

## Benchmark Lesson on Microbial Contaminants

**Title of Lesson:** Microbial Contaminants in Drinking Water

**Date of Lesson:** N/A

**Source of Lesson:** Roland Ramirez

**Description of class:** N/A

**Length of Lesson:** 50min

**Grade Level:** 9 - 12

**Honors or regular:** N/A

### TEKS Addressed:

(11) Science concepts. The student knows that organisms maintain homeostasis. The student is expected to:

(D) summarize the role of microorganisms in maintaining and disrupting equilibrium including diseases in plants and animals and decay in an ecosystem.

(12) Science concepts. The student knows that interdependence and interactions occur within an ecosystem. The student is expected to:

(B) interpret interactions among organisms exhibiting predation, parasitism, commensalism, and mutualism;

### The Lesson:

#### I. Overview

The Students will listen to a brief lecture of concerns associated with Microbial Contaminants. The students will then look at the samples they brought under a microscope to see if they are able to see anything. The students will then be given a reading assignment that will correlate with the next day's lesson.

#### II. Performance or Learner Outcomes

The students will be able to identify different types of microbial contaminants in water and some of health concerns associated with them.

#### III. Resources, materials, and supplies needed

Microscopes, pipettes, slides, slide covers

#### IV. Supplementary materials, handouts

Excerpts from the paper "Controlling Disinfection By-Products and Microbial Contaminants in Drinking Water" and from other sources

#### V. Resources for packets

[www.hc-sc.gc.ca/ehp/ehd/catalogue/bch\\_pubs/98ehd211/chapter1.pdf](http://www.hc-sc.gc.ca/ehp/ehd/catalogue/bch_pubs/98ehd211/chapter1.pdf)

[www.epa.gov/safewater/dwh/health.html](http://www.epa.gov/safewater/dwh/health.html)

[www.epa.gov/safewater/mdbp/mdbp.html](http://www.epa.gov/safewater/mdbp/mdbp.html)

<http://www.epa.gov/ORD/NRMRL/Pubs/600R01110/600R01110.htm>

## Five-E Organization

Teacher does:

Student does:

<p><b>Engage:</b> Ask the students to think about different things that can make them sick and then ask some of the students to share their thoughts. Then tell the students to imagine that those things are in their water and that they cannot see them.</p> <p><i>Questions:</i> Call on students and see what they are imagining. What other things in water could be harmful to you?</p>	<p><b>Hoped for Student Response:</b> The students listen to the teacher and give examples like viruses and bacteria.</p> <p><b><i>Expected Student Response:</i></b> The students will be hesitant to answer and will not want to volunteer.</p>
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**Evaluate:**

The teacher will call on several different students, by name, who raised their hands to answer the questions.

**Decision Point Assessment (DPA):**

If the students are having trouble with the questions, probe and try to bring in real life examples of water that one wouldn't normally drink (i.e. stagnant pond water)

<p><b>Explore:</b> Have the students get into groups of two at each microscope station. Pass out the water samples the students brought to class as well as a water sample that you collected from a ditch that is near to the school. Begin by showing the students the correct way to prepare a slide. Once instructed go around and check to make sure all the student's slides have been prepared correctly. Have the students look at their slides under the microscope and record their observations. The teacher will also show the students the correct method for cleaning their slides so that the students will be able to clean their workstation once the lesson is over.</p> <p><i>Questions:</i> What do you see under your microscope? Do you see any organisms that look similar to those that you may have seen before?</p>	<p><b>Hoped for Student Response:</b> The students will listen to the instructions given by the teacher and will record their observations on paper as to what they viewed under the microscope for each sample. The students will clean their work station once they have completed the lab.</p> <p><b><i>Expected Student Response:</i></b> The students will be unsure of what to record and how to use the microscope and the groups may require some slight individual instruction.</p>
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**Evaluate:**

The teacher will walk around to the different groups to make sure they are progressing in a timely manner. The teacher will check the different observations the

groups have made and make constructive comments on their observations. The teacher will also collect their observations once the students have finished with the lab.

**Decision Point Assessment (DPA):**

If the students are having trouble with the microscope or the questions go over with them again the proper procedures for using a microscope and slide preparation. If they are having trouble with the questions, try to probe for some background knowledge that could be used in answering the questions.

<p><b>Explain:</b>          Begin lecturing on the different types of microbial contaminants that can be found in drinking water (i.e. Chloroform, E. coli, Cryptosporidium, Giardia, and Salmonella)          Then go on to explain how they get into drinking water and the different effects these contaminants can have on humans.  <i>Questions:</i>          What do you think makes these organisms bad for drinking water?          Why is it okay to eat bacteria like in yogurt but bad for you to have in the water you drink?</p>	<p><b>Hoped for Student Response:</b>          The students will listen to the lecture and take notes</p> <p><b>Expected student Response:</b>          The students may become bored and not pay attention during the lecture.</p>
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**Evaluate:**

The teacher will periodically stop and ask the students questions or ask the students if they have any questions and for their input on the issue.

**Decision Point Assessment (DPA):**

If the students become bored during the lecture, one can stop periodically and ask questions such as the ones posed above under the section “**Explain.**”

<p><b>Elaborate:</b>          The teacher will pass out excerpts from the paper “<i>Controlling Disinfection By-Products and Microbial Contaminants in Drinking Water</i> and other sources” and assign it to the students as reading in preparation for the next class period lesson. The students will be allowed to begin reading if there is extra class time. The students will be told that there will be a quiz the next class period. Suggest to the students to outline or take notes while reading on the different types of microbes and what they do and how they usually</p>	<p><b>Hoped for Student Response:</b>          The students will take the reading and begin reading if there is extra class time.</p> <p><b>Expected Student Response:</b>          The students may not want to begin reading the reading excerpts and will try and sit and do nothing.</p>
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contaminant water. <i>Questions:</i> N/A	
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**Evaluate:**

A quiz will be given over the reading the next class period.

**Decision Point Assessment (DPA):**

If the students do not wish to start the reading assignment I will remind them that it is an integral part of the next days assignment.