

## The Unique Water Molecules of the Great Lakes

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Topic: Water molecules of the Great Lakes

Target Grade: Gr. 10 chemistry

### **Lesson Overview:**

The goal of this lesson will be to raise awareness of the unique local proximity to the waters of the Great Lakes, particularly Lake Michigan. Topics addressed will include recreation, maritime transportation, weather and pollution. This lesson connects to the chemistry curriculum since the water molecule and its properties and structure are studied intensively.

### **Objectives:**

1. At the end of this lesson students will identify and replace inaccurate personal models of the importance of the Great Lakes using evidence learned or discovered.
2. At the end of this lesson students will be able to infer changes in the Great Lakes ecosystem prompted by the introduction of new species, environmental conditions, chemicals and air, water or earth pollution.
3. At the end of this lesson students will be able to analyze the benefits and problems associated with industrialization and global maritime shipping on and in the Great Lakes including implications for the individual and community.

### **Wisconsin State Content Standards Addressed:**

A.12.6

Identify and replace inaccurate personal models and explanations of science related phenomena using evidence learned or discovered.

F.12.8

Using the science themes, infer changes in ecosystems prompted by the introduction of new species, environmental conditions, chemicals, and air, water, or earth pollution.

G.12.3

Analyze the costs, benefits, or problems resulting from a scientific or technological innovation, including implications for the individual and the community.

### **Description of Activities:**

This activity will be implemented into a semester sophomore chemistry class curriculum that is well defined and with minimal extra time. While presenting information on the electronic

structure, shape, and properties of the water molecule students will be asked about important water sources in our area. Many students do not typically frequent the Lake Michigan area even though it is only a few miles from their homes. The inner city of Milwaukee with a well known reputation for crime and violence creates somewhat of a barrier or easy travel routes to the lake.

Lake Michigan, from which the water for Wauwatosa is drawn, as well as the aquifers used by outlying areas will be discussed. Asking how many students that were sickened by cryptosporidium a few years back will be a way to capture students' interest. A zebra mussel "giveaway" and questions pertaining to their procurement, identity and effects will also elicit interest.

The role of Lake Michigan as well as the other Great Lakes will be emphasized. Recreational activities including boating, sailing, swimming, and fishing (shore and boat) will be discussed. The role of the port of Milwaukee along with other major ports on the Great Lakes and their connectiveness will be emphasized. A classroom map of the United States and Wisconsin with its outlying areas will be used to provide visual connections. A field trip to the port authority to yield an inside look of its importance and the Lake Michigan waterfront with its beaches, fishing pier, marina, etc. would be an excellent extension if time in the curriculum permits.

The meteorological aspects of our proximity to Lake Michigan – fog, lake effect snow, cooler summers, warmer winters would also be discussed. "Pollution" including ground runoff, sewage overflow, sediment contamination, VHS, and the introduction of exotic species would be addressed.

#### **Assessments:**

A pre-assessment discussion of the importance of Lake Michigan and the Great Lakes will be utilized for attention getting purposes. Post assessment questions will be imbedded in the unit test pertaining to water and other compounds in a multiple choice format.

Questions include:

1. How many miles from the Lake Michigan shoreline is the water intake for Wauwatosa/Milwaukee water supply located?  
A. 1 mile    B. 3 miles    C. 5 miles    D. 10 miles
2. The weather of areas bordering the Great Lakes is  
A. the same as outlying area  
B. has cooler winter, warmer summers  
C. has warmer winters, cooler summers  
D. has warmer winters, warmer summers  
E. has cooler winters, cooler summers
3. What is the economic impact of maritime transportation in Milwaukee and other Great Lakes ports?  
A. great locally, nationally and internationally  
B. great on a local and national level  
C. fair locally, nationally and internationally  
D. fair on a local and national level  
E. it depends  
(This question will promote further discussion.)
4. The most recent threat to the Great Lakes and inland fishing recreational activities is  
A. zebra mussels  
B. PCB's  
C. over fishing  
D. gobies  
E. VHS

**Resources:**

Jacques, A. S. and R. Corge. "Seaway is Too Vital to Even Think about Closing." The Milwaukee Journal Sentinel Milwaukee, WI, November 7, 2005.

Lake Carriers Association. U.S. – Flag Shipping on the Great Lakes. (brochure).

Lopez, Alisa. "Q & A about VHS." Wisconsin Natural Resources August 2007: 12-16.

Michigan State Extension. The Great Lakes Basin. October 2000 Extension Bulletin E1865.

United States Environmental Protection Agency and Government of Canada. The Great Lakes An Environmental Atlas and Resource Book. 2002.