



Something is Fishy in the Nitrogen Cycle

Subject/grade level: Eighth Grade Science

Materials: aquarium, air pump, filter system, new aquarium gravel, live aquatic plants, live fish, tap water conditioner, fish food, Ammonia test strips, Nitrite test strips, Nitrate Test Kit

Standards:

MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

MS-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

Lesson Objective(s):

To test for, observe and record daily changes in the amounts of three nitrogen compounds as they relate to the nitrogen cycle in a newly setup aquarium.

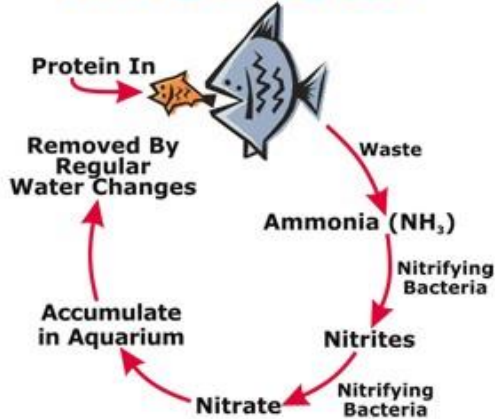
To test for, observe and record daily changes in the pH of a newly set-up aquarium.

To understand how bacteria can clean the water by consuming and converting toxic compounds into less toxic forms.

Engagement:

Draw the nitrogen cycle in a flow chart type diagram. Discuss the steps of the nitrogen cycle.

Nitrogen Cycle



Students should think about the answer to this question: If you don't want to have to change the water in your fish tank every few weeks, what can you do?

Exploration:

Students will set-up the new aquarium with new gravel. Add live plants and an air pump. Students will measure the levels of ammonia, nitrite, and nitrate in the tank. Add fish to the aquarium. Measure and record the levels of the three nitrogen compounds daily for three weeks.

Explanation:

Students should explain what happened to the levels of each nitrogen compound and how it relates to the nitrogen cycle.

Students will identify the role each has in the nitrogen cycle. What role do the fish play? What role do the plants play?

Elaboration:

Students should answer the following questions:

Which nitrogen compound increased first? How can you explain this?

Which nitrogen compound increased second? How can you explain this?

Which nitrogen compound increased last? How can you explain this?

Where do you think the bacteria came from in your initial tank setup?

Evaluation:

Students should answer:

Now that you understand a little about the concerns of starting a new aquarium, what would you do to help your friend setup his new tank that would give it a better chance of surviving?

How can humans use this knowledge of bacteria and the nitrogen cycle?