

Elements

An International Magazine of Mineralogy, Geochemistry, and Petrology



Elements is published jointly by the Mineralogical Society of America, the Mineralogical Society of the UK and Ireland, the Mineralogical Association of Canada, the Geochemical Society, The Clay Minerals Society, the European Association of Geochemistry, the International Association of GeoChemistry, the Société Française de Minéralogie et de Cristallographie, the Association of Applied Geochemists, the Deutsche Mineralogische Gesellschaft, the Società Italiana di Mineralogia e Petrologia, the International Association of Geoanalysts, the Polskie Towarzystwo Mineralogiczne (Mineralogical Society of Poland), the Sociedad Española de Mineralogía, Swiss Geological Society, the Meteoritical Society, the Japan Association of Mineralogical Sciences, and the International Association on the Genesis of Ore Deposits. It is provided as a benefit to members of these societies.

Elements is published six times a year. Individuals are encouraged to join any one of the participating societies to receive *Elements*. Institutional subscribers to any of the following journals—*American Mineralogist* and *The Canadian Mineralogist*—also receive one copy of *Elements* as part of their subscription. Institutional subscriptions are available for US\$180 (US\$195 non-US addresses) a year in 2022. Contact the executive editor (editorialteam.elements@gmail.com) for information.

Copyright 2022 by the Mineralogical Society of America.

All rights reserved. Reproduction in any form, including translation to other languages, or by any means—graphic, electronic, or mechanical, including photocopying or information storage and retrieval systems—without written permission from the copyright holder is strictly prohibited.

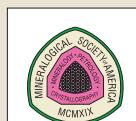
Publications mail agreement no. 40037944

Printed in USA

ISSN 1811-5209 (print)
ISSN 1811-5217 (online)

elementsmagazine.org
pubs.geoscienceworld.org/elements

GeoScienceWorld
Participating Publisher



Volume 18, Number 1 • February 2022

Salt-carved sculptures in the Wieliczka Salt Mine (Poland) PHOTO: HIROCHIKA SUMINO.

Halogens: From Planetary Surfaces to Interiors

Guest Editors: **Patricia L. Clay** and **Hirochika Sumino**



9



15



21



27



35



41

Halogens: Salts of the Earth

Patricia L. Clay and Hirochika Sumino

A Halogen Record of Fluid in the Solar System

Jessica J. Barnes and Michael E. Zolensky

Sediments, Serpentinites, and Subduction: Halogen Recycling from the Surface to the Deep Earth

Mark A. Kendrick and Jaime D. Barnes

Natural Halogen Emissions to the Atmosphere: Sources, Flux, and Environmental Impact

Anita Cadoux, Susann Tegtmeier, and Alessandro Aiuppa

Experimental and Observational Constraints on Halogen Behavior at Depth

Bastian Joachim-Mrosko, Tatsuhiko Kawamoto, and Hélène Bureau

Developments in Halogen Abundance and Isotope Measurements

Ray Burgess, Mitsuhiro Ebihara, and Hans Egginkamp

DEPARTMENTS

Editorial – Beware the Bromides	3
From the Editors	4
Meet the Authors	5
Perspective	7
Society News	
Clay Minerals Society	47
Association of Applied Geochemists	48
Deutsche Mineralogische Gesellschaft	49
Geochemical Society	52
European Mineralogical Union	54
Association Internationale pour l'Étude des Argiles	54
Japan Association of Mineralogical Sciences	55
Mineralogical Society of Poland	55
International Association of Geoanalysts	56
International Mineralogical Association	58
Société Française de Minéralogie et de Cristallographie	59
Mineralogical Society of the UK and Ireland	60
Mineralogical Society of America	62
Meteoritical Society	64
European Association of Geochemistry	65
Mineralogical Association of Canada	66
Italian Society of Mineralogy and Petrology	68
Meeting Report	69
GeoScience Slam – Tectonic Petrameter	70
Calendar	72
Advertisers in this Issue	72