Investigation 2.C: What's in the Water?

Question: How do human activities affect local water quality?

Hypothesis

With your lab partner, write a hypothesis about water quality in two similar but contrasting areas, such as:
- upstream of a city vs. downstream of the city
- upstream of an animal farm vs. downstream of the animal farm
- run-off from a freshly watered plant vs. run-off from a freshly watered and fertilized plant

Prediction

Based on your hypothesis, predict how water samples from the two areas will differ with respect to pH and concentrations of sulfate (or iron), nitrate, and phosphate.

Materials

- water sample from each area
- Probeware or colourimetric assay kit for sulfate (or iron), nitrate, phosphate, and pH
- 8 to 10 test tubes (10 mL)
- pipette bulb
- 2 pipettes (2 mL)
- 2 sample jars and lids
- metal scoopula

Safety Precautions

Read and follow the safety instructions that come with the assay kit. Wear gloves and wash your hands after completing the investigation.

Procedure

1. Obtain water samples from the two contrasting areas.

2. If you and your lab partner are using a colourimetric assay kit, first label each set of test tubes with the field site and the test (for example, nitrate). Use the pipette bulb and a pipette to dispense water from each water sample into the labelled test tubes. Use the colourimetric assay kit to test the samples in the test tubes, and record the data in the table on the following page.

Investigation 2.C: What's in the Water? (cont'd)

Water sample	pH	[sulfate]	[nitrate]	[phosphate]
Area 1				
Area 2				

3. If you are using Probeware, test the samples directly from the sample jars and record the data.

Analysis

1. Draw a bar graph to compare the results of each test for the two water samples.

2. Explain any differences between the two samples.

3. Compare your results with the amounts of sulfate (or iron), nitrate, phosphate, and pH in Calgary tap water, given below.

Calgary Tap Water Parameters

Water quality parameter	Units	Calgary tap water
sulfate	mg/L	30.4–43.6
iron	mg/L	< 0.1
nitrate (as total nitrogen)	mg/L	0.052–0.124
phosphate	mg/L	0.001–0.004
pH		6.98–8.18

Conclusions

4. Based on your results, suggest how human activities are affecting local water quality.

5. How might problems with local water quality affect the natural environment?

Extension

6. In August 2005, a train derailment caused 730 000 L of fuel oil and wood preservative to empty into Wabamun Lake, west of Edmonton. Since then, the Paul Band has been active in the cleanup effort of what is, to them, a sacred resource. Which chemicals contaminated the lake? Where were the immediate effects? What is the status of the lake now?