

## 2014 AP<sup>®</sup> ENVIRONMENTAL SCIENCE FREE-RESPONSE QUESTIONS

4. Biogeochemical cycles describe the movement of certain elements (typically bound with other elements in compounds) through Earth's atmosphere, hydrosphere, biosphere, and lithosphere. These elements and their compounds are necessary components of all life, and because they cycle, they can be used repeatedly by new generations of organisms. Each biogeochemical cycle has different pathways with various reservoirs (sources and sinks) where elements may reside for days or millions of years.
- (a) The atmosphere is one important carbon reservoir.
    - (i) **Describe** a biological process by which carbon is removed from the atmosphere and converted to organic molecules.
    - (ii) **Describe** a biological process by which carbon is converted from organic molecules to a gas and returned to the atmosphere.
  - (b) Oceans and terrestrial systems are also important carbon reservoirs.
    - (i) **Explain** how atmospheric carbon is incorporated into two oceanic sinks.
    - (ii) **Identify** one terrestrial sink, other than fossil fuels, that stores carbon for thousands to millions of years.
  - (c) The burning of fossil fuels has been shown to increase the concentration of carbon in the atmosphere. **Discuss** TWO other human activities that increase the concentration of carbon in the atmosphere.
  - (d) **Identify** an environmental problem that results from elevated atmospheric carbon concentrations. **Discuss** one consequence of the problem you identified.
  - (e) Phosphorus is another element important to all organisms.
    - (i) **Describe** one major way in which the phosphorus cycle differs from the carbon cycle.
    - (ii) **Identify** one reason that phosphorus is necessary for organisms.

**STOP**

**END OF EXAM**