

Introduction to Water Conservation & Desalination

Created and delivered by **S. Christian Benker**, Geology PhD candidate
Prepared for Wiggs Middle School Grade 6, El Paso, Texas, April 2007

TEKS Objectives

(6.1) Scientific processes. The student conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices.

(6.2) Scientific processes. The student scientific inquiry methods during field and laboratory investigations. The student is expected to:

(B) collect data by observing and measuring

(C) analyze and interpret information to construct reasonable explanations form direct and indirect evidence.

(D) communicate valid conclusions.

(E) construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data.

(6.3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(C) represent the natural world using models and identify their limitations.

(6.4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.

(A) collect, analyze, and record information using tools including beakers, Petri dishes, meter sticks, graduated cylinders, weather instruments, timing devices, hot plates, test tubes, safety goggles, spring scales, magnets, balances, microscopes, telescopes, thermometers, calculators, field equipment, compasses, computers, and computer probes

(6.14) Science concepts the student knows the structures and functions of Earth systems. The student is expected to:

(B) identify relationships between groundwater and surface water in a watershed

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Lesson Vocabulary

Salinity, filtration, pH, conservation, brine, brackish water, osmosis, reverse osmosis

Materials Required & Preparation

Materials Required: **A1, Ru, Day 1, Day 2, Day 3, Day 4, Day 5**

Day 1: See attached electronic file: Water Use & Conservation
Water Usage Table Generation

Key Question: What is conservation and why is it important for water?

Day 2: See attached electronic file: Great Filtration Competition

Key Question: How can we desalinate, or remove salt from, water?

Day 3: See attached electronic file: The Doorman (Explaining Osmosis & Reverse Osmosis)

Key Question: How do you think reverse osmosis filtration works?

Day 4: See attached electronic file: Monitoring pH Levels

Key Question: Why is it important to know if a liquid is an acid, a base, or neutral?

Day 5: See attached electronic file: Desalination Plants & Brine Disposal

Key Question: How do we dispose brine (excess salt) removed during desalination?

A revisable grading rubric spreadsheet file is also attached.

Safety Information

Drain clog removal liquid as well as other households cleansers used during pH measurement in the Day 4, Monitoring pH Levels, laboratory are harmful if swallowed. Students should be instructed to use caution and where necessary protective materials. Appropriate caution labels should be placed at these experimental stations.

Furthermore, equipment can be expensive and must be handled with care. Students should be given a brief tutorial.

Engagement Technique

On Day 1 students will have the opportunity to leave the classroom (under teacher supervision) and explore their school and water conservation issues with it. A meeting can be arranged between the students and administrators to discuss issues discovered and steps that can be taken to correct for these issues.

Exploration

Students will perform pH tests and personally build a series of desalination processes.

Explanation, Elaboration, and Extension

After completing desalination experimentation, students should have a good understanding of water desalination processes and how each works.

Evaluation

During Day 1 students will be required to create a line graph summarizing the school's water use over the past 6 months. This will provide them with a glimpse of how valuable water resources are. Additionally, they will personally develop water conservation methods.

At the conclusion of Day 5 students will be required to draw their own desalination plant incorporating knowledge learned throughout the week. However, students will be briefly introduced to the problem of brine (excess salt extracted from water) disposal and will need to personally think of a method of disposal.

Peer Review

This lesson was reviewed by Ms. Mary Myrick and Mrs. Maria Reyna from Wiggs Middle School with El Paso Independent School District. Additional reviews came from Mr. Jose Luis Cruz-Campa, M.S., and other National Science Foundation-University of Texas, El Paso GK-12 fellows, investigators, and coordinators.

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