Curricular Unit

Subject Area(s) Physical Science, Physics, Chemistry

Curricular Unit Title Drinking Water Treatment Process

Yellow highlight = required component

Header

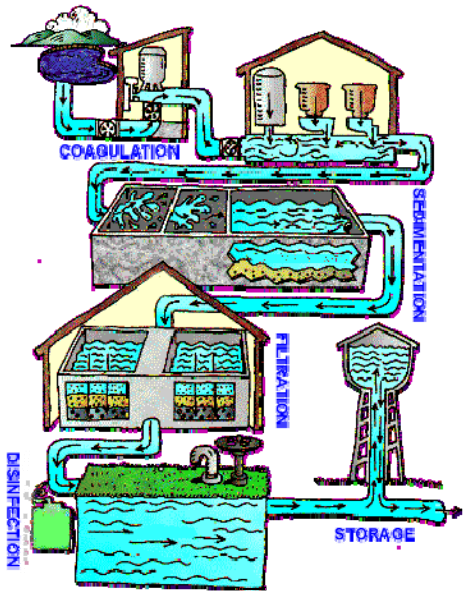
Image 1

Image file: drinking_water_plant_diagram.jpg

ADA Description: Cartoon schematic of a drinking water treatment plant. The water comes from a lake and is treated with coagulation, sedimentation, filtration, and disinfection until it is stored in a water tower at the end. Each of the process steps has its own cartoon that generally illustrates how the process works.

Source/Rights: Copyright © US Environmental Protection Agency http://water.epa.gov/learn/kids/drinkingwater/watertreatmentplant_index.cfm

Caption:



Grade Level 11 (10-12)

Summary

The development of drinking water treatment processes has greatly increased the standard of human health throughout the past century. Through a 3-lesson series complete with hands-on activities, students learn the importance of water treatment, the determining factors of what makes water safe to drink, and the details of the traditional drinking water treatment process, including: coagulation, flocculation, sedimentation, filtration, and disinfection. Each lesson discusses the full spectrum of engineering design options and treatment technologies, while focusing on the most widely used methods for treating surface water on a large scale. Students use this knowledge to design and treat a small amount of local lake or river water.

Engineering Connection

Treating contaminated water to make it clean enough to drink has been the product of many years of engineering work. Civil and environmental engineers design systems that take water that is hazardous to drink and make potable by removing particles and pathogens. Although there are many engineered systems for drinking water treatment, the primary way engineers treat surface water is by coagulation, flocculation, sedimentation, filtration, and disinfection, which are engineered methods that closely emulate natural processes.

Engineering Category = 1

Choose the category that best describes this unit's amount/depth of engineering content:

1. Relating science and/or math concept(s) to engineering
2. Engineering analysis or partial design
3. Engineering design process

Keywords

coagulation, disinfection, drinking water treatment, environmental engineering, filtration, flocculation, sedimentation

Educational Standards

See the individual lessons and activities

Related Lessons & Activities

Related lessons:

1. Introduction to Drinking Water Treatment
2. Drinking Water Treatment: Coagulation, Flocculation, and Sedimentation
3. Drinking Water Treatment: Filtration and Disinfection

Related activities:

1. First Steps to Treating Surface Water
2. The Clean-Up Crew: Filtration

Time Required

1 week

Unit Overview

The first lesson and activity serve as background information in order to build a foundation of knowledge for the students to build off of when discussing the details of drinking water treatment. Lesson 2 discusses the processes of coagulation, flocculation, and sedimentation, which are used to destabilize the suspended particles in the source water. The 3rd lesson completes the story by describing the details of filtration and disinfection. These final steps are used to remove any remaining particles and neutralize any remaining biotic pathogens. Lessons 2 and 3 are correlated with activities 2 and 3, such that they students are participating in the processes that they are learning about in the lessons.

Unit Schedule

Summary Assessment

The main two assessments are the scientific paper and quiz that the students complete by the end of the unit. However, the students fill out worksheets that follow each lesson and activity throughout the unit to help the teacher assess the students' understanding as well as resources for the students to use in preparing for their paper and quiz.

Attachments

- Drinking_Water_Treatment_Unit_Quiz.docx
- Drinking_Water_Treatment_Unit_Quiz_Solutions.docx
- Drinking_Water_Treatment_Unit_Presentation.ppx

Other

Redirect URL

Contributors

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Supporting Program

University of Houston, National Science Foundation GK-12 and Research Experience for Teachers (RET) Programs