
name

**Training session
for science and technology
resource persons**



TEACHERS' LOGBOOK

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WORKSHOP SCHEDULE

DAY 1

- Welcome, schedule of activities
- Definition of the problem
- Work organization
- Information gathering in specialist teams
- Specialists' reports

LUNCH

- Experiment: acidity and buffering capacity
- Demonstration of rain acidification
- Introduction to Day 2

DAY 2

- Introduction to the specifications for the models/instruments
- Examination of specifications
- Construction of models

LUNCH

- Team presentations
- Task analysis - connections with the QEP
- Workshop assessment
- Evaluation in science and technology

Workshop Mandate

Objectives:

- To enable participants to fully understand the Secondary Cycle One Science and Technology program
- To enable participants to start thinking about evaluation
- To prepare participants to train teachers
- To enable participants to identify future training needs

Approach:

To enable participants to experience as students the approach set forth in the Secondary Cycle One Science and Technology program. (Reflective approach to the task)

Training in Three Stages:

- One-day information session on the program
- Two- to three-day training session through science and technology
- Specialized training in various areas

Broad Area of Learning Targeted by the Task

Environmental Awareness and Consumer Rights and Responsibilities

Educational Aim

To encourage students to develop an active relationship with their environment while maintaining a critical attitude toward consumption, technology development and the exploitation of the environment

Focuses of Development

- Awareness of his/her environment
- Construction of a viable environment based on sustainable development
- Awareness of social, economic and ethical aspects of consumption

Evaluation

The purpose of this task is to foster learning, not to evaluate the students. It should help promote the development of cross-curricular and subject-specific competencies as well as regulation during the learning process.

Context

The Minister of the Environment is calling on the expertise of consulting firms to explain a phenomenon observed over the past ten years: that is, a decline in fish stocks as well as increased acidity in lakes on the north shore of the St. Lawrence River.

Mandate

The consulting firms are asked to study all aspects of the problem in order to explain to ministry representatives the causes and effects of this degradation. Each consulting firm will use the services of a biologist, a geologist, a hydrologist and a meteorologist.

Names of the firm :

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Names of specialists:

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Biologist
-
Geologist
-
Hydrologist
-
Meteorologist

Instructions

- Work in groups of four.
- You have three hours in which to respond to the problem and prepare a presentation.
- You may consult specialists from the same field.
- Save all your research and discussion notes.

Information Gathering

Specialist Meeting

- You have one hour to gather information and prepare your report.
- Working alone, examine the information available or conduct your own research.
- Working in a team, agree on what information to include on the subject worksheets. (This information will be passed on to your coworkers in your firm.)
- Specialists from the same field must consult one another.
- Save all your research and discussion notes.

Multidisciplinary Team Meeting

- Using the documents gathered during the specialist meeting, fill out the specific worksheets.
- At the end of the meeting, each participant should have filled out his or her worksheet.
- Each team should submit a preliminary report explaining the problem, as well as their assessment of the information-gathering activity.

HYDROLOGY WORKSHEET

Your expert report should help us recognize the importance of the world's fresh water reserves and the urgent need to protect this resource. It should provide a detailed explanation of:

- The water cycle and more specifically, runoff and infiltration
- The importance of water to living organisms
- Spring acid shock and, more specifically, mixing



METEOROLOGY WORKSHEET

Your expert report should focus on the Earth's atmosphere, its composition and the effect that industrialization has on air and water composition in Quebec. It should also include a study of prevailing winds and air mass displacement.



GEOLOGY WORKSHEET

Your expert report should explain the origin of rocks and minerals and how they are classified. You should pay particular attention to the characteristics and buffering capacity of soils in the various physiographic regions of Quebec.



BIOLOGY WORKSHEET

Your expert report should study the importance of biodiversity, the features of the various zones in a lake and their importance on the reproduction of species living there. It should also include information on the dangers of bioaccumulation and the effect of acidification on the evolution of species in a lake.



Consulting firm :

PRESENTATION OF THE PROBLEM

A large empty rectangular box with a thin black border, intended for the student to write the presentation of the problem.

ASSESSMENT OF INFORMATION-GATHERING ACTIVITY

Cooperation among specialists during information-gathering activity:

Task sharing:	good	average	poor
Team spirit:	good	average	poor
Decision making:	good	average	poor

Comments : _____

Information sharing within the consulting firm:

Task sharing:	good	average	poor
Team spirit:	good	average	poor
Quality of reports:	good	average	poor

Comments : _____

Representation of the problem:

Climate:	good	average	poor
Decision making:	good	average	poor
Procedure:	good	average	poor

Comments : _____

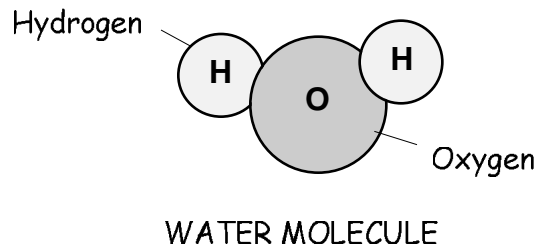
Overall assessment:

Team's strengths : _____

Team's weaknesses : _____

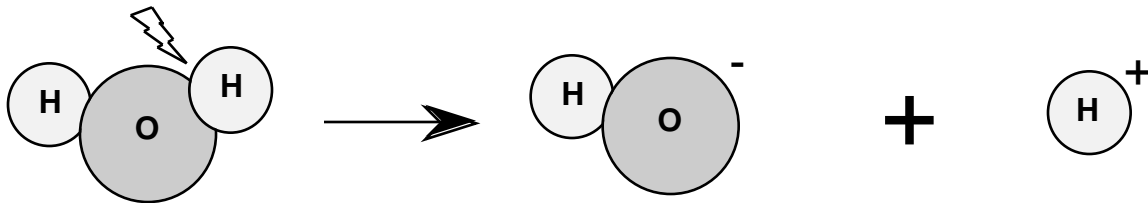
ACIDITY

Pure water is a substance composed of particles that are made up of two atoms of hydrogen and one atom of oxygen. It can be represented as follows:



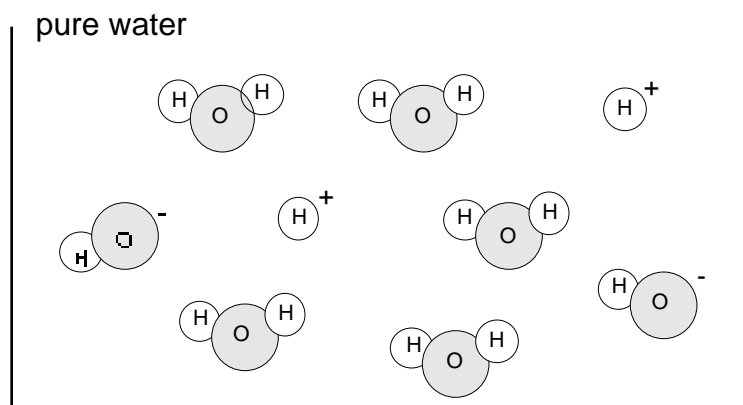
At first sight, it seems that pure water does not conduct electricity. However, if we use a very sensitive instrument, a faint current can be detected. This current can only be explained by the presence of electrically charged particles in water.

Studies have shown that these charged particles are the result of a break in the chemical bond of a water molecule. It can be illustrated as follows:

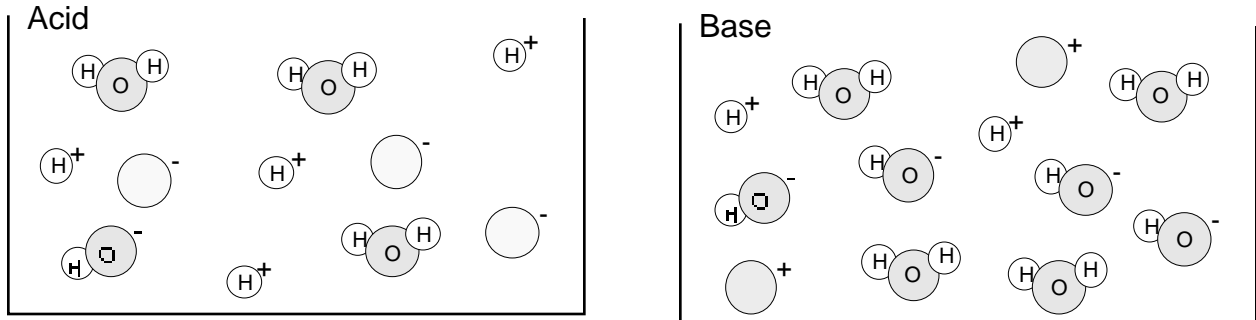


Once the bond is broken, the two resulting parts of the molecule carry an electric charge: a positive one and a negative one. These charged particles are called ions. There are small quantities of H^+ and OH^- ions in water.

It is the quantity of ions that allows us to determine whether a solution is an acid or a base. Where there are equal quantities of positive and negative ions, the solution is said to be neutral. That is why pure water is neither an acid nor a base: it contains as many H^+ ions as OH^- ions.



By adding certain substances to pure water, we can create an imbalance in the number of H^+ and OH^- ions. If there are more H^+ ions, the solution created is an acid; if there are more OH^- ions, the solution is a base.



In 1909, the Danish chemist Soren Sorensen introduced a method of measuring the degree of acidity of a solution, which is known today as the pH scale. The pH of a solution is calculated according to the number of H^+ ions in a solution. The pH measures the "power" of concentration of "hydrogen" ions in a solution.

	ACIDIC						NEUTRAL	BASIC							
pH	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Number of ions	$H^+ > OH^-$						$H^+ = OH^-$	$H^+ < OH^-$							

Taste was the first method used to determine whether a solution was acidic or alkaline (basic). For more than 300 years, however, organic molecules, such as those found in certain plant pigments, have been used to safely distinguish acids from bases. These substances change colour depending on the pH of the environment. We will use red cabbage juice as a pH indicator.

Experiment: Acidity and buffering capacity

Using the materials provided and working in pairs, you must design an experiment to determine the pH of certain household products and to verify the buffering capacity of igneous rock and sedimentary rock.

Prepare your report according to the following format:

1) **Definition of the problem:** In your own words, clearly state the problem that you wish to resolve and briefly explain how you will go about it.

2) **Materials:** Make a list of all the materials and equipment you will need to conduct your experiment.

3) **Procedure:** List, in order, all of the operations to be carried out in the laboratory.

4) **Presentation of results:** Present in table form* all of the data collected during the experiment.

* A table has boundaries and a heading centered above. The data may be presented in columns or rows separated by lines.

5) **Analysis and interpretation:** Explain the significance of the results and indicate what trait or characteristic they show. Answer the questions in this section. Identify causes of error and indicate what could be done to improve the experiment.

6) **Conclusion:** Clearly and concisely answer the question formulated in the presentation of the problem.

Materials available:

- household products
- red cabbage juice
- test tubes
- test tube rack
- stirring rod
- solutions (pH 2 to 12)
- dropper

NOTE: BEFORE CONDUCTING YOUR EXPERIMENT, HAVE IT APPROVED BY THE PERSON IN CHARGE OF THE LABORATORY.

Title : _____

PRESENTATION OF THE PROBLEM:

MATERIAL

PROCEDURE

PRESENTATION OF RESULTS

ANALYSIS AND INTERPRETATION

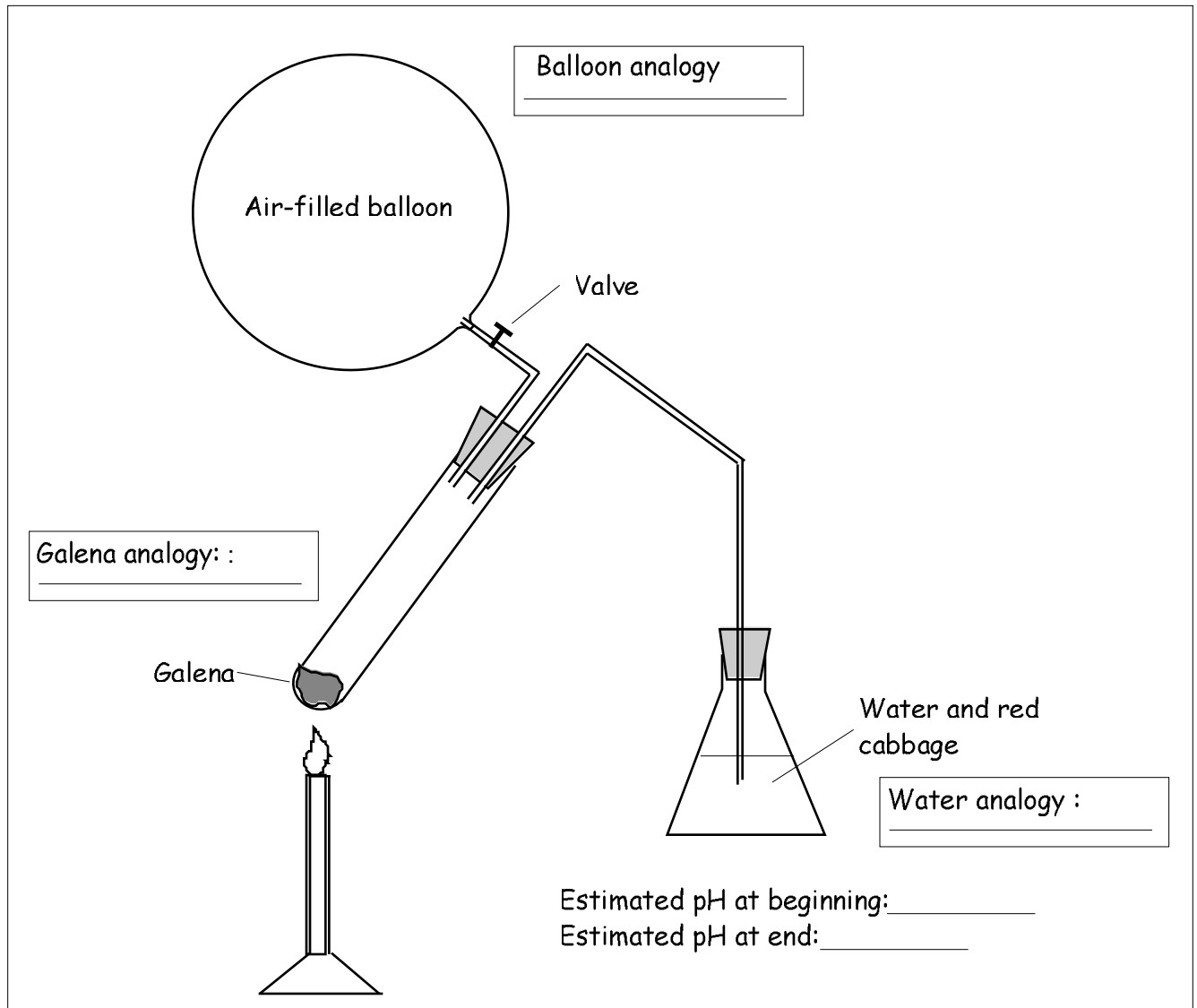
In your opinion, what happens when a person suffers from acid indigestion or heartburn?

Would milk be effective in soothing a burning sensation? (Justify your answer.)

In your opinion, how do antacids, sodium bicarbonate or Pepto-Bismol work to relieve acid indigestion?

CONCLUSION

DEMONSTRATION: Rain Acidification



EXPLANATION :

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