

UNIT 7:

H₂O Taste Test

Teacher's Notes

H₂O Taste Test

Background Information

Everyone's sense of taste depends on one's sense of smell, if you have a cold; your sense of taste is diminished. Water is the "universal solvent" (i.e. almost everything will dissolve in it; including many different kinds of minerals). These dissolved minerals such as iron, sulfur and calcium (from underground or where the water is stored) will also add taste and even colour to the water.

In an effort to treat drinking water supplies, municipalities may filter out some things (iron, sulfur) and add certain things (chlorine, fluoride) all of which will affect the taste as well as the purity. Bacteria and impurities can and will affect body function and overall body health.

70% of our body is water, which has to be replaced regularly because some is lost each day due to perspiration (water evaporating from our skin), respiration (water in our breath) and digestion (water in our urine). Four large glasses of water per day are necessary to keep our bodies supplied with water.

Overview of Activity:

Students will be challenged to taste the difference between water from four different sources. Are they able to tell the difference? What is it about water that we taste anyway? Students discover that the dissolved minerals and additives to water create the different tastes of water.

Learning Expectations:

Earth and Space Systems, Grade 4 (Rocks, Minerals and Erosion)

- Describe the difference between minerals and rocks

Life Systems, Grade 4 (Habitats and Communities)

- Identify, through observation, various factors that affect plants and animals in a specific habitat (e.g., availability of water, food sources, shelter, light, ground features)

Three Key Messages:

The students should learn these messages from this activity:

- Water is composed of more than two parts hydrogen and one part oxygen; naturally dissolved minerals, biotic material and treatment additives.
- It is the "extra stuff" in the water that creates the tastes of water.
- Testing for and controlling the "extras" is important to maintaining healthy water supplies and habitats.

Discussion:

- Q. Ask who lives in the city, town or in the country, do they know where they get their water from?**
- Q. Do they have a favorite water supply (home, cottage, school, bottled etc.)?**
- Q. Can they describe why they like about the ones that they do enjoy. Are there some that they do not like? Where? Why?**

Review the background information material above. So, choosing a water source that is safe to drink is really important telling sources apart by taste can be fun.

H₂O Taste Test

Talk about the different dissolved minerals found in drinking water and the fact that the source of water will sometimes effect how the water will taste. Use the chart to discuss the different minerals found in different concentrations in water and what are considered unsafe minerals/elements in our water (eg. Arsenic). Go over the sources used in this activity and add that all of this water has been tested on a regular basis for safety. Be sure to add that only one (distilled water) has had all other material removed through collecting the condensed water after evaporation.

Activity 1 - The Taste Test

Materials Needed:

- (Can be done in small groups or as whole class)
- Water samples from 4 different sources (eg. Well, municipal treated water, bottled water, distilled water)
- Four similar containers for dispensing a cup at a time
- Disposable cups
- Recycling container
- A, B, C & D flip signs with sources
- Dissolved Minerals/Elements Chart

Procedure:

1. Arrange the sample jugs on the table with their sample letters. Ensure that an adequate supply of cups of water is on hand for the activity.
2. Choose two volunteers to taste all four in a blind tasting. Which source do they think will taste better? Why? Can they tell which is which from looking at the samples?
3. Provide a sample of each source for each taster. First, taste A then B, then C, then D. Ask the students which sample belongs to which source? Why? Flip the source labels over to reveal the answer after they have chosen. Discuss the results, how did they do? Keep a quiet tally of the number of tasters and correct guesses.
4. Review the key messages with the students.

Activity 2 - Bottled Water Analysis

Materials Needed:

- Variety of different kinds of bottled water
- Worksheets, pencils
- Cups
- Chart of elements

Bottled Water Analysis:

Water is more than H₂O. Since water is the universal solvent, many different minerals will dissolve into water. On bottled water, you will find a list of the dissolved minerals found in the water, based on parts per million (ppm). In other words, for every one million parts of water, those numbers of minerals are present. Different sources account for some of the different types of minerals found in the water. Some places may add minerals and chemicals to help the water taste better or to help make the water safe for drinking. These chemicals may assist in killing bacteria or helping other material to fall from the water. The following list includes some of the minerals tested for in bottled water. Some of these are ones that would make us sick if we drank them or drank too much of them. Check bottled water that you may have in your household to see how it compares. Is there any taste difference between the different kinds of bottled water?

Natural Spring Water (with Ozone) Bottler: Our Compliments:

Dissolved Mineral Salts 220 ppm

Source: Amaranth Township, Ontario

HCO ₃ 190 ppm	Mg 16 ppm	Na 4 ppm	Al 0 ppm	As 0 ppm
NO ₃ 0 ppm	Ca 46 ppm	SO ₄ 12 ppm	Fe 0 ppm	K 1 ppm
Cl 1 ppm	Pb 0 ppm	Cu 0 ppm	Cr 0 ppm	Zn 0 ppm
Mn 0 ppm				

Dasani Remineralized Water Bottler: Coca-Cola

(Reverse osmosis - non carbonated)

Total dissolved solids - less than 35 ppm

Flouride ions 0 ppm	Magnesium- Sulphate	Potassium- Chloride	Salt	Ozone
Water				

Natural Spring Water Bottler: Tim Horton's

Sodium free, Fluoride ions 0.4 ppm, mineral content 440 ppm

Source: Wellington County

NCO ₃ 280 ppm	N ₀₃ 2 ppm	Cl 22 ppm	As 0 ppm	Mg 33 ppm
Ca 100 ppm	Pb 0 ppm	K 3 ppm	Na 33 ppm	SO ₄ 20 ppm
Cu 0 ppm	Zn 0 ppm			

Evian Bottler: Danone Group, France

Sodium free, dissolved mineral salts 309 ppm, Fluoride ion 0.1 ppm

Source: Cachat Spring, Evian, France

Ca 78 ppm	Mg 24 ppm	Na 5 ppm	K 1 ppm	HCO ₃ 357 ppm
SO ₄ 10 ppm	Cl 4 ppm	N ₀₃ 1 ppm	SiO ₂ 14 ppm	Pb 0 ppm
Cu 0 ppm	Zn 0 ppm	As 0 ppm		

Canadian Essence Bottler: Ice River Springs

Sodium free, ozonated, dissolved mineral salts 270 ppm, Fluoride ions 0 ppm

Source: Feversham, Grey County, Ontario

As 0 ppm	HCO ₃ 330 ppm	Ca 87 ppm	Cl 5 ppm	Cu 0 ppm
F 0 ppm	Mg 31 ppm	NO ₃ 2 ppm	Pb 0 ppm	K 1 ppm
Na 2 ppm	SO ₄ 8 ppm	Zn 0 ppm		

Vittel Bottler: The Perrier Group

Source: Vittel Bonne Source, France

Dissolved mineral salts 403 ppm, Fluoride ions 0.2 ppm

Ca 91 ppm	Mg 19.9 ppm	Na 7.3 ppm	K 4.9 ppm	HCO ₃ 258 ppm
SO ₄ 104 ppm	Cl 3.7 ppm	NO ₃ 0.6 ppm	As 0 ppm	Cu 0 ppm
Pb 0 ppm	Zn 0 ppm			

Aberfoyle Springs Bottler: Aberfoyle Springs Ltd.

Natural mineral content 340 ppm, Fluoride ions 0.4 ppm

Source: Wellington County Spring Water

HCO ₃ 180 ppm	NO ₃ 0 ppm	Cl 32 ppm	Mg 25 ppm	As 0 ppm
Ca 69 ppm	Pb 0 ppm	K 2 ppm	Na 18 ppm	SO ₄ 56 ppm
Cu 0 ppm	Zn 0 ppm			

Natural Spring Water Bottler: Master Choice (Great Atlantic and Pacific Company)

Dissolved Mineral salts: 220 ppm, Fluoride ions 0.3 ppm

Source: Amaranth Township, Ontario

HCO ₃ 190 ppm	Mg 16 ppm	Na 4 ppm	Al 0 ppm	NO ₃ 0 ppm
Ca 46 ppm	SO ₄ 12 ppm	Fe 0 ppm	Cl 1 ppm	Pb 0 ppm
Cu 0 ppm	Cr 0 ppm	As 0 ppm	K 1 ppm	Zn 0 ppm
Mn 0 ppm				

Montclair Natural Spring Water Bottler: The Perrier Group

Source: Northumberland County, Ontario

Sodium free, mineral salts content: 300 ppm, Fluoride ions 0 ppm

HCO ₃ 262 ppm	NO ₃ 3.1 ppm	Cl 9.2 ppm	As 0 ppm	Mg 19 ppm
Ca 66 ppm	Pb 0 ppm	K 1 ppm	Na 5.5 ppm	SO ₄ 26 ppm
Cu 0 ppm	Zn 0 ppm			

Natural Spring Water Bottler: Presidents Choice (Sunfresh Ltd.)

Source: Feversham, Ontario

Dissolved mineral salts: 281 ppm, Fluoride ions 0 ppm

HCO ₃ 300 ppm	SO ₄ 9 ppm	Pb 0 ppm	Na 2 ppm	Cl 5 ppm
K 1 ppm	F 0 ppm	N 1 ppm	As 0 ppm	Zn 0 ppm
Cu 0 ppm	Mg 28 ppm	Ca 81 ppm		

What Elements Are Present in the Human Body?

Living cells contain anywhere from 65% to 90% water by weight, so it's no surprise that most of the body's mass is oxygen. Carbon, the basic building block of organic compounds, takes second place. Together, the top six body elements – oxygen, carbon, hydrogen, nitrogen, calcium and phosphorous – account for about 99% of the body's mass.

Element	Composition by Weight (%)
O	65
C	18
H	10
N	3
Ca	1.5
P.....	1.0
K.....	0.35
S.....	0.25
Na	0.15
Mg	0.05
Cu, Zn, Se, Mo, F, Cl, I, Mn, Co, Fe	0.70
Li, Sr, Al, Si, Pb, V, As, Br	traces

But this is like describing a slice of Black Forest chocolate cake as “mostly carbon, hydrogen, and oxygen”. A list of ingredients completely misses what's essential and interesting about the cake. As Hermann Muller put it, “To say that a man is made up of certain chemical elements is a satisfactory description only for those who intend to use him as a fertilizer.”

Information Source: General Chemistry Online! - Fred Senese

The Elements - Legend

C - Carbon

Cl - Chlorine

Pb - Lead

K - Potassium

As - Arsenic

Ca - Calcium

O - Oxygen

Cu - Copper

Zn - Zinc

Na - Sodium

Fe - Iron

Cr - Chromium

Mg - Magnesium

Al - Aluminum

Mn - Manganese

N - Nitrogen

F - Fluorine

SO₄ - Sulfate (sulfur and water → a dissolved salt)

HCO₃ - Bicarbonate

NO₃ - Nitrate

SiO₂ - Silicon Dioxide

H2O Worksheet

Look at the water bottles (or the list of bottles and contents) and write down the contents in the appropriate space below. Use a periodic table or the available "Elements Chart" to list the names of the elements tested for in the water. Are any of the elements poisonous or not good for our health? (Use the "What Elements Are Present In Our Bodies" sheet for this information – some will be listed under "traces") and research each element to find out this information. Underline the contents that are common to all of the bottles in blue. Underline the ones that are not good for our health in red.

Can you taste a difference in the water? Circle the kind that you like the best.

Name of Type of Water	Elements and Parts Per Million