**Name: Date:**

**APES - Water Quality Protocols**

There are several chemical, biological and physical tests used to determine water quality. Use the handouts for reference to better understand why the following tests are used and how water systems may be impacted by these factors.

**Dissolved Oxygen (DO)**

1. How is the potential for DO affected by temperature and stream velocity?
2. Is it possible for water to have too much dissolved oxygen? What impact does this have?
3. What is the major anthropogenic reason for low dissolved oxygen levels (**hypoxia**)?
4. What species are present when oxygen levels are high? What species indicate lower oxygen levels?
5. What is the DO saturation percent of a water with a temperature of 17C and a DO of 5ppm?

How would you rate this water sample?

**BOD**

1. What does BOD stand for? Is it better for a stream to have a high or low BOD? Explain.
2. List several ways human activities can increase BOD (level of organic material):

**Temperature**

1. What is one major cause of thermal pollution?
2. Why is it important to record water’s temperature when collecting samples?
3. Discuss ways aquatic organisms are impacted by temperature.

**Phosphorous and Nitrogen**

1. Identify the following:

**PO4 NO3 NO2**

**NH3 N2**

1. What is the major cause of **cultural eutrophication**?
2. What forms of nitrogen are harmful to animals?
3. What form is used by plants and animals for growth?
4. What is the condition **methemoglobinemia** and what individuals are at greatest risk?
5. Explain why the following might occur. You observe an algae bloom yet tests do not indicate high levels of **nitrates** and **phosphates**. Further upstream the water is clear yet tests indicate high levels of these nutrients.
6. Eutrophication is the natural aging process (succession) of a lake where rooted plants eventually take over, gradually filling in a lake from the shoreline. This occurs in shallow lakes that are very productive due to high light and nutrient levels. Deeper lakes that do not have a high level of productivity and turbidity are known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Turbidity**

1. List factors responsible for increasing turbidity.
2. How are aquatic organisms impacted by turbidity?
3. Describe two methods used to measure turbidity.

**Carbon Dioxide**

1. Since CO2 is soluble, what effect does it have on water?

**pH**

1. What does pH stand for?
2. What is the optimum pH range for most aquatic organisms?
3. Explain how low pH levels affect the following:

Nutrient levels

Metals such as aluminum and lead

Toxicity of ammonia to fish

1. What do fungal mats indicate about the pH levels in a stream?

**Hard vs Soft Water**

1. What does it mean when people refer to water as hard? Where do the **cations** come from?
2. The hardness or softness of water can have a significant impact on plumbing. This is a great concern to industry which uses large volumes of water. Explain how plumbing is affected by water that is “too” hard and “too” soft.
3. Why is it helpful for households to “soften” their water?

**Total Dissolved Solids (TDS)**

1. Give examples of TDS:
2. Relate TDS levels to the local geology of an area.
3. How do high TDS levels affect photosynthesis and temperature? Explain.
4. What human activities lead to high TDS and must be closely regulated?