Chemists Celebrate Earth Day 2008: Streaming Chemistry—

JCE Resources for Chemistry and Water

by Erica K. Jacobsen

This annotated bibliography collects the best that past issues of *JCE* have to offer for use with the 2008 Chemists Celebrate Earth Day theme, "Streaming Chemistry". Each item has been characterized as an activity, book review, calculation, demonstration, experiment, or informational; several fit more than one classification. The most recent articles are listed first. An indication of the levels the article may serve are included. Articles that appeared adaptable to other levels, but not designed explicitly for those levels, are labeled "poss. h.s." "poss. elem.", and so forth. Since all references are to *Journal* articles, they appear in abbreviated form, including only **year**, *volume*, page.

Supporting *JCE Online* Material

http://www.jce.divched.org/Journal/Issues/2008/Feb/abs188.html

Abstract and keywords

Full text (PDF) with links to cited URLs and *JCE* articles

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Resources for Chemistry and Water

Research Advances: Hard-Shelled Bioindicators; Improving Water Quality with Chicken Manure?; Fishing for an Answer: Wild or Farmed? King, A. G. **2008,** *85,* 174.
Informational; coll./poss. h.s.
Presents recent research related to water, such as the study of persistent toxic compounds in the Great Lakes Basin Ecosystem.

Balneology: Spa Science. Williams, K. R. **2008,** *85,* 179.
Informational; h.s./coll.
"From Past Issues" column that describes a 1939 *JCE* article that discusses the study of the therapeutic use of baths and mineral springs.

News from Online: Water, Streaming Chemistry. Tomasik, J. H. **2008,** *85,* 185.
Informational; h.s./coll.
Describes multiple Web sites that relate to water chemistry.

Hold the Heat: Global Warming and Calorimetry. Burley, J. D.; Johnston, H. S. **2008,** *85,* 224A.
Activity; h.s./coll./poss. elem.
Students measure temperature as a function of time for samples of ice/water heated by light bulbs and/or convection with room-temperature surroundings. It is linked with the topic of global warming.

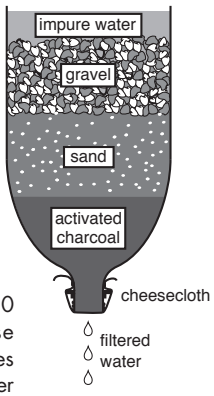
Characterizing Water Quality in Students' Own Community. An Effective Campus Field Trip. Lunsford, S. K.; Speelman, N.; Yeary, A.; Slattery, W. **2007,** *84,* 1027.
Experiment; coll.
Description of a lab experience for preservice high school teachers where they perform surface water quality studies.

The Great Wakonse Earthquake of 2003: A Short, Problem-Based Introduction to the Titration Concept. Coppola, B. P.; Gottfried, A. C.; Gdula, R. L.; Kiste, A. L.; Ockwig, N. W. **2006,** *83,* 600.
Activity; h.s./coll.
Uses a fictitious earthquake scenario as a context for analyzing suspect drinking water and water disinfection methods.

Water Wordsearch. Helser, T. L. **2005,** *82,* 551.
Activity; h.s./coll.
Students fill in terms about the physical properties of water and find them in a word search matrix.

Water Filtration. Jacobsen, E. K. **2004,** *81,* 224A.
Activity; elem./h.s.
Students make a water filtration column using gravel, sand, and activated charcoal and use it to filter a water sample.

Arsenic in Drinking Water—A Global Environmental Problem. Wang, J. S.; Wai, C. M. **2004,** *81,* 207.
Informational; h.s./coll.
Summarizes literature regarding global groundwater contamination by arsenic and related health problems, controversies about government regulation, and techniques for arsenic removal.



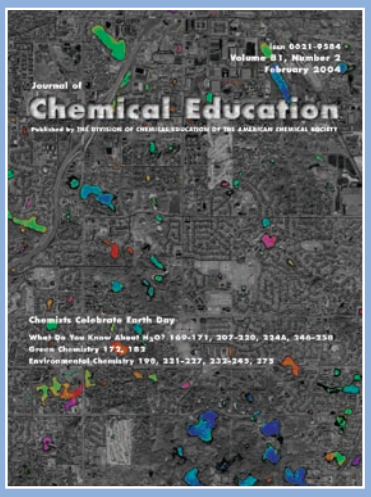
In *JCE* Classroom Activity #60 (Water Filtration), students use simple materials to filter impurities from water. A schematic of the filter is at the right.

Photo courtesy Canadian Wildlife Service

California Urban Water Conservation Council

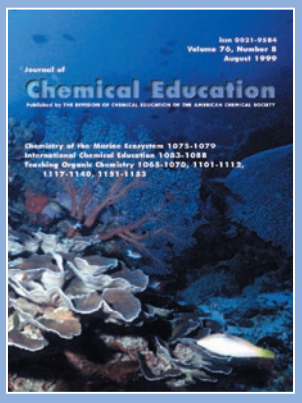
Researchers have used snapping turtle eggs (far left) as bioindicators of toxic compounds in the environment.

Visit a virtual water-saving home at *http://www.h2ouse.org/* to learn about ways to conserve water.



JCE's February 2004 cover shows a false-color satellite image that illustrates the water clarity of lakes in Eagan, MN.

Two streams—one with clean water and one with dirty water—are shown coming together into a river in that same issue.



JCE's August 1999 cover shows a coral reef in the Pacific Ocean.

Water Quality Monitoring by Satellite. *J. Chem. Educ.* Staff **2004,** *81,* 171.
Informational; h.s./coll./poss. elem.
Describes the use of satellite remote sensing to gather information for water quality assessments. Includes water clarity map.

***Nature:* "Water, Water, Everywhere, nor Any Drop to Drink".** Heinhorst, S.; Cannon, G. **2004,** *81,* 170.
Informational; h.s./coll.
Briefly describes *Nature* articles about the global water crisis, problems with water pollution, and water purification.

The Analysis of Seawater: A Laboratory-Centered Learning Project in General Chemistry. Selco, J. I.; Roberts, J. L. Jr.; Wacks, D. B. **2003,** *80,* 54.
Experiment; coll./poss. h.s.
Students analyze real world samples of seawater using various qualitative and quantitative methods.

Acid Raindrops Keep Fallin' in My Lake. *J. Chem. Educ.* Staff **2003,** *80,* 40A.
Activity; h.s./poss. elem.
Students simulate acid rain falling on lakes by adding vinegar to bowls of water, and investigate the effect of adding different solids to the bowls.

A Demonstration of Acid Rain and Lake Acidification: Wet Deposition of Sulfur Dioxide. Goss, L. M. **2003,** *80,* 39.
Demonstration; h.s./coll.
Demonstration that illustrates the dissolution of acidic oxides in airborne water droplets in the manner it occurs in the atmosphere.

Measurements for a Rainy Day. *J. Chem. Educ.* Staff **2002,** *79,* 1104A.
Activity; h.s./poss. elem.
Students collect data on a rainy day and use the information to calculate the rate of rainfall.

The Purification of Water by Freeze–Thaw or Zone Melting. Oughton, J.; Xu, S.; Battino, R. **2001,** *78,* 1373.
Experiment; h.s./coll.
Students quantitatively investigate the purification of salt water using the freeze–thaw process.

Water: A Matrix of Life, 2nd Edition. Franks, F.; reviewed by Tabbutt, F. **2001,** *78,* 593.
Book review; coll.
Book that reviews the properties of water, the effects the properties have on life, and what we don't understand about water.

An Aquarium as a Means for the Interdisciplinary Teaching of Chemistry. Calascibetta, F.; Campanella, L.; Favero, G.; Nicoletti, L. **2000,** *77,* 1311.
Informational; h.s./coll.
Describes a program that uses a simplified ecosystem model (an aquarium) as the basis for introducing fundamental chemical concepts and principles.

***Water:* A Powerful Theme for an Interdisciplinary Course.** Tabbutt, F. D. **2000,** *77,* 1594.
Informational; coll.
Describes an interdisciplinary course, including how the chemistry was taught, field trip descriptions, and representative books.

Exploring the Ocean—Stating the Case for Chemistry. Scheuer, P. J. **1999,** *76,* 1075.
Informational; h.s./coll.
Describes chemistry-related exploration of the ocean, focusing on the area near Hawai'i.

The Chemistry of Water. Kegley, S. E.; Andrews, J.; reviewed by McCool, D. **1999,** *76,* 326.
Book review; h.s./coll.
Book is a cross between a text and lab manual; it focuses on the purity of water, with instruction in water quality assessment methods.

Identifying Bottled Water: A Problem-Solving Exercise in Chemical Identification. Myers, R. L. **1998,** *75,* 1585.
Experiment; h.s./coll.
Students decide which analyses to perform on samples of bottled water, to match each sample with its label.

Spring Shock! Impact of Spring Snowmelt on Lakes and Streams. Halstead, J. A. **1998,** *75,* 400A.
Activity; h.s./coll./poss. elem.
Students collect and analyze runoff from frozen cubes of vinegar, and relate it to "spring shock".

Chemists Celebrate Earth Day 2008: Streaming Chemistry

Rain, Lakes, and Streams. Investigating Acidity and Buffering Capacity in the Environment. Halstead, J. A. **1997,** *74,* 1456A.
Activity; h.s./poss. elem.
Students investigate the effect of their breath on poorly buffered water and relate it to the acidity of rain.

A Discussion of Water Pollution in the United States and Mexico; with High School Laboratory Activities for Analysis of Lead, Atrazine, and Nitrate. Kelter, P. B.; Grundman, J.; Hage, D. S.; Carr, J. D.; Castro-Acuña, C. M. **1997,** *74,* 1413.
Informational/Experiment; h.s./coll.
Presents information and experiments as described in the title.

Integrating High School Chemistry with Environmental Studies and Research. Randall, J. **1997,** *74,* 1409.
Informational; h.s./coll.
Narrative description by a high school teacher of his class's water testing of a stream and its relation to chemistry.

Microscale Experiments. Dissolved Oxygen and Chloride Determination in Water. Crosson, M.; Gibb, R. **1992,** *69,* 830.
Experiment; h.s./coll.
Presents experiments as described in the title.

Acid Rain Investigations. Epp, D. N.; Curtright, R. **1991,** *68,* 1034.
Demonstration; h.s./coll.
Overhead projector demonstration that illustrates the formation of acid rain and the effects of different types of bedrock on acid rain.

Acid Rain Analysis by Standard Addition Titration. Ophardt, C. E. **1985**, *62,* 257.
Experiment; coll./poss. h.s.
Students use a standard addition titration method and Gran's Plot to determine the acidity of a rain or snow sample.

In *JCE* Classroom Activity #8, students use frozen vinegar to investigate the "spring shock" phenomenon.

Modeling Hypersaline Lake "Turn-Over". Sprague, G. **1984,** *61,* 956.
Demonstration; h.s./coll./poss. elem.
Demonstration that models saline lake inversions using a saturated salt solution on a stirrer/hot plate.

The Chemical Oceanographer. Abel, R. B. **1983,** *60,* 221.
Informational; h.s./coll.
Describes different areas an oceanographer might study, along with information on training and education.

"Water, water every where, Nor any drop to drink." O'Connor, R. **1981,** *58,* 726.
Calculation; coll./poss. h.s.
"Brain Tinglers" calculation about a hand-operated pump that uses reverse osmosis to make drinking water from seawater.

A Short History of Oceanography with Emphasis on the Role Played by Chemistry. Thompson, T. G. **1958,** *35,* 108.
Informational; h.s./coll.
Describes the history of the study of the seas and the role played by chemistry in this area.

JCE Resource Papers
Good Classroom Resources, Well Described, Theme Based

Looking for theme-based references to *JCE* articles, complete with suggestions for their use? The resource papers listed here were constructed around National Chemistry Week and Earth Day themes by Erica K. Jacobsen of the *JCE* staff. These are great references—that alert you to really good articles—in print or online at *JCE Online.*

- ☆ ***JCE* Resources for Chemistry and Careers**
  2007, 84, 1595–1597
- ☆ ***JCE* Resources for Chemistry and Recycling**
  2007, *84,* 212–213
- ☆ ***JCE* Resources for Chemistry and the Home**
  2006, *83,* 1444–1446
- ☆ ***JCE* Resources for Chemistry and Soils**
  2006, *83,* 199–200
- ☆ ***JCE* Resources for Chemistry and Toys**
  2005, *82,* 1443–1446
- ☆ ***JCE* Resources for Chemistry: Health and Wellness**
  2004, *81,* 1390–1396
- ☆ ***JCE* Resources for Chemistry and the Atmosphere**
  2003, *80,* 1106–1112
- ☆ ***JCE* Resources for Chemistry and Cleaning**
  2002, *79,* 1162–1167
- ☆ ***JCE* Resources for Chemistry and Art**
  2001, *78,* 1316–1321
- ☆ ***JCE* Resources in Food Chemistry**
  2000, *77,* 1256–1267