Iron is the fourth most abundant element at the Earth’s surface. As an essential nutrient and electron source/sink for the growth of microbial organisms, it is metabolically cycled between reduced and oxidized chemical forms. This flow of electrons is invariably tied to the reaction with other redox-sensitive elements, including oxygen, carbon, nitrogen, and sulfur. The end result of these interactions is that iron is intimately involved in the geochemistry, mineralogy, and petrology of modern aquatic systems and their associated sediments, particulates, and pore waters. In the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role in the geological past, vast iron sediments, the so-called banded iron formations, suggest that iron played an even greater role...
TOURMALINE: FROM GEMSTONE TO GEOCHEMICAL INDICATOR

Volume 7, Number 5 (October)

Guest Editors: Darrell J. Henry and Barbara L. Dutrow
(Louisiana State University)

From the Vikings’ sunstone to a modern piezometric pressure sensor, tourmaline is an intriguing mineral with a new degree of significance. Tourmaline was considered by 18th century physicists as the key to a grand unification theory relating heat, electricity, and magnetism, but new studies define its role as an indicator of Earth’s processes. With its plethora of chemical constituents and its wide stability range, from near-surface conditions to the pressures and temperatures of the mantle, tourmaline has become a valuable mineral for understanding crustal evolution. Tourmaline encapsulates a single-mineral thermometer, a provenance indicator, a fluid-composition recorder, and a geochronometer. Although also prized as a gemstone, tourmaline is clearly more than meets the eye.

• Tourmaline: Nature’s DVD
  Darrell J. Henry and Barbara L. Dutrow

• From polarity to piezometry:
  Tourmaline crystallography and applications
  Frank C. Hawthorne (University of Manitoba) and Dona Dirlam
  (Gemological Institute of America)

• No element left behind: Tourmaline isotopes
  Horst Marschall (University of Bristol) and Shao-Yong Jiang
  (University of Nanjing)

• Tourmaline as a guide to ore deposits
  John Slack (U.S. Geological Survey) and Bob Trumbull (GFZ, Potsdam)

• Tourmaline in sedimentary, igneous, and metamorphic systems
  Darrell J. Henry, Vincent van Hinsberg (Oxford University),
  and Barbara L. Dutrow

• Tourmaline as a gemstone
  Federico Pezzotta (University of Milan) and Brendan Laur
  (Gemological Institute of America)

Abandoned tailings pile in the city of Potosi in the Bolivian Andes

Elements

Volume 7, Number 6 (December)

MINE WASTES

Guest Editors: Karen Hudson-Edwards (Birbeck College, University of London), Heather E. Jamieson (Queen’s University), and Bernd Lottermoser (University of Tasmania)

Since the dawn of civilization, humankind has been extracting metals and minerals for the production of goods, energy, and building materials. These mining activities have created great wealth, but they have also produced colossal quantities of solid and liquid wastes, known collectively as “mine wastes.” Mine wastes represent the greatest proportion of waste produced by industrial activity. In fact, the quantity of solid mine wastes and the quantity of Earth materials moved by fundamental global geological processes are of the same order of magnitude—approximately several thousand million tons per year. Therefore, the large-scale production, secure disposal, and sustainable remediation of mine wastes represent problems of global significance. Over the past 10–15 years, novel geochemical, mineralogical, microbiological and toxicological techniques have led to a much better understanding of the character, weathering mechanisms, long-term stability, ecotoxicology, and remediation of mine wastes. This issue of Elements will bring readers up to date with these current findings and will highlight new frontiers for mine waste research.

• History and significance of mine wastes
  Karen Hudson-Edwards

• Chemistry and mineralogy of metallic mine wastes
  Heather Jamieson

• Chemistry and mineralogy of coal and oil sands mine wastes
  Kim Kasperski and Randy Mikula (Natural Ressources Canada)

• Acid mine drainage and other mine waste waters
  Kirk Nordstrom (USGS)

• Ecotoxicology of mine wastes
  Geoff Plumlee (USGS)

• Recycling, reuse, and rehabilitation of mine wastes
  Bernd Lottermoser and Graeme Spiers (Laurentian University)