

WATER DISTRIBUTION DEMONSTRATION

INTRODUCTION

Humans must have freshwater to live. But about ninety-seven percent of the Earth's water is too salty to use. The remaining 3 percent is freshwater, but most of it is in polar icecaps, remote glaciers, and icebergs and is not easily accessible. Accessible freshwater, therefore, comes from streams, lakes, and underground sources. These sources represent less than one-half of one percent of all water on Earth. If all the water on Earth equals 100 percent, then the following table shows the breakdown representing each type.

Earth's Total Water Supply	Earth's Total Freshwater Supply
97.2% Oceans (saltwater)	2.38 % Icecaps, glaciers
<u>2.8%</u> Freshwater	0.397% Ground water
100.0% Total Water on Earth	0.022% Surface water
	<u>0.001%</u> Air and soil
	2.8 % Total Freshwater on Earth

OBJECTIVES

After the demonstration, students will:

1. Know the distribution of Earth's water.
2. Be able to name the sources of freshwater on Earth (icecaps and glaciers, ground water, surface water, atmospheric water vapor, and soil moisture).

MATERIALS

Two 1,000-milliliter (mL) graduated cylinders, four 100-mL graduated cylinders, one medicine dropper, food coloring.

TEACHER PREPARATION

If two 1,000-mL graduated cylinders are not available, other clear containers can be used. If you have access to laboratory glassware, fifteen 100-mL graduated cylinders will work. Ten cylinders will hold 972 mL of saltwater, while the remaining five graduated cylinders will hold freshwater. A clear plastic jug holding one liter (soft drink container) of colored water can be used. Other clear glasses or jars can hold the smaller divisions. The following table shows the distribution of water for this demonstration.

Earth's Total Water Supply	Earth's Total Freshwater Supply
972 mL Ocean (saltwater)	23 mL Icecaps and Glaciers
<u>28 mL</u> Freshwater	4 mL Ground water
1,000 mL Total Water on Earth	2* Drops Surface water
	<u>1*</u> Drop Water in air and soil
	28 mL Total Freshwater on Earth

1 liter = 1,000 mL

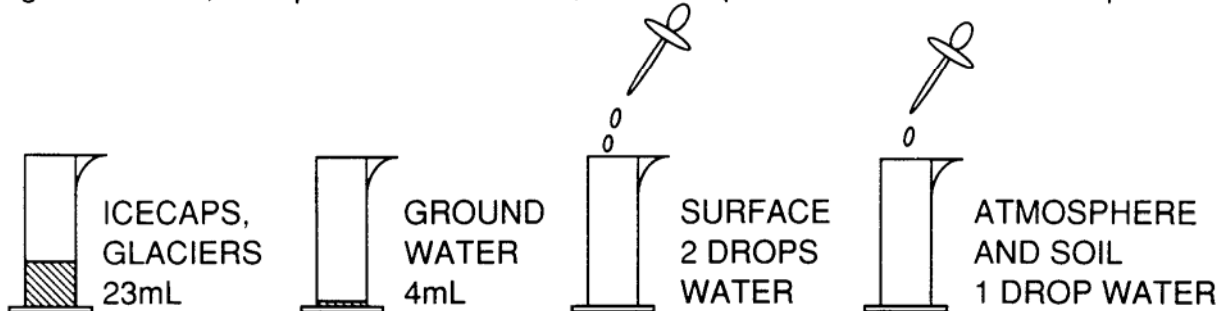
*3 drops = 1 mL

PROCEDURE

1. Fill one 1,000-mL graduated cylinder with colored water to the 1,000 mL line. Tell the students that this represents the Earth's entire supply of water. Pour 28 mL of the total water into a second 1,000-mL graduated cylinder. The 28 mL of water represents the Earth's total freshwater supply. The remaining 972 mL of water is saltwater that occurs primarily in oceans.



2. Divide the 28 mL of freshwater by pouring into smaller containers; 23 mL for icecaps and glaciers, 4 mL for ground water, 2 drops for surface water, and 1 drop for the water in the atmosphere and soil.



3. List the percentages of Earth's water on the chalkboard or overhead projector. Refer to these numbers as you continue.

Interpretative Questions

As the students examine and compare the different volumes of water in the graduated cylinders, ask the following questions:

1. Which of the four freshwater graduated cylinders represents the most freshwater on Earth?
ANSWER: 23 mL, representing icecaps and glaciers.
2. Is this a source of freshwater commonly used by humans for drinking, watering the lawn, cleaning, etc.? Explain.
ANSWER: No, icecaps and glaciers are usually too far away from population centers.
3. Approximately what percentage of the Earth's freshwater is ground water?
ANSWER: $4 \text{ mL} / 28 \text{ mL} \times 100 = 14\%$ ground water.
4. Where is most of Earth's water found?
ANSWER: Oceans.
5. Can cities such as San Francisco, Miami, and New York City, which are near oceans, use the water from the oceans for households and industry? Explain.
ANSWER: No, the ocean water contains salts that are harmful to humans, kill plants, and corrode metals.
6. Can the salts be removed from water? Why isn't this commonly done?
ANSWER: Yes, but the desalinization process is very expensive.
7. Why is the little bit of water in the atmosphere important to plants, animals, and humans?
ANSWER: Water in the atmosphere is carried inland in the forms of rain, snow, sleet, and hail which supply freshwater sources such as lakes, streams, and ground water.