



HOW TO TEST THE WATER

Teacher Guide

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(These sheets will be available in editable electronic form at www.3NE/Learning - See Useful Resources below.)

Curriculum Connections

Science 14

Unit C: Investigating Matter and Energy in the Environment

- Describe the relationship between photosynthesis and cellular respiration in terms of biological energy storage
- Identify life functions common to living systems

Fill In The Blank KEY (10 points)

- apron, gloves, safety glasses
- toxic, burn
- clean
- label
- (the) line
- upside down



Check List KEY (7 pts)

	record numbers for each test			
1	✓	✓	✓	✓
2	✓	✓		
3	✓			
4	✓	✓	✓	
5			✓	
6	✓	✓	✓	✓
7		✓	✓	
8				✓

Short Answer KEY (3 points)

Take out the Test Kit Colour Chart. Hold each test tube over the white area of the Chart next to its colour list.

Unit D: Investigating Matter and Energy in the Environment

- Assess the impact of modern agricultural technology on the natural pathways of recycling matter
- Explain how various factors influence the size of populations
- Describe the relationship between land use practices and altering ecosystems

Science 20

Unit D: Changes in Living Systems

General Outcome 3: Students will analyze and describe the adaptation of organisms to their environments, factors limiting natural populations, and evolutionary change in an ecological context.

Science 30

Unit D: Energy and the Environment

General Outcome 1: Students will explain the need for balancing the growth in global energy demands with maintaining a viable biosphere.

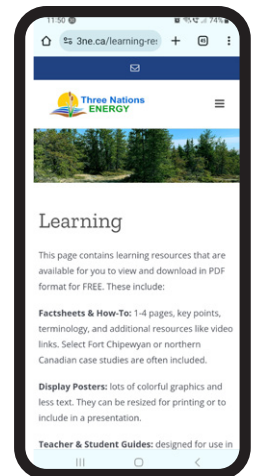
Useful Resources

Please see the other Aquaponics resources available at <https://www.3ne.ca/learning-resources/>

What, How, Why - This is the introduction to aquaponics covering the basics including a question sheet, answer key and Alberta curriculum connections.

Exploring Employment - Two articles discussing aquaponics as a possible home business and training opportunities.

See the website for more topics!





HOW TO TEST THE WATER

Get the Equipment:

- ◆ API Master Test Kit
 - Colour Chart
 - 7 Test Bottles
 - 4 Test Tubes with Lids
- ◆ CLEAN plastic cup or syringe
- ◆ Sharpie marker
- ◆ Gloves, apron, safety glasses



Set up this equipment near a sink

Before You Start

These chemicals are toxic and can burn your skin! Do NOT use near the aquaponics unit.



- ◆ Fill clean plastic cup (or syringe) with water from the fish tank.
- ◆ Put on apron, gloves, and safety glasses.
- ◆ CLEAN 4 test tubes if needed
- ◆ Label them A, B, C, D if needed
- ◆ Pour fish tank water into the 4 test tubes up to the line.

How to Use Dropper Bottles

For all tests, after removing squeeze bottle cap, turn the bottle **upside down** so drops come out evenly. Squeeze **slowly**.



Nitrate Test

1. Use Nitrate Test Bottle #1.
2. Squeeze **10 drops** into test tube A.
3. Cap the test tube and shake a few times.
4. **SHAKE** Nitrate test bottle #2 FOR 30 SECONDS before you use it.
5. Squeeze **10 drops** from Bottle #2 into the same test tube A.
6. Put cap on the test tube and **shake** for ONE MINUTE.
7. Set test tube aside. (NEEDS 5 minutes for the colour to show up.)



Ammonia Test

1. Use Ammonia test solution #1.
2. Squeeze 8 drops into test tube B.
3. Use Ammonia test solution #2.
4. Squeeze 8 drops into test tube B.
5. Put cap on the test tube and shake for 5 seconds.
6. Set test tube aside. (NEEDS 5 minutes for the colour to show up.)



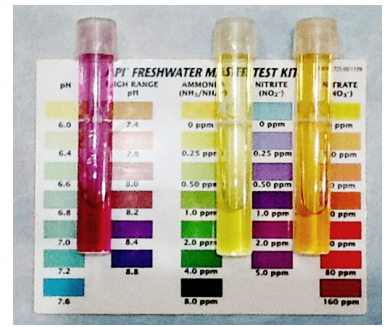
Nitrite Test

1. Use the Nitrite Test Solution.
2. Squeeze 5 drops into test tube C.
3. Put cap on the test tube and shake for 5 seconds.
4. Set test tube aside. (NEEDS 5 minutes for the colour to show up.)



Record

1. Take out the Test Kit Colour Chart.
2. Hold each test tube over the white area of the Chart next to its colour list. Select the closest match.
3. Record the number for each test on today's log sheet.



pH Test

1. Use the regular pH Test solution.
2. Squeeze 3 drops into test tube D.
3. Put cap on the test tube and shake a few times.
4. Set test tube aside.



Clean Up

1. Put caps back on all solution bottles.
2. Empty all the test tubes into a sink and rinse them all with clean water. (Do NOT pour into fish tank.)
3. Put all equipment away.

FRESHWATER MASTER TEST KIT

This test is only used if the pH is very high

pH	HIGH RANGE pH	AMMONIA (NH ₃ /NH ₄ ⁺)	NITRITE (NO ₂ ⁻)	NITRATE (NO ₃ ⁻)
6.0	7.4	0 ppm	0 ppm	0 ppm
6.4	7.8	0.25 ppm	0.25 ppm	5.0 ppm
6.6	8.0	0.50 ppm	0.50 ppm	10 ppm
6.8	8.2	1.0 ppm	1.0 ppm	20 ppm
7.0	8.4	2.0 ppm	2.0 ppm	40 ppm
7.2	8.8	4.0 ppm	5.0 ppm	80 ppm
7.6		8.0 ppm		160 ppm

WHAT IS PPM?

Just as per cent (%) means "out of a hundred", so parts per million or ppm means "out of a million". This describes the concentration or strength of something in water. One ppm can also be written as 1 milligram of something per liter of water (mg/l).

CHECKPOINT: Are You Ready to Test the Water? (20 points)

Fill In The Blank (10 points)

1. Before you start testing, you MUST put on these three things:

2. You need to wear these things because the chemicals in this test are _____ and can _____ your skin.

3. Before you start, make sure all the test tubes are _____.

4. It is a good idea to use a marker to _____ the test tubes A,B,C,D.

5. Collect water from the fish tank and fill each test tube up to _____.

6. For all tests, turn the bottle _____ so drops come out evenly.

Check List (7 points)

Put a check mark in ALL boxes for the tests described below.



(The first one is done for you.)

1. Put the cap put on the test tube before shaking

2. Uses TWO dropper bottles of chemicals

3. Shake the bottle BEFORE you use it.

4. Takes 5 minutes for the colour to show up.

5. Needs only 5 drops of chemical for the test

6. Empty test tube into the sink and rinse

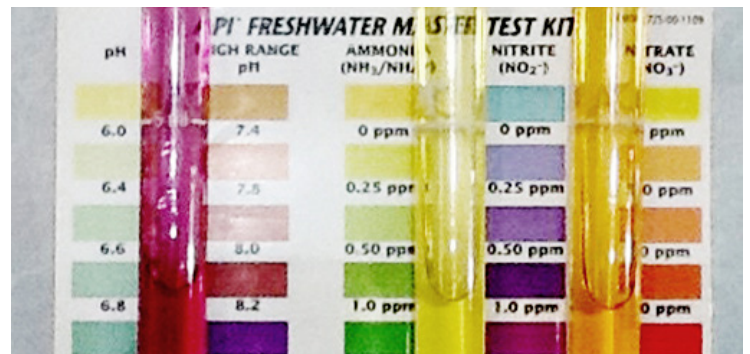
7. Test tube needs to be shaken for 1 minute

8. Needs only 3 drops of chemicals for the test

✓	✓	✓	✓

Short Answer (3 points)

1. Describe how to read the colour result from a test. _____



month/year

Aquaponics - Monitoring & Testing Log

Please read the instructions for doing all tests and inspections carefully

IF ANYTHING LOOKS WRONG - Contact a Teacher or the Office right away

	DAILY INSPECTIONS				End of Day		WEEKLY	ONCE A WEEK TESTS (If cycling, test every 2-3 days)				Name of Tester (full name)	
	Air Pump	Water Heater	Water Pump	Bell Siphon	Main Drain	Top Up Water in Fish Tank	Nitrate	Ammonia	Nitrite	pH			
<i>fill in dates below</i>	<i>initial after each inspection is completed</i>						<i>record numbers for each test</i>						
Week 1													
Week 2													
Week 3													
Week 4													
Week 5													