LaMotte
SAMPLE PACKET

the Tapwater Tour

WELCOME!

Code 3608

WARNING: This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Symbol Legend

Signals interesting facts or suggestions for additional class acitivities.

Reminds instructor that handouts should be distributed here.

Alerts teacher that this section is for the instructor and not a part of the lecture (it may note an entire page which organizes an activity or a single step such as solution preparation).

Italicized phrases in the text are answers to questions posed to the students or helpful comments which supplement the procedure.

Reminds the instructor to hang up something up inthe classroom.

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Chemistry Questions

Replacement Parts

Preface

The goal of the Tapwater Tour is to have students discover their drinking water for what it really is. The test systems used are uniquely designed to be safe, simple, and yet valid.

The tablets included in this kit are the same tablets used by professional water analysts. Since this method does not require sophisticated measuring devices, the tablet reactions can be explained in simple scientific terms. They are never interpreted as magic tricks.

Real Science

The tour is designed to be presented directly to your class as a lecture. Thought provoking questions are scattered throughout the text and answers are provided in *italics*.

This program introduces students to scientific thought while stimulating curiousity and enthusiasm. "Hands-on" active participation in this lab leads to:

Cognitive Domain	Processes
Observation	Defining • Enumerating
Analysis	Organizing • Comparing
Evaluation	Judging • Choosing
Comprehension	Describing • Interpreting
Application	Applying • Generalizations • Summarizing

Your students will become familiar with the chemical concepts of:

Dissolving • Concentration • Reaction

Line up for the Tapwater Tour!

Teacher's Tips

Notes after the "cow" symbol shown above include interesting facts or suggestions for additional class activities.

Preparation

Read instructions ahead of time to familiarize yourself with the procedures for each section.

Shopping List and Materials Check Lists

Be sure to have everything on hand before it is needed. Encourage students to "recycle/reuse" containers by rinsing them out and bringing them into class for this project.

Organizing

To avoid chaos, divide your class into teams before beginning any activity. By dividing your class into ten teams, you will have enough tablets to complete the tests as instructed. Students will test their own tap water individually and samples, prepared by the teacher, as a group. Let the teams give themselves a name.

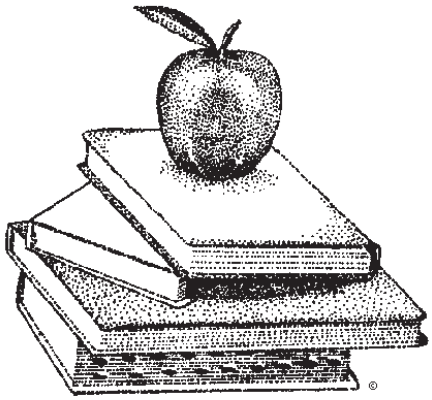
Vocabulary

Terms like "distilled", "hard water", and "indicator" may be new to your students but they are part of the scientific vocabulary your students can learn on the Tour. Try to use and encourage the use of these terms as you lead your students through the Tapwater Tour. Some vocabulary words and their definitions are listed on page 9.

Record Keeping

Have students make folders with a water related theme to hold their data sheets, pictures, and drawings.

Display the Classroom Data Chart as a permanent record or part of a bulletin board display.

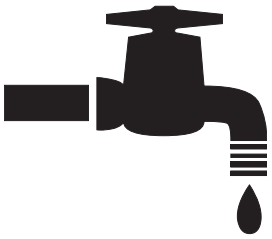


TesTabs® and Test Bags

The tablets and household products used in these activities are safe if properly used. Do not allow students to eat or drink any of the products or solutions. A few products require additional precautions. These will be noted by a ✚; please read and follow the precautions for these products.

Do not pinch the tablet in the bag with your fingernails or poke at it with a pencil or pen; this may cause a leak.

Water Words



These words will be used throughout the Tapwater Tour. Many should already be familiar to you and your students.

Acid	see pH
Algae	Simple rootless plants that grow in sunlight waters in relative proportion to the amount of nutrients available. They can affect water quality adversely by lowering the dissolved oxygen in the water. They are food for small aquatic fish and animals.
Bacteria	Microscopic living organisms which can aid in pollution control by consuming or breaking down organic matter in sewage or by similarly acting on oil spills or other water pollutants. Bacteria in air, water and soil can also cause human, animal and plant problems.
Base	see pH
Calcium	A naturally occurring metal which is found in limestone, chalk and gypsum. Calcium in water contributes to the overall hardness.
Carbon Dioxide (CO_2)	A colorless, odorless, non-poisonous gas, which results from fossil fuel combustion and is normally a part of ambient air.
Chlorine	Added to disinfect water by destroying bacteria and algae.
Corrosion	The deterioration of metal parts which are slowly eaten away by oxidation or rusting. Corrosion usually occurs when oxygen comes into contact with metal surfaces.

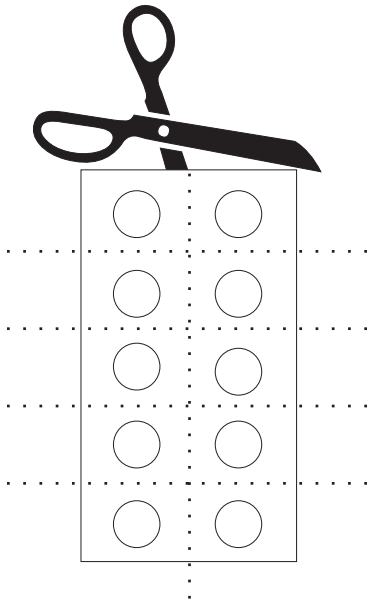
Organizing the Tour

Gather Materials

A shopping list is provided on page 8. It contains all items necessary for your entire tapwater tour.

Prepare for Each Unit

A materials check list is provided at the beginning of each section. It contains all the items necessary for that section of the Tapwater Tour.



TesTabs®

Tablets are supplied in strips of ten tablets. Cut the tablets as shown at left. Do not break foil seal around each tablet. Store cut tablets in envelopes or zipper top bags.

Get Started

The lecture portion of the Tapwater Tour begins on page 13. The Introduction will be presented on Day 1. The students will receive a research contract to take home. They will return the next day with their home tap water and be ready to begin the tour.

Recording Results

Each student will produce their own Data Sheets. Results for all students will be summarized on the Classroom Data Chart.

UNIT 1 • Introduction

Today we will begin the Tapwater Tour.

Three-fourths of the earth is covered with water. Only 0.8% of this is fresh water and less than one half of that fresh water is available for us to use in our homes. We all take water for granted and use more than you think. The average person uses five gallons of water just to brush their teeth! The average family of four uses 300 gallons of water each day. Where else is water used in your house?

Because water is so important, we have to make sure that it tastes good enough to drink and doesn't damage our plumbing. Why might some water taste bad?

Everyone has things in their water besides water. Some of the things in water taste bad. How would you like to drink water out of a puddle?

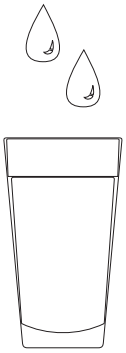
Some scientists are water quality scientists. Their job is to test water and fix it before we drink it. You will be testing your own tap water and other water samples in exactly the same way. You will test for corrosive pH, smelly chlorine, rusty iron, bitter copper and soap scum hardness. Soon, each of you will become a home drinking water expert.

HAND OUT: Water Facts handout and Research Contract.

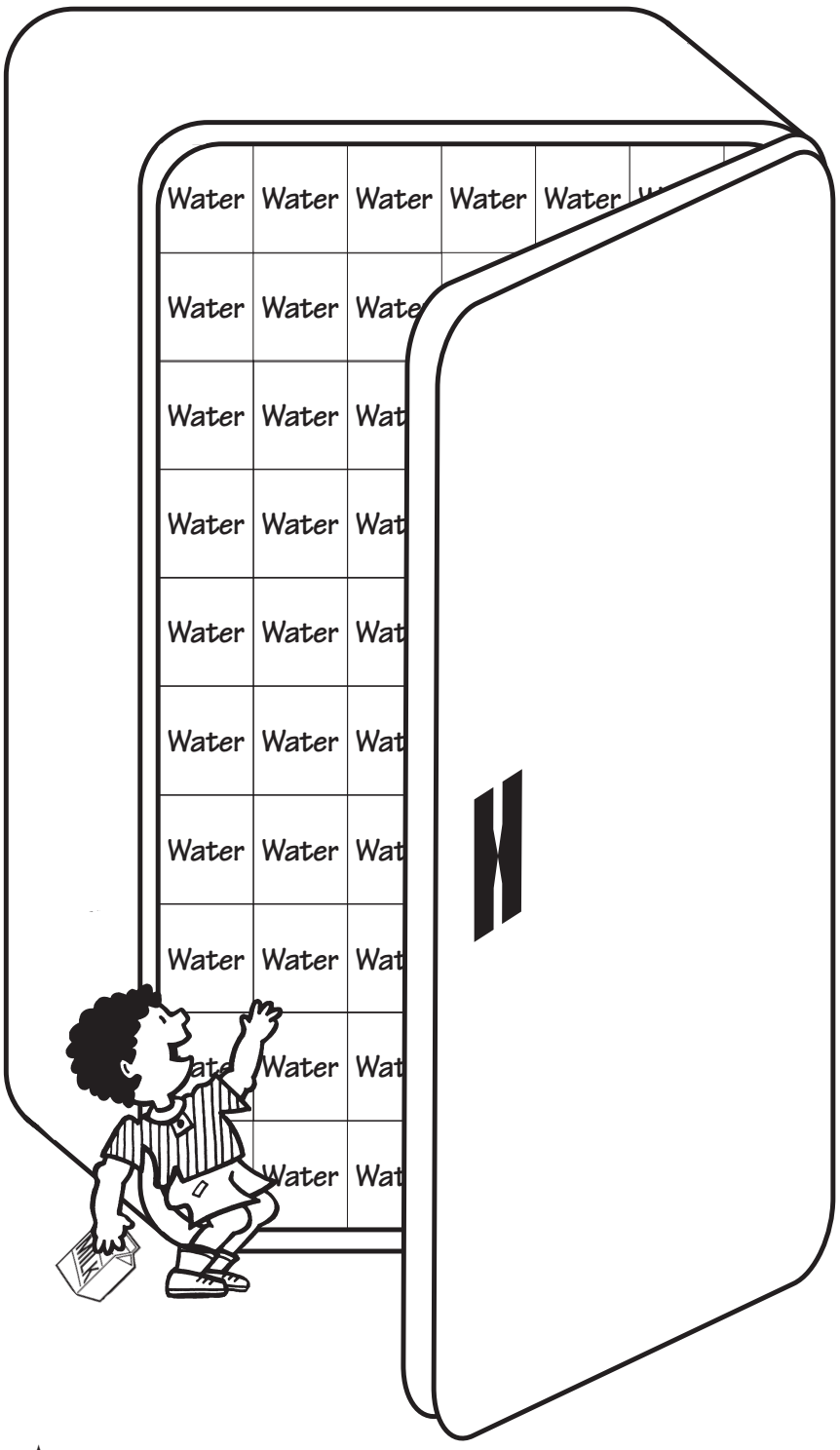
Remind the students to bring a tap water sample and research contract tomorrow. Discuss appropriate containers.

Water Facts

Three-fourths of the earth is covered with water...



...less than 0.4% of that water is good enough to use!



The average family of four uses 300 gallons of water each day!

UNIT 2 • pH

Materials Check List for pH Test

- ❑ pH Wide Range tablets *(1 for each student and 3 per group)*
- ❑ Sample bags *(1 for each student)*
- ❑ Sample #1 - Baking soda *(prepare with students)*
- ❑ Sample #2 - Vinegar *(prepare with students)*
- ❑ Sample #3 - Aspirin *(prepare with students)*
- ❑ Tap water *(student sample)*
- ❑ Straws *(1 for each student)*
- ❑ Distilled water *(4 quarts)*
- ❑ Quart containers *(3)*
- ❑ Data sheet *(1 for each student)*
- ❑ Prepare poster for class results *(see page 21)*
- ❑ Color Chart Poster

NOTE: *We recommend that this unit be presented in two separate sections.*

Samples for Activity 2 can be made in advance, if necessary, but it is very important for students to actually observe substances dissolve in water for themselves.

To avoid chaos, divide your class into teams before beginning the activity. By dividing your class into ten teams, you will have enough tablets to complete the tests as instructed. Students will test their own tap water individually and samples, prepared by the teacher, as a group. Let the teams give themselves names.

What is pH?

pH is a measure of how acidic or basic things are. We assign numbers to things to tell us just how acidic or basic they are.

HAND OUT: pH Scale

Battery acid is very acidic with a pH of almost zero. Bleach is very basic with a pH of 12.6. pH 7 is at the middle of the scale. This is the neutral pH. That is, it is neither acidic nor basic. Distilled water has a pH of 7 because it has no minerals in it (it is pure water).

pH is the negative log of the hydrogen ion concentration pH = -Log [H+]

Another word for basic is alkaline.

Strong acids and bases are dangerous. In your home the bleach is probably stored high up in a cabinet so your little brother or sister can't drink it. Weak acids and bases are part of everyday life. Rainwater is slightly acidic.

Why do you think the pH of sea water is higher than distilled water? Why does it taste different? What happens when the sun dries sea water on your skin?

Distilled water is pure - it has no minerals. Salt water has many things dissolved in it. Salt water evaporates, leaving minerals behind.

Can you tell, by looking at water, if anything is dissolved in it? Let's do the activity and see.

HAND OUT: pH Data Sheets, pH tablets, and sample bags

HANG UP: Classroom Data Chart

Scientist's Name _____ Date _____

Research Team _____

Data Sheet

pH Test

WARNING: This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Your Water Sample

Color _____

pH _____

Sample #1

What was added? _____

Color _____

pH _____

Sample #2

What was added? _____

Color _____

pH _____

Sample #3

What was added? _____

Color _____

pH _____

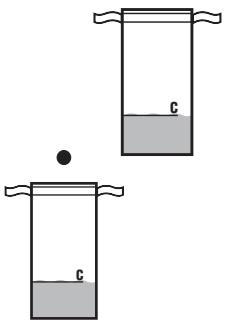
pH Activity 1

O.K. students, divide into teams.

Test your tap water. Follow the procedure carefully.

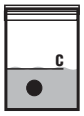
WARNING: This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Procedure

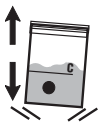


1. Fill the bag to line C with your tap water.

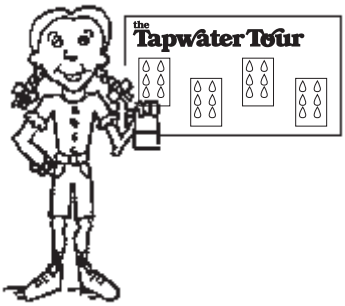
2. Remove one pH Wide Range tablet from the foil strip and drop it into the bag.
(It is OK to touch the tablet.)



3. Roll the top of the bag down towards you 3 or 4 times. Fold the yellow tabs back around the bag.



4. Holding the top of the bag, shake to dissolve the tablet.



5. Compare the color of the reaction to the color chart poster. Record the pH on your Data Sheet and the Classroom Data Chart.

DO NOT throw the test away.

pH Discussion

pH of rain water may be as low as 4.0 as a result of carbonic, sulfuric, nitric acids, etc. from air pollution.

Look at your data from the pH lab. Whose drinking water pH was greater than 7? Whose was less than 7? Record name and pH values on the Classroom Data Chart. Who had the most acidic water? Who had the most basic drinking water?

Can you think of a reason why the pH values were different?

Drinking water from different sources has different mineral contents. That is, different things are dissolved in the water.

Matching Game

Match one item from Column A with one item from Column B.
Draw a line to connect the matched items.

Column A	Column B
its pH is about 2.3	very acidic
a pH value of 7 is _____	basic
acidic water is _____	corrosive
bleach is _____	distilled water
the gas that we exhale	Cola drink
pure water	limestone
a rock that changes the pH of water	neutral
battery acid is _____	carbon dioxide

Summary

The Tapwater Tour can be summarized in a variety of ways. The Water Quality Report is a wrap-up in itself. The report should generate discussions on students expectations, actual results, discrepancies and possible reasons for those unexpected results.

HAND OUT: Water Quality Reports and Crossword Puzzle