MAINE MOBILE BIOLAB
STUDENT HANDOUT

Name:	

Water Quality

Water quality refers to the condition of water in our rivers, lakes, streams, and oceans, as well as the water that comes out of our taps at home. It's essential because clean and safe water is crucial for all living things on Earth, including humans, animals, and plants.

Water can become polluted when harmful substances like chemicals, waste, or dirt get into it. This pollution can harm the environment and make the water unsafe to drink or swim in. Water quality testing helps scientists and experts check the health of water by measuring things like the levels of bacteria, chemicals, and other contaminants. By taking care of our water quality, we can ensure that we have access to clean and safe water for drinking, recreation, and the well-being of our planet.

Filters are indispensable tools in the ongoing effort to improve water quality. They act as a shield against impurities, efficiently removing particles, chemicals, and harmful microorganisms from water sources. Whether in large-scale water treatment plants or at the household level, filters play a critical role in enhancing the safety and cleanliness of our water supply.

Sand filters, for instance, capture larger particles, while activated carbon filters are adept at adsorbing contaminants and unpleasant odors. Membrane filters with microscopic pores provide an even higher level of purification by blocking even the tiniest impurities. By employing these filtration methods, we can significantly enhance water quality, ensuring that the water we consume is free from harmful substances and safe for both human consumption and the environment, contributing to healthier and more sustainable ecosystems.

Today you'll learn about different ways to measure water quality and how different filters can aid in improving water quality!

QUICK CHECK: What harmful substances might be detected in water with poor water quality?

PART I – Initial Quality Testing

To determine the quality of the water, we will look at 2 parameters: pH and turbidity

pH Sensor

1. Unscrew the storage bottle cap and remove the pH sensor.
2. Rinse the pH sensor with distilled water, then dry it off with a tissue.
3. Place the end of the pH probe 2-3 cm into the bottle with untreated water.
4. When the reading stabilizes, record the pH to one decimal point in Table 1.
5. Rinse the pH sensor with distilled water, then dry it off with a tissue.
6. Place the pH sensor back into the storage bottle and tighten the cap.

Turbidity Sensor

1. Pour the untreated water into the glass bottle up to the white line. Place the lid on the bottle.
2. Dry the outside of the bottle with a tissue.
3. Insert the bottle into the turbidity sensor, cap up, making sure the white arrow on the bottle aligns with the arrow on the sensor.
4. Close the lid.
5. Press the green arrow in the bottom left corner of the LabQuest screen. Wait 10 seconds and press the red square to stop data collection. Click "Analyze" then "Statistics" then "Turbidity." Record the "Max" turbidity number to one decimal point in Table 1.
6. Remove your bottle from the sensor and pour the solution back into the sample bottle.
7. Rinse the empty glass bottle with distilled water.

Table 1: Quality Before and After Filtration

	pH	**Turbidity (NTU)**
	How acidic or basic a liquid is. Acidic is < 7, Basic is > 7	*How clear is the liquid. Clear water = low turbidity, Cloudy water = high turbidity*
Before Filtration		
After Filtration		

PART II– Filtration

Now we will test our filter to see how well it can clean the water. Each group will design their own filter.

Materials available:

- Coffee filters
- Sand
- Pebbles
- Baking soda
- Activated charcoal
- Cotton balls

1. Place a funnel on the empty bottle.
2. Layer the materials you'd like into the funnel. Leave about 2cm of space at the top.
3. Record the layers of materials used in Table 2 below.
4. Prewet the filter by rinsing it with distilled water into the waste container.
5. Slowly pour the untreated water into the funnel.
6. Make observations about the filtered water that is collected in Table 2. Compare your filter results with those at your table.

Table 2: Filter Design
Top of funnel   Bottom of funnel
Observations of Filtered Water

PART III– Final Quality Testing

Return to Part 1 to test the filtered water with the probes. Record the values in Table 1.

Conclusions

Compare the water parameter readings you collected with the groups at your table. Which filter was best at improving the water quality?

If you could redesign your filter, what would you change?