The Phosphate Cycle

Homework

1. **What organisms help convert animal waste into PO_4^{-3} and HPO_4^{-2}?**

   bacteria

2. **What compounds could PO_4^{-3} and HPO_4^{-2} form with sodium ion?**

   Na_3PO_4 and Na_2HPO_4

3. **Why do plants need PO_4^{-3} and HPO_4^{-2}?**

   Phosphates are needed to make ATP, DNA, RNA, phospholipids

4. **What three human activities contribute phosphates to the phosphorus cycle?**

   Fertilizing agricultural fields
   Going to the bathroom
   Laundry and dishwashing

5. ***Read the following and answer the questions 6 to 9 that follow:***

Experimental Evidence that Showed that Increased Levels of Phosphorus is the Main Nutrient Cause of Algal Blooms(from

Fifty years ago, no one knew what exactly caused algal blooms in lakes and in rivers. There was some evidence to suggest that carbon, nitrogen and phosphorus, which are associated with agriculture runoff and waste water, were responsible. Small scale experiments were not able to show which were more important.

David Schindler, a scientist at the University of Alberta and his colleagues conducted a number of groundbreaking experiments in northern Ontario in the 1960s and early 1970s.

They divided an experimental lake, using a plastic divider curtain, into two approximately equal portions. Carbon and nitrogen were added to one half of the lake, while carbon, nitrogen and phosphorus were added to the other half. For eight consecutive years, the side receiving phosphorus developed algal blooms, while the side receiving only carbon and nitrogen did not.

6. In Schindler's experiment, what was the hypothesis?

He suspected that phosphorus and not nitrogen was the main factor that made algae grow out of proportion.

7. What were the independent and dependent variables?

a) Independent variable (controlled by scientist): amounts of N, C and P.

b) Dependent variable (outcome of changing the substance or factor that scientist controls: number of algae

c) What served as a control? Same volume of water; same lake, same amount of carbon and nitrogen

8. Was the hypothesis confirmed? YES

9. Based on the result what could be concluded from this experiment?

Out of the three elements, carbon, nitrogen and phosphorus, which are associated with agriculture runoff and waste water, phosphorus was shown to be the most important in controlling the growth of algae.