira, Sławomir / Niemczynowicz, Agnieszka / Combrzyński, Maciej / Wójtowicz, Agnieszka / Kuboń, Maciej / Kusz, Andrzej / Oniszczyk, Anna

Page 609

Published Online: 08/27/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

The effect of selected substances on the stability of standard solutions in voltammetric analysis of ascorbic acid in fruit juices

Kowalski, Radosław / Mazurek, Artur / Pankiewicz, Urszula / Włodarczyk-Stasiak, Marzena / Sujka, Monika / Wyróstek, Jakub / Kałwa, Klaudia

Page 655

Published Online: 09/01/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Determination of the content of Pb, Cd, Cu, Zn in dairy products from various regions of Poland

Sujka, Monika / Pankiewicz, Urszula / Kowalski, Radosław / Mazurek, Artur / Ślepecka, Katarzyna / Góral, Magorzata

Page 694

Published Online: 09/25/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Special Issue on IC3PE 2018 Conference

The Photocatalytic Activity of Zns-TiO₂ on a Carbon Fiber Prepared by Chemical Bath Deposition

Rahmawati, Fitria / Putri, Fatmawati R. / Masykur, Abu

Page 122

OK

 OPEN ACCESS

N-octyl chitosan derivatives as amphiphilic carrier agents for herbicide formulations

Kamari, Azlan / Yusoff, Siti Najiah Mohd

Page 365

Published Online: 06/01/2019

 **DOWNLOAD PDF**

 OPEN ACCESS

Kinetics and Mechanistic Study of Hydrolysis of Adenosine Monophosphate Disodium Salt (AMPNa₂) in Acidic and Alkaline Media

Sim, Yoke-Leng / Kaur, Beljit

Page 544

Published Online: 08/24/2019

 **DOWNLOAD PDF**

 OPEN ACCESS

Antimalarial Activity of Andrographis Paniculata Ness's N-hexane Extract and Its Major Compounds

Prakoso, Nurcahyo Iman / Zakiyah, Zahrah Nur / Liyanita, Arida / Rubiyanto, Dwiwarso / Fitriastuti, Dhina / Ramadani, Arba Pramundita / Kamari, Azlan / Mow, Sim Kooi

Page 788

Published Online: 09/25/2019

 **DOWNLOAD PDF**

 OPEN ACCESS

Special Issue on ICCESEN 2017

Theoretical Diagnostics of Second and Third-order Hyperpolarizabilities of Several Acid Derivatives

Karakas, A. / Ceylan, Y. / Karakaya, M. / Taser, M. / Terlemez, B. B. / Eren, N. / Kouari, Y. El / Lougdali, M. / Arof, A. K. / Sahraoui, B.

Page 151

Published Online: 04/10/2019

Determination of Gamma Rays Efficiency Against *Rhizoctonia solani* in Potatoes

Kara, Asli / Arici, Şerife Evrim

Page 254

Published Online: 04/24/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Studies On Compatibilization Of Recycled Polyethylene/Thermoplastic Starch Blends By Using Different Compatibilizer

Oner, Baris / Gokkurt, Tolga / Aytac, Ayse

Page 557

Published Online: 08/24/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Liquid-Liquid Extraction of Linalool from Methyl Eugenol with 1-Ethyl-3-methylimidazolium Hydrogen Sulfate [EMIM][HSO₄] Ionic Liquid

Erkoç, Tuğba / Sevgili, Lutfullah M. / Çavuş, Selva

Page 564

Published Online: 08/24/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Synthesis of Graphene Oxide Through Ultrasonic Assisted Electrochemical Exfoliation

Aksoy, Canser / Anakli, Duygu

Page 581

Published Online: 08/27/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

OK

Arda, Nazli

Page 337

Published Online: 04/24/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

The influence of the grafted aryl groups on the solvation properties of the graphyne and graphdiyne - a MD study

Berisha, Avni

Page 703

Published Online: 09/25/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Electrochemical modification of platinum and glassy carbon surfaces with pyridine layers and their use as complexing agents for copper (II) ions

Haziri, Veton / Berisha, Avni / Podvorica, Fetah I.

Page 722

Published Online: 09/25/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Effect of Electrospinning Process on Total Antioxidant Activity of Electrospun Nanofibers Containing Grape Seed Extract

Faki, Rabia / Gursoy, Oguz / Yilmaz, Yusuf

Page 912

Published Online: 11/13/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Effect Of Thermal Treatment Of Trepel At Temperature Range 800-1200°C

Reka, Arianit A. / Pavlovski, Blagoj / Ademi, Egzon / Jashari, Ahmed / Boev, Blazo / Boev, Ivan / Makreski, Petre

Page 1235

Published Online: 12/31/2019

📌 Topical Issue on Agriculture

The effect of *Cladophora glomerata* exudates on the amino acid composition of *Cladophora fracta* and *Rhizoclonium* sp.

Pikosz, Marta / Czerwik-Marcinkowska, Joanna / Messyasz, Beata

Page 313

Published Online: 04/24/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Influence of the Static Magnetic Field and Algal Extract on the Germination of Soybean Seeds

Lewandowska, Sylwia / Michalak, Izabela / Niemczyk, Katarzyna / Detyna, Jerzy / Bujak, Henryk / Arik, Pelin

Page 516

Published Online: 07/26/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

The use of UV-induced fluorescence for the assessment of homogeneity of granular mixtures

Matuszek, Dominika Barbara

Page 485

Published Online: 08/24/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

The use of microorganisms as bio-fertilizers in the cultivation of white lupine

Sulewska, Hanna / Ratajczak, Karolina / Niewiadomska, Alicja / Panasiewicz, Katarzyna

Page 813

Published Online: 10/29/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

OK

Śpitalniak-Bajerska, Kinga / Kupczyński, Robert / Szumny, Antoni / Kucharska, Alicja Zofia / Vogt, Andrzej

Page 831

Published Online: 10/12/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Production of phosphorus biofertilizer based on the renewable materials in large laboratory scale

Wyciskiewicz, Małgorzata / Sojka, Marcin / Saeid, Agnieszka

Page 893

Published Online: 10/16/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Human health risk assessment of potential toxic elements in paddy soil and rice (*Oryza sativa*) from Ugbawka fields, Enugu, Nigeria

Ezeofor, Chidinma C. / Ihedioha, JaneFrances N. / T.Ujam, Oguejiofo / Ekere, Nwachukwu R. / Nwuche, Charles O.

Page 1050

Published Online: 11/13/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Recovery of phosphates(V) from wastewaters of different chemical composition

Hutnik, Nina / Stanlik, Anna / Piotrowski, Krzysztof / Matynia, Andrzej

Page 1071

Published Online: 12/06/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Special Issue on the 4th Green Chemistry 2018

Dead zone for hydrogenation of propylene reaction carried out on commercial catalyst pellets

Szukiewicz. M. / Chmiel-Szukiewicz. E. / Kaczmarski. K. / Szalek. A.

OK

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Improved thermally stable oligoetherols from 6-aminouracil, ethylene carbonate and boric acid

Chmiel-Szukiewicz, Elżbieta

Page 1080

Published Online: 12/10/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

The role of a chemical loop in removal of hazardous contaminants from coke oven wastewater during its treatment

Kwiecińska-Mydlak, Anna / Sajdak, Marcin / Rychlewska, Katarzyna / Figa, Jan

Page 1288

Published Online: 12/31/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Combating paraben pollution in surface waters with a variety of photocatalyzed systems: Looking for the most efficient technology

Dominguez, Joaquin R. / Gonzalez, Teresa / Cuerda-Correa, Eduardo M. / Muñoz-Peña, Maria J.

Page 1317

Published Online: 12/31/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

✔ Special Issue on Chemistry Today for Tomorrow 2019

Applying Discriminant and Cluster Analyses to Separate Allergenic from Non-allergenic Proteins

Naneva, L. / Nedyalkova, M. / Madurga, S. / Mas, F. / Simeonov, V.

Page 401

Published Online: 06/03/2019

 **DOWNLOAD PDF**

OK

Chemometric Expertise Of Clinical Monitoring Data Of Prolactinoma Patients

Nedyalkova, Miroslava / Dimitrov, Dimitar / Donkova, Borjana / Simeonov, Vasil

Page 408

Published Online: 06/03/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Chemomertic Risk Assessment of Soil Pollution

Nedyalkova, Miroslava / Simeonov, Vasil

Page 711

Published Online: 09/15/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

New composite sorbent for speciation analysis of soluble chromium in textiles

Vasileva, Penka / Dakova, Ivanka / Yordanova, Tanya / Karadjova, Irina

Page 1095

Published Online: 12/19/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Photocatalytic activity of NiFe₂O₄ and Zn_{0.5}Ni_{0.5}Fe₂O₄ modified by Eu(III) and Tb(III) for decomposition of Malachite Green

Tsvetkov, M. P. / Ivanova, I. R. / Valcheva, E. P. / Zaharieva, J. Ts. / Milanova, M. M.

Page 1124

Published Online: 12/18/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Photophysical and antibacterial activity of light-activated quaternary eosin Y

Staneva, Desislava / Yordanova, Stanislava / Vasileva-Tonkova, Evgenia / Stoyanov, Stanimir / Grabchev, Ivo

Page 1011

OK

 OPEN ACCESS

Spectral properties and biological activity of La(III) and Nd(III) Monensinates

Pantcheva, I. / Dimitrova, R. / Ivanova, V. / Nedzhib, A. / Dorkov, P. / Dinev, D. / Spasov, R. / Alexandrova, R.

Page 1423

Published Online: 12/31/2019

 DOWNLOAD PDF

 OPEN ACCESS

Special Issue on Monitoring, Risk Assessment and Sustainable Management for the Exposure to Environmental Toxins

Soil organic carbon mineralization in relation to microbial dynamics in subtropical red soils dominated by differently sized aggregates

Huang, Jinqun / Zhang, Changwei / Cheng, Dongbing / Hu, Bo / Zhang, Pingcang / Wang, Zhigang / Liu, Jigen / Li, Zhongwu

Page 381

Published Online: 06/12/2019

 DOWNLOAD PDF

 OPEN ACCESS

A potential reusable fluorescent aptasensor based on magnetic nanoparticles for ochratoxin A analysis

Qin, Pinzhu / Huang, Dawei / Xu, Zihao / Guan, Ying / Bing, Yongxin / Yu, Ang

Page 1301

Published Online: 12/31/2019

 DOWNLOAD PDF

 OPEN ACCESS

Special Issue on 13th JCC 2018

Fluorescence study of 5-nitroisatin Schiff base immobilized on SBA-15 for sensing Fe³⁺

Fahmi, Muhammad Riza Ghulam / Fajar, Adroit T.N. / Roslan, Nurliana / Yuliati, Leny / Fadlan, Arif / Santoso, Mardi / Lintang, Hendrik O.

OK

 OPEN ACCESS

Thermal and Morphology Properties of Cellulose Nanofiber from TEMPO-oxidized Lower part of Empty Fruit Bunches (LEFB)

I.P., Mahendra / B., Wirjosentono / Tamrin / H., Ismail / J.A., Mendez

Page 526

Published Online: 08/12/2019

 **DOWNLOAD PDF**

 OPEN ACCESS

Encapsulation of Vitamin C in Sesame Liposomes: Computational and Experimental Studies

Hudiyanti, Dwi / Hamidi, Noor Ichsan / Anugrah, Daru Seto Bagus / Salimah, Siti Nur Milatus / Siahaan, Parsaoran

Page 537

Published Online: 08/24/2019

 **DOWNLOAD PDF**

 OPEN ACCESS

A comparative study of the utilization of synthetic foaming agent and aluminum powder as pore-forming agents in lightweight geopolymer synthesis

Anggarini, Ufafa / Pratapa, Suminar / Purnomo, Victor / Sukmana, Ndaru Candra

Page 629

Published Online: 08/19/2019

 **DOWNLOAD PDF**

 OPEN ACCESS

Synthesis of high surface area mesoporous silica SBA-15 by adjusting hydrothermal treatment time and the amount of polyvinyl alcohol

Thahir, Ridhawati / Wahab, Abdul Wahid / Nafie, Nursiah La / Raya, Indah

Page 963

Published Online: 12/31/2019

 **DOWNLOAD PDF**

 OPEN ACCESS

OK

Page 1000

Published Online: 11/13/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Ion Exchange of Benzoate in Ni-Al-Benzoate Layered Double Hydroxide by Amoxicillin

Dwiasi, Dian Windy / Mudasir, Mudasir / Roto, Roto

Page 1043

Published Online: 11/13/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Synthesis And Characterization Of CoMo/Mordenite Catalyst For Hydrotreatment Of Lignin Compound Models

Nugrahaningtyas, Khoirina Dwi / Rahmawati, Nining / Rahmawati, Fitria / Hidayat, Yuniawan

Page 1061

Published Online: 12/19/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

Production of Biodiesel from Nyamplung (*Calophyllum inophyllum* L.) using Microwave with CaO Catalyst from Eggshell Waste: Optimization of Transesterification Process Parameters

Ansori, Ansori / Wibowo, Sasmitha Ayu / Kusuma, Heri Septya / Bhuana, Donny Satria / Mahfud, Mahfud

Page 1185

Published Online: 12/31/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

The Study of the Optical Properties of C60 Fullerene in Different Organic Solvents

Saraswati, Teguh Endah / Setiawan, Umam Hasan / Ihsan, Mohammad Rifki / Isnaeni, Isnaeni / Herbani, Yuliati

Page 1198

Published Online: 12/31/2019

OK

Topical Issue on Environmental Chemistry

Ionic liquids modified cobalt/ZSM-5 as a highly efficient catalyst for enhancing the selectivity towards KA oil in the aerobic oxidation of cyclohexane

Hong, Yun / Fang, Yanxiong / Sun, Dalei / Zhou, Xiantai

Page 639

Published Online: 08/21/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Application of Thermal Resistant Gemini Surfactants in Highly Thixotropic Water-in-oil Drilling Fluid System

Liu, Yonggui / Zhang, Yang / Yan, Jing / Song, Tao / Xu, Yongjun

Page 1435

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Screening Study on Rheological Behavior and Phase Transition Point of Polymer-containing Fluids produced under the Oil Freezing Point Temperature

Zhu, Lingyue / Dong, Jing / Jiang, Wei / Yuan, Dandan / Jiang, Hong / Yan, Chao / Wang, Baohui

Page 1442

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

The Influence Of NO/O₂ On The NO_x Storage Properties Over A Pt-Ba-Ce/ γ -Al₂O₃ Catalyst

Feng, Xuedong / Yi, Jing / Luo, Peng

Page 1459

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Design of SiO₂/TiO₂ that Synergistically Increases The Hydrophobicity of Methyltrimethoxysilane Coated Glass

Widati, Alfa Akustia / Nuryono, Nuryono / Kartini, Indriana

Page 798

Published Online: 09/25/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Antidiabetes and Antioxidant agents from Clausena excavata root as medicinal plant of Myanmar

Thant, T. M. / Aminah, N. S. / Kristanti, A. N. / Ramadhan, R. / Aung, H. T. / Takaya, Y.

Page 1339

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Development of a Gold Immunochromatographic Assay Method Using Candida Biofilm Antigen as a Bioreceptor for Candidiasis in Rats

Masfufatun / Hariyanto, Loo / Harsono / Baktir, Afaf

Page 1345

Published Online: 12/31/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

Special Issue on Applied Biochemistry and Biotechnology 2019

Adsorption of copper ions on Magnolia officinalis residues after solid-phase fermentation with Phanerochaete chrysosporium

Tao, Fengyun / Liu, Yangping / Chen, Junliang / Wang, Peng / Huo, Qing

Page 1173

Published Online: 12/18/2019

 [DOWNLOAD PDF](#)

 [OPEN ACCESS](#)

OK

Boussaa, S. Anas / Kheloufi, A. / Zaourar, N. Boutarek

Page 475

Published Online: 07/01/2019

 **DOWNLOAD PDF**

 **OPEN ACCESS**

 **Comments (0)**

[LIBRARIES](#)

[TRADE](#)

[AUTHORS](#)

[SOCIETIES](#)

[NEWSROOM](#)

[TEXTBOOKS](#)

[OPEN ACCESS](#)

▼ [ABOUT DE GRUYTER](#)

▼ [E-PRODUCTS & SERVICES](#)

▼ [IMPRINTS AND PUBLISHER PARTNERS](#)

▼ [HELP & CONTACT INFORMATION](#)

▼ [NEWS](#)

Access brought to you by: Airlangga University Library (UNAIR)

Copyright © 2011–2020 by Walter de Gruyter GmbH

Powered by PubFactory



SJR

Scimago Journal & Country Rank

Enter Journal Title, ISSN or Publisher Name

[Home](#)[Journal Rankings](#)[Country Rankings](#)[Viz Tools](#)[Help](#)[About Us](#)

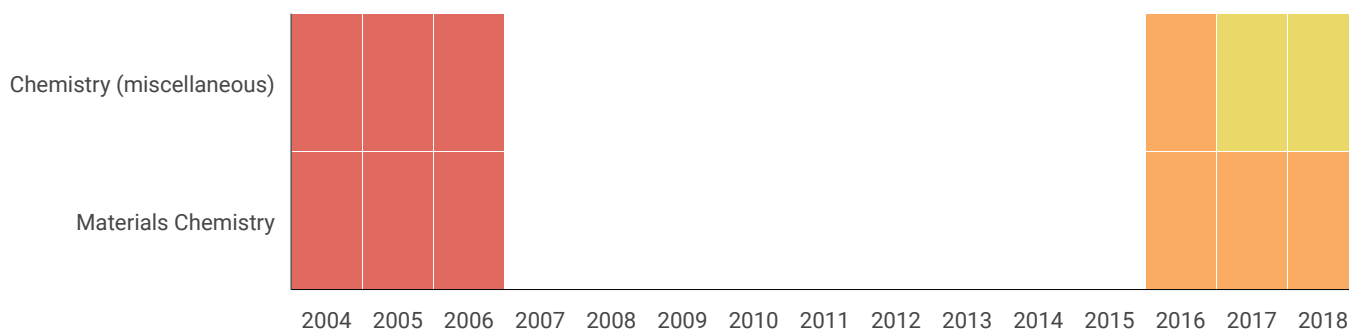
Open Chemistry

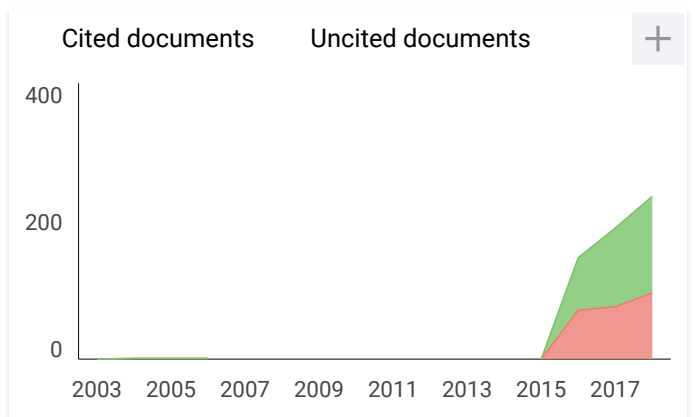
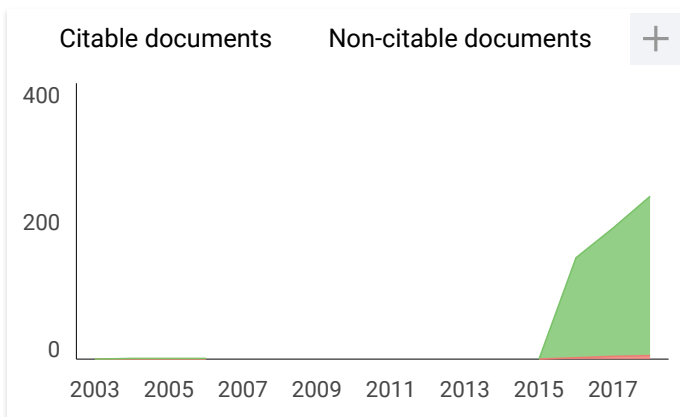
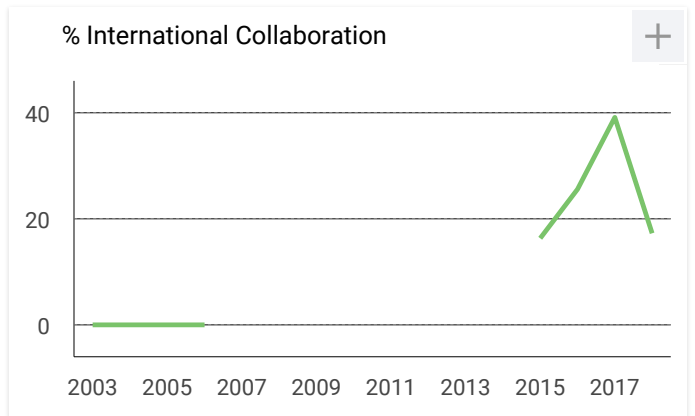
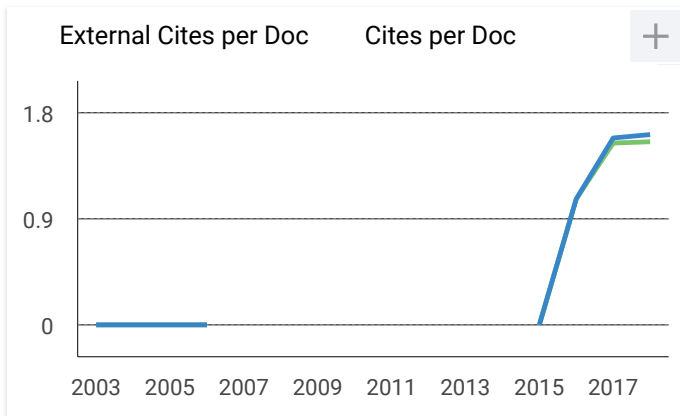
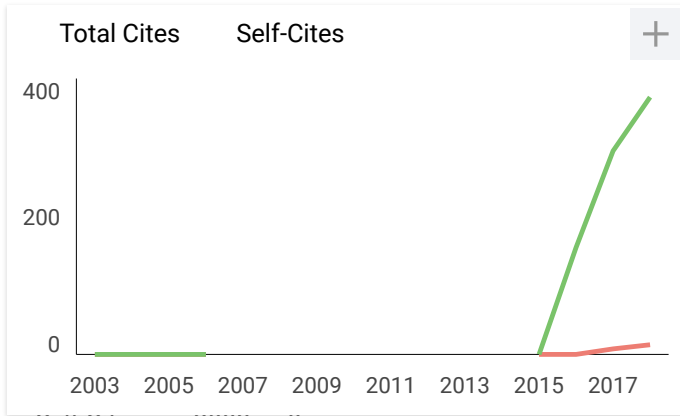
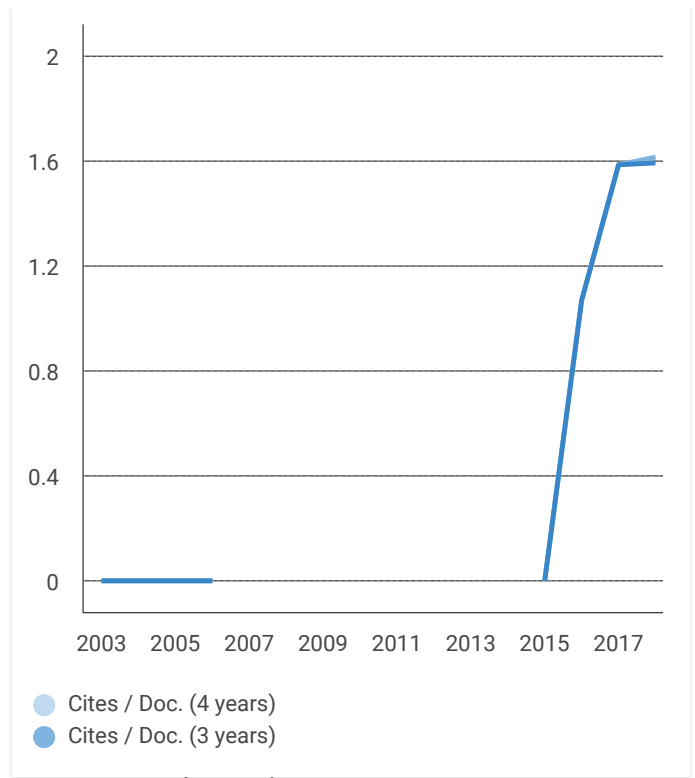
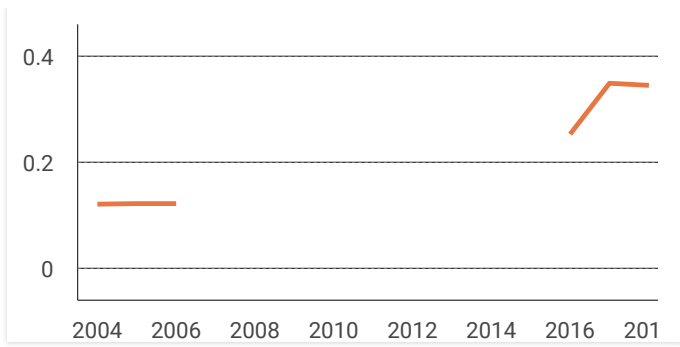
Country [Germany](#) -  [SJR Ranking of Germany](#)**Subject Area and Category** [Chemistry](#)
[Chemistry \(miscellaneous\)](#)[Materials Science](#)
[Materials Chemistry](#)**Publisher** [Walter de Gruyter GmbH](#)**Publication type** Journals**ISSN** 23915420**Coverage** 2015-ongoing**Scope** Open Chemistry is a peer-reviewed, open access journal that publishes original research, reviews and short communications in the fields of chemistry in an ongoing way. Our central goal is to provide a hub for researchers working across all subjects to present their discoveries, and to be a forum for the discussion of the important issues in the field. Our journal is the premier source for cutting edge research in fundamental chemistry and it provides high quality peer review services for its authors across the world. Moreover, it allows for libraries everywhere to avoid subscribing to multiple local publications, and to receive instead all the necessary chemistry research from a single source available to the entire scientific community.[Homepage](#)[How to publish in this journal](#)[Contact](#)[Join the conversation about this journal](#)

12

H Index

Quartiles

SJR Citations per document 



Open Chemistry

Q2

Chemistry (miscellaneous)

best quartile

SJR 2018

0.35

powered by scimagojr.com

← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimagojr.com" style="border: 1px solid #ccc; padding: 2px 5px; display: inline-block;">https://www.scimagojr.com
```

Research Article

T. M. Thant, N. S. Aminah*, A. N. Kristanti, R. Ramadhan, H. T. Aung, Y. Takaya

Antidiabetes and Antioxidant agents from *Clausena excavata* root as medicinal plant of Myanmar

<https://doi.org/10.1515/chem-2019-0056>

received November 27, 2018; accepted February 27, 2019.

Abstract: All around the world, patients with diabetes and the prevalence of its disease are currently growing. Due to these side effects of oral hypoglycemic agents and oxidative stress in complicating diabetes, there is growing interest in drugs, which possess dual function as both type II diabetes mellitus treatment and oxidative stress treatment. The objective of this research is to search effective antidiabetes and antioxidant bioactive compounds from the Myanmar medicinal plant *Clausena excavata*. The root part of *C. excavata* was successfully extracted with 95% ethanol and followed by column chromatographic separation technique. The structure of isolated pure compounds was elucidated by using methods of spectroscopic such as UV-Vis, IR, NMR and HRFABMS spectrometry. The α -glucosidase inhibition assay was performed against baker's yeast and rat intestine (sucrose and maltase) α -glucosidases. The activity of isolated compounds' antioxidant was measured by using DPPH assay. Among the tested enzymes, the two isolated compounds, which were dentatin (**1**) and heptaphylline (**2**), exhibited highest inhibitory on maltase enzymes with IC_{50} values 6.75 and 11.46 μ M; as positive control, acarbose (IC_{50} , 2.35 μ M) was utilized. Moreover, scavenging activity was found to be present upon seeing

the result of antioxidant activity investigation of (**1**) and (**2**) (IC_{50} values 2.66 and 1.55 mM), where ascorbic acid (IC_{50} 0.012 mM) was used as standard. Both compounds showed their antidiabetic and antioxidant activity with different fashion, especially exhibited strongest activity against on maltase α -glucosidase.

Keywords: *Clausena excavata*; dentatin; heptaphylline; α -glucosidase; antidiabetes; antioxidant; DPPH.

1 Introduction

In general, diabetes is a chronic metabolic disorder that could be serious and lethal. It is characterized by relative or absolute insufficiencies which occurs either when the body cannot effectively use the insulin (a hormone that regulates blood glucose) it produces, or when the pancreas does not produce adequate insulin [1]. World Health Organization (WHO) recognized three types of diabetes mellitus such as, (i) type 1 diabetes (insulin-dependent) (ii) type 2 diabetes (non-insulin-dependent) and (iii) gestational diabetes. One of the most frequent effects of uncontrolled diabetes is raised blood glucose. It could lead to fatal damages to the blood vessels, nerves, eyes, kidneys and eventually the heart [1, 2]. Diabetes is not only lethal but it is also the major cause of blindness, heart attacks, kidney failure, strokes, gangrene, and neuropathy especially for adults [3]. The patients of diabetes who also live with the prevalence of the disease are growing in the whole world. There were 422 million diabetic adults (or about 8.5% of the world's population) in 2014. The number increased highly compared to the year of 1980 with 108 million of diabetic adults (4.7% of the world's population) [4].

One inevitable consequence of Type 2 Diabetes Mellitus (T2DM) is Hyperglycemia. The symptom is marked by high level of blood sugar and it is said to be the most destructive effect associated with T2DM. The high level of blood sugar stimulates glucose auto-oxidation so that free radicals could be formed. The presence of free

*Corresponding author: N. S. Aminah, Dept. of Chemistry, Fac. of Science and Technology, Universitas Airlangga, Komplek Kampus C UNAIR, Jl. Mulyorejo, Surabaya, Indonesia, E-mail: nanik-s-a@fst.unair.ac.id

T. M. Thant, Ph.D. Student of Mathematics and Natural Sciences, Fac. Of Science and Technology, Universitas Airlangga, Komplek Kampus C UNAIR, Jl. Mulyorejo, Surabaya, Indonesia; Dept. of Chemistry, Mandalay Degree College, Mandalay, Myanmar

A. N. Kristanti, R. Ramadhan, Dept. of Chemistry, Fac. of Science and Technology, Universitas Airlangga, Komplek Kampus C UNAIR, Jl. Mulyorejo, Surabaya, Indonesia

H. T. Aung, Dept. of Chemistry, Mandalay University, Mandalay, Myanmar

Y. Takaya, Fac. Of Pharmacy, Meijo University, 150 Yagotoyama, Tempaku, Nagoya, 468-8503, Japan

radicals lead to macro and microvascular dysfunction and polyneuropathy since it is exceeding the scavenging abilities of endogenous antioxidant defenses [5]. There are many harms that could be caused by free radicals such as damaging DNA, proteins, cellular molecules, and lipids that further could lead to altered cellular functions. In fact, recently there are numerous studies that reveal the capability of antioxidants in neutralizing free radicals effectively. For instance, animals induced with diabetes through experiments are able to prevent themselves in developing the disease. Moreover, it is also effective in reducing the severity of diabetic complications [6].

Even though there are several drugs to tightly regulate blood glucose, to reduce microvascular and macrovascular complications, the main undesirable effects of this antidiabetic drug that are currently available are brain damage, swelling, erythema, abdominal pain, weight gain, metallic taste, vitamin B₁₂ deficiency, heart failure and gastro intestinal disturbances. Due to these side effects of oral hypoglycemic agents and oxidative stress in complicating diabetes, there is growing interest in herbal medicament as one of the methods to cure T2DM and oxidative stress [7].

Besides insulin, there are other already-developed drugs that help the body lower blood glucose levels, such as insulin secretagogues, insulin sensitizers, α -glucosidase inhibitors, peptide analogues, dipeptidylpeptidase-4 inhibitors and glucagon like peptide-1. However, these synthetic medications possess dangerous side effects, which include hypoglycemia, nausea, diarrhea, gastrointestinal discomfort, weight gain, liver disease, heart failure, etc. [2]. Natural products emerge as one promising area in the activity of drug developments given that the secondary metabolite derived from plants and animals are proven effective to be healing agents for various diseases. The secondary metabolites of the plants, grant the natural defense mechanisms against pathogens, predators, as well as self-protection against herbivores and microbes [8].

The currently available modern medicines have numerous harmful effects. Therefore, to develop safe and effective medications for patients of diabetes is undeniably needed. Plants are endowed with safe and effective natural ability as medications, proven since the ancient times where plants have been an exemplary source of medicine. After preclinical and clinical evaluation, various plants are proven to possess significant characteristics of antidiabetic property. Moreover, many phytoconstituents (compounds that are responsible for antidiabetic effects) have been isolated from plants in the past few years [9].

A shrub named *C. excavata* Burm. f. (Rutaceae) is mainly distributed in southern and southeastern Asia, including Myanmar. It is usually known as 'SatPu Khar Yar' by Myanmar people while the roots are commonly used as medications for colds, fever, headache, cough, malaria colic, sores, wounds, rhinitis, and detoxification. The plant possesses bioactive constituents which are mainly reported to be carbazole alkaloids [10, 11, 12], coumarins [13, 14, 15] along with a little amount of triterpenoids [16], limonoids [17] and pyrano coumarin [18]. The bioactivities, such as antiplatelet, antiplasmodial, antimicrobial, antitumor, anti-HIV, antimycobacterial and antifungal activities, of coumarins and carbazoles, have been reported from a different plant part and location [19], but there was not yet reported secondary metabolites from Myanmar *C. excavata* and their antidiabetic and antioxidant activity. In this research, we isolated constituents from *C. excavata* and evaluated their antidiabetic activity that was measured by an α -glucosidase inhibition assay. Meanwhile, the antioxidant activity was done by DPPH assay. The highest inhibition activity against maltase α -glucosidases was shown from the two isolated compounds especially against on maltase α -glucosidases.

2 Experimental Section

2.1 Plant material

In October 2016, the researchers collected the roots of *C. excavata* from Pyin Ma Nar Township, Mandalay Division, Myanmar [18]. Afterwards, the plant materials were sent to Mandalay University, Myanmar, to be identified by Prof. Soe Myint Aye, a botanist from Department of Botany of Mandalay University.

2.2 Extraction and isolation

Over a period of two weeks, as much as 3.6 kg of the dried roots were consecutively extracted with 95% EtOH (12.0 L) at room temperature. Once the solvent was removed by evaporation, as much as 156g of dark gummy extracts was obtained. As much as 100g of the extracts was effectively partitioned three times using *n*-hex and methanol solvents with ratio 1:1(v/v). Afterward, as much as 80.4g of methanol portion was subjected to vacuum liquid chromatography over silica gel that has been eluted with different mixtures of *n*-hexane: ethylacetate by gradually increasing gradient polarity. Ultimately, there were 7 combined fractions

(MF-1 to -7) obtained from the process. One of the sub fractions namely sub fraction MF-1 was fractionated by silica gel column eluted with gradient polarity *n*-hexane : ethylacetate, (0-10% EtOAc). From it, three sub fractions (MF1.1 to MF-1.3) including pure compound (**1**, 368 mg) were obtained. Finally, fraction MF-1.1 (1.3 g) was purified on silica gel column eluted with gradient polarity *n*-hexane : ethylacetate, (0-5% EtOAc) and thereafter produced pure compound (**2**, 98 mg).

2.3 General procedure

1D and 2D NMR tests were performed on a Bruker 600 MHz (^1H) and 151 MHz (^{13}C) in solvent CDCl_3 . The report of chemical shifts was shown in ppm as referenced to solvent residues (CDCl_3 , δ_{H} 7.26 ppm and δ_{C} 77.0 ppm). Fisher-Johns Melting Apparatus was utilized to determine melting points. Infrared spectra were recorded on KBr disks on IRTracer-100, ν in cm^{-1} . UV spectra and antioxidant assay (DPPH) were measured with UV-1800 spectrophotometer. Vacuum liquid chromatography and analytical preparative thin layer chromatography were performed by using Kieselgel 60 (F_{254} , Merck). Merck Kieselgel 60 (40-63 μm) was employed for column chromatography. Sigma Aldrich supplied rat intestinal acetone powder and baker's yeast. Inhibition of α -glucosidase was measured with a TECAN Infinite 50 microplate reader spectrophotometer, whereas the spectrophotometric measurement of yeast was conducted using iMarkTM microplate reader.

2.4 α -Glucosidase inhibitory activities

The inhibition of α -glucosidase was examined using a method explained by Ramadhan et al. [20]. The aforementioned protocol was used to determine the inhibitory reaction of these isolated compounds against maltase from rat intestine and sucrase. 20 μL of raw enzyme solution, 80 μL of glucose kit, and buffer of phosphate with 0.1 M of molarity that consists of 10 μL of buffer (pH 6.9, 30 μL) and 20 μL of the substrate solution (10mM maltose and 100 mM sucrose). The released glucose concentration was identified by the method of glucose oxidase with a glu-kit. After that, this reaction mixture was incubated at 37°C. Maltase was incubated for 10 minutes, whereas sucrose was incubated for 40 minutes. The glucose oxidase method was employed using a glu-kit to detect the glucose concentration released from the action mixture (Human, Germany). Enzyme activity was calculated through absorbance measurement at 503 nm. The reaction

inhibition percentage was determined using $[(A_0 - A_1)/A_0] \times 100$, in which A_0 refers to sample-less absorbance, while A_1 refers to absorbance with sample. A graph of inhibition percentage against concentration of inhibition was used to determine the value of IC_{50} . The standard control was Acarbose® and the test was conducted in duplicate. Moreover, to determine the inhibition of all isolated compounds against yeast, the method used by Damsud et al. [21] was applied with a slight modification. 10 μL of sample and yeast (0.4 U/ml) was mixed in 1 mM phosphate buffer (pH 6.9) and shook with microplate shaker for about 2 min and pre-incubated for 10 minutes at 37°C. 50 μL of *p*-nitrophenyl- α -D-glucopyranoside (PNPG) was added to the reaction mixture. Then, the mixture was put in the incubator for 20 minutes at 37°C. After the incubation, Na_2CO_3 (100 μL) was added to the reaction in order to quench it. The *p*-nitrophenoxide that was released from PNPG was identified by iMark microplate reader at 405 nm. The equation mentioned above was employed to calculate the percentage of inhibition.

2.5 DPPH radical scavenging assay

DPPH radical scavenging activity of isolated pure compounds was performed using the method employed by Aminah et al. [22]. In this method, DPPH (2,2-diphenyl-1-picrylhydrazyl) reagent was utilized as free radicals. The reducing ability of antioxidants towards DPPH was evaluated by monitoring the decrease of its absorbance at 523 nm by UV spectrometer. Firstly, isolated compound was dissolved with methanol. It was then added with buffer acetate solution with the molarity of 0.1 M and a pH of 5.5 as well as 5.10^{-4} M DPPH radical solution. The dissolution was done to determine antioxidant activity. With a spectrometer at 523 nm, isolated compounds inhibition against DPPH radical was observed following 30 minute incubation at 25°C. The percentage of inhibition activity was quantified using this equation: $[(A_{\text{control}} - A_{\text{sample}}) / A_{\text{control}} \times 100]$. In this equation, A_{control} refers to the stable DPPH radical's initial concentration in the absence of the test compound. Meanwhile, A_{sample} shows the absorbance of the residual DPPH concentration with methanol. The values of IC_{50} (mM) were calculated using a plotted graph of extract concentration versus scavenging; IC_{50} refers to the complete sum of antioxidant needed to lower the initial concentration of DPPH radical by fifty percent.

Ethical approval: The conducted research is not related to either human or animal use.

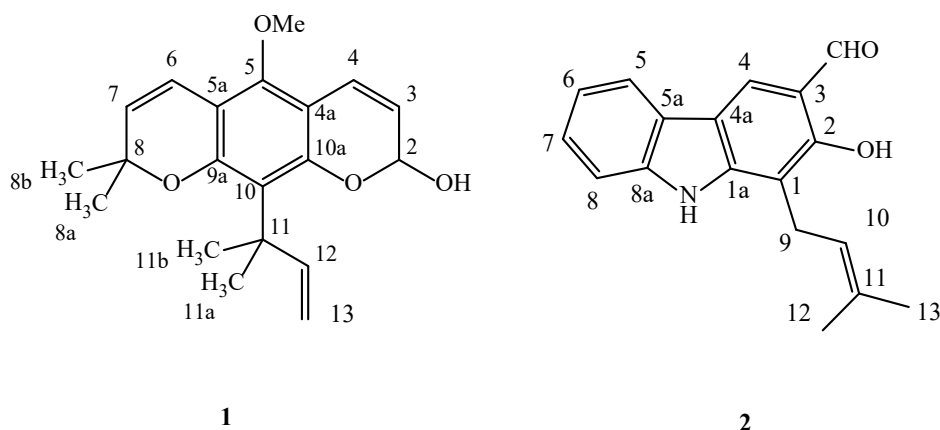


Figure 1: The structure of isolated compounds **1** and **2** from *C. excavata*.

3 Results and Discussion

Compound (1) yielded as white prism like crystal with melting points 93–94 °C. According from HR-FABMS spectrum it show molecular formula $C_{20}H_{22}O_4$ (m/z 327.1597 $[M + H]^+$ (calcd. for $C_{20}H_{22}O_4$, 327.1596). The presence of aromatic (1641, 1590, 1469 cm^{-1}) groups and conjugated lactone (1686 cm^{-1}) was denoted by IR spectrum. Due to 7-oxygenated coumarin, absorption maxima were exhibited by the spectrum of UV at 330 and 272 nm. The 1H -NMR spectrum of compound (**1**) showed 9 signals and representing 27 protons it pattern is similar to nordentatin only one methoxy signal at δ 3.83 (s, 3H). As a typical pyrano coumarin, compound (**1**) showed the presence of two pyrone protons δ 6.19 (d, $J = 9.6$ Hz, 1H, H-3) and 7.87 (d, $J = 9.6$ Hz, 1H, H-4). The presence of chromene ring was showed by two olefinic proton pair δ 5.69 (d, $J = 9.9$ Hz, 1H, H-7) and 6.56 (d, $J = 9.9$ Hz, 1H, H-6). The prenyl group exomethylene protons was showed by δ 6.30 (dd, $J = 17.4$, 10.6 Hz, 1H, H-12), δ 4.94 (dd, $J = 17.4$, 1.1 Hz, 1H, H-13), δ 4.88 (dd, $J = 10.6$, 1.1 Hz, 1H, H-13). Moreover the existence of 1,1-dimethyl groups was revealed by two singlet peaks δ 1.45 (s, 6H) and δ 1.66 (s, 6H) (Table S1). The ^{13}C NMR data revealed the presence of lactone carbonyl with δ (160.7), together with 8 quaternary carbons, 5 methine carbons, one sp^2 methylene, one methoxy carbon and 4 methyl carbons (Figure S2). After carefully checked all NMR data and matched with literature values compound (**1**) was elucidated as dentatin (Figure 1) [11].

Compound (2) afforded as yellow green crystal UV (MeOH), λ_{max} (log ϵ) 342 (0.97), 298(3.32), 278(3.02), 249(1.64), 235(2.26). Compound (**2**)'s IR spectrum pointed out that -OH and -NH functional groups at (3437 cm^{-1}) and carbonyl and aromatic benzene groups at (1728, 1612 and 1588 cm^{-1}) were present. In the spectrum of 1H NMR,

compound (**2**) revealed a total of 11 signals representing 14 protons. In the down field region three singlets; intramolecular bonding OH-(δ 11.66) with -CHO (δ 9.91) and one broad signal due to -NH (δ 8.21) and another singlet proton H-4 (δ 8.03). In the aromatic region four signals with δ values, 7.97 (dd, $J = 7.7$ Hz, 1H, H-5) 7.26 (td, $J = 3.8$, 7.7 Hz, 1H, H-6), 7.40 (td, $J = 3.8$, 7.7 Hz, 1H, H-7) and 7.41 (dd, $J = 7.7$, 3.8 Hz, 1H, H-8) showed the absence of substituent in ring A. the presence of prenyl group was revealed by one methylene protons at δ 3.64 (d, $J = 6.9$ Hz, 2H, H-9), δ 5.33 (t, $J = 6.9$ Hz, 1H, H-10) and one dimethyl group (δ 1.91 (s, 3H, H-12), δ 1.78 (s, 3H, H-13). According to the spectra of ^{13}C NMR and DEPT, it was revealed that there were 18 signals and 18 carbons. Furthermore, the DEPT spectrum showed the presence of one aldehyde carbon, 8 quaternary carbons, 6 methine carbons, one methylene carbon, and two methyl carbon as shown in (Table 2). The 2D NMR spectra such as DQF-COSY data revealed the correlation of two adjacent protons (Figure S9). The HSQC spectrum gave the direct correlation protons and carbon. Finally, the combination of fragments and attachments of substituents were confirmed by HMBC data (Table S2) (Figure S1) and compound (**2**) was elucidated as heptaphylline (Figure 1). It was also reliable with the data which reported earlier [11].

Every isolated compound was utilized by α -glucosidase assay to detect antidiabetes activity and also by DPPH assay to detect antioxidant activity. Based on the tested compounds, dentatin (**1**) and heptaphylline (**2**) displayed inhibition against on maltase and yeast α -glucosidase that have IC_{50} values of (6.75, 11.46 μM) and (0.482, 24.96 mM) respectively. However, compound (**1**) showed no inhibition whereas compound (**2**) IC_{50} value 223.9 (μM) against on sucrase enzymes (Table 1). According to this data, compound (**1**) exhibited 2-fold more potent

Table 1: α -Glucosidase inhibitory and antioxidant activities of isolated compounds (1-2).

Compound	α -Glucosidase			DPPH IC ₅₀ (mM)
	Baker's yeast IC ₅₀ (mM)	Maltase IC ₅₀ (μ M)*	Sucrase IC ₅₀ (μ M)*	
1	0.481843	6.75	NI**	2.66
2	24.9641	11.46	223.91	1.55
Acarbose	0.1030	2.35	15.48	-
Ascorbic acid	-	-	-	0.0118

* Nonlinear regression analyzes were evaluated by SigmaPlot 12.5

than compound (2) but 3-fold less potent than standard control, acarbose (IC₅₀ 2.35 μ M) against on maltase α -glucosidase. Each isolated compound demonstrated antioxidant activity with IC₅₀ values of 2.66, and 1.55 mM respectively. The results showed that the compound (1) is higher inhibitory than compound (2) against on maltase and yeast enzymes.

4 Conclusion

In searching antidiabetic and antioxidant agents from Myanmar medicinal plant *C. excavata* root ethanolic extract lead to the isolation of two known bioactive compounds namely dentatin (1) and heptaphylline (2). Each isolated compound was evaluated on its antidiabetic activity and antioxidant activity by employing α -glucosidase inhibition and DPPH assays, respectively. Both compound (1) and compound (2) demonstrated the highest activity of inhibition against maltase (IC₅₀ 6.75 μ M), (IC₅₀ 11.46 μ M) respectively. Nevertheless, compound (1) and compound (2) showed that there was inhibition on yeast α -glucosidase in the presence of IC₅₀ values of 0.482 and 24.96 mM. Furthermore, each isolated compound displayed antioxidant activity; the IC₅₀ values were 2.66 and 1.55 mM (ascorbic acid, IC₅₀ 0.012 mM). The study showed both compounds demonstrated inhibition against α -glucosidases and free radical scavenging activity. Compound (1) showed a stronger activity. Hence, isolated compound (1) from *C. excavata* root can be a prospective candidate for natural antidiabetes and antioxidant agent.

Acknowledgement: We would like to thank Airlangga Development Scholarship (ADS) and "RISET MANDAT GRANT 2018 of Universitas Airlangga" that have funded this research.

Conflict of interest: Authors state no conflict of interest.

References

- [1] World H.O., et al., Global Report on Diabetes, Curr. Med. Res. Opin., 2014, 56(1), 1051–1062.
- [2] Das S.K., Samantaray D., Patra J. K., Samanta L., Thatoi H., Antidiabetic potential of mangrove plants: a review, Front. Life Sci., 2016, 9(1), 75–88.
- [3] Marles R.J., Farnsworth N.R., Antidiabetic plants and their active constituents, Phytomedicine, 1995, 29 (2), 137–189.
- [4] Giovannini P., Howes M.J.R., Edwards S.E., Medicinal plants used in the traditional management of diabetes and its sequelae in Central America: A review, J. Ethnopharmacol., 2016, 184, 58–71.
- [5] Bajaj S. and Khan A., Mini Review Antioxidants and diabetes, Indian J. Endocrinol. Metab., 2012, 16, S267-71.
- [6] Parikh N.H., Parikh P.K., Kothari C., Indigenous plant medicines for health care: treatment of diabetes mellitus and hyperlipidemia, Chin. J. Nat. Med., 2014, 12(5), 335–344.
- [7] Yakoob A.T., Tajuddin N.B., Hussain M.I.M., Mathew S., Govindaraju A., Qadri I., Antioxidant and hypoglycemic activities of *Clausena anisata* (Wild.) Hook f. Ex Benth. Root Mediated Synthesized Silver Nanoparticles, Pharmacogn. J., 2016, 8(6), 579–586.
- [8] Smith A., Gnanadhas A., Natarajan V., Arumugam K. M., Sundarajan P., Isolation and characterization of anti-diabetic compound from *D. Regea Volubilis* [Benth.] Leaf, 2016, 4, 191–194.
- [9] Patel D.K., Kumar R., Laloo D., Hemalatha S., Natural medicines from plant source used for therapy of diabetes mellitus: an overview of its pharmacological aspects, Asian Pacific J. Trop. Dis., 2012, 2(3), 239–250.
- [10] Peh T.H., Lim G.K., Taufiq-yap Y.H., Cheng G., Ee L., A new cytotoxic carbazole alkaloid isolated from the stem bark of Malaysian *Clausena excavata*, Can. Chem. Trans., 2013, 1(3), 165–172.
- [11] Sripisut T., Cheenpracha S., Ritthiwigrom T., Prawat U., Laphookhieo S., Chemical constituents from the roots of *Clausena excavata* and their cytotoxicity, Rec. Nat. Prod., 2012, 6(4), 386–389.
- [12] Wu T.S., Huang S.C., Wu P.L., Kuoh C.S., Alkaloidal and other constituents from the root bark of *Clausena excavata*, Phytochemistry, 1999, 52(3), 523–527.
- [13] Kumar R., Saha A., and Saha D., A new antifungal coumarin from *Clausena excavata*, Fitoterapia, 2012, 83(1), 230–233.

- [14] Ito C., et al., Chemical constituents of *Clausena excavata*: isolation and structure elucidation of novel furanone-coumarins with inhibitory effects for tumor-promotion, *J. Nat. Prod.*, 2000, 63(9), 1218–1224.
- [15] Takemura Y., Nakamura K., Hirusawa T., Ju-ichi M., Ito C., Furukawa H., Four new furanone-coumarins from *Clausena excavata*, *Chem. Pharm. Bull. (Tokyo)*, 2000, 48(4), 582–584.
- [16] Sunthitikawinsakul A., et al., Coumarins and carbazoles from *Clausena excavata* exhibited antimycobacterial and antifungal activities, *Planta Med.*, 2003, 69(2), 155–7.
- [17] Muhd S.N.W., Cytotoxic constituents of *Clausena excavata*, *African J. Biotechnol.*, 2011, 10(72), 16337–16341.
- [18] Thant T.M., et al., A new pyrano coumarin from *Clausena excavata* roots displaying dual inhibition against α -glucosidase and free radical, *Natural Product Research*, 2019, 1–6. DOI: 10.1080/14786419.2019.1586696.
- [19] Arbab I.A., et al., *Clausena excavata* Burm. f. (Rutaceae): a review of its traditional uses, pharmacological and phytochemical properties, *J. Med. Plants Res.*, 2011, 5(33), 7177–7184.
- [20] Ramadhan R., Phuwapraisirisan P., New arylalkanones from *Horsfieldia macrobotrys*, effective antidiabetic agents concomitantly inhibiting α -glucosidase and free radicals, *Bioorganic Med. Chem. Lett.*, 2015, 25(20), 4529–4533.
- [21] Damsud T., Chanwun T., Kaewpiboon C., Antidiabetic agents with α -glucosidase inhibition and antioxidant capacity from the shoots of *Clausena cambodiana* Guill., *Int. J. Agric. Technol.*, 2017, 13(4), 449–456.
- [22] Aminah N.S., Kristanti A.N., Tanjung M., Antioxidant activity of flavonoid compounds from the leaves of *Macaranga gigantea*, *J. Chem. Pharm. Res.*, 2014, 6(6), 688–692.

Supplemental Material: The online version of this article offers supplementary material (<https://doi.org/10.1515/chem-2019-0056>).