

Chemical Monitoring Critical Thinking Questions

Water Temperature Change

1. What does testing for water temperature change involve?
2. What can cause water temperature to change?
3. What problems result from increases in water temperatures?
4. What other parameter when increased may lead to increased water temperature?

Phosphates

1. What are phosphates?
2. How do they get into the water? What are the sources?
3. What can result from excess phosphates in water?
4. What other parameters are affected by high phosphate levels?

Dissolved Oxygen (DO)

1. What is dissolved oxygen?
2. How does it get into the water?
3. Why is it important?
4. What other parameters directly influence the amount of oxygen water can hold?

Nitrates

1. What are nitrates?
2. How do they get into the water? What are the sources?
3. What can result from excess nitrates in water?
4. What other parameters are affected by high nitrate levels?

Biochemical Oxygen Demand 5-Day (BOD5)

1. What is BOD5? What does it measure?
2. What types of things when "broken down" contribute to high BOD5 levels?
3. What problems can result from high BOD5 levels?
4. What other parameters are generally associated with high BOD5 levels?

Turbidity

1. What is turbidity?
2. What causes water to be turbid? What are the sources?
3. What problems can result from excessive turbidity?
4. What other parameters may also be associated with highly turbid water?

pH

1. What is pH?
2. What can happen in the environment to change the pH of water?
3. What can pH affect?
4. What other parameters affect pH?

E. coli

1. What is *E. coli* ?
2. How does it get into the water? What are some sources?
3. Why do we test for it?
4. What other parameters are high *E. coli* levels often associated with?

Chemical Monitoring Critical Thinking Answers

Water Temperature Change

1. What does testing for water temperature change involve?

Change in temperature between sampling site and 1 mile upstream.

2. What can cause water temperature to change?

Thermal pollution: clear cuts, industrial discharges (esp. power plants), runoff from paved surfaces

3. What problems result from increases in water temperatures?

Decreased DO, increased photosynthesis and decay, impacts on aquatic organisms.

4. What other parameter when increased may lead to increased water temperature?

Increased turbidity due to soil erosion, urban runoff, or algae..

Dissolved Oxygen (DO)

1. What is dissolved oxygen?

Oxygen dissolved in water - like carbon dioxide is dissolved in soda.

2. How does it get into the water?

From the atmosphere, also from photosynthesis.

3. Why is it important?

Aquatic organisms need it to breathe - the higher the DO, the higher the diversity.

4. What other parameters directly influence the amount of oxygen water can hold?

Temperature! Considering % saturation, as temp increases the water can hold less O₂.

Biochemical Oxygen Demand 5-Day (BOD₅)

1. What is BOD₅? What does it measure?

Amt. of oxygen consumed by bacteria during breakdown of organic waste over 5 days.

2. What types of things when "broken down" contribute to high BOD₅ levels?

Wastes produced by breakdown of aquatic vegetation, animal waste, feedlot runoff.

3. What problems can result from high BOD₅ levels?

Potential for oxygen depletion in the water - fish kills.

4. What other parameters are generally associated with high BOD₅ levels?

High nutrient levels - phosphorus and nitrogen.

pH

1. What is pH?

Measure of how acidic or basic the water is-from 0 (very acidic) to 14 (very basic).

2. What can happen in the environment to change the pH of water?

Influenced by geology (limestone), rain, and discharges from point sources

3. What can pH affect?

Affects toxicity of other chemicals (e.g. aluminum) - many organisms are very pH-sensitive.

4. What other parameters affect pH?

Changes with temperature; response to high levels of photosynthesis

Phosphates

1. What are phosphates?

Nutrient essential for plant growth, naturally present in low concentrations.

2. How do they get into the water? What are the sources?

Via runoff and erosion. Present in fertilizers, organic waste & attached to soil particles.

3. What can result from excess phosphates in water?

Can lead to Eutrophication, excess plant growth and decay - increased BOD.

4. What other parameters are affected by high phosphate levels?

Often results in low dissolved oxygen.

Nitrates

1. What are nitrates?

Nutrients essential to plant growth.

2. How do they get into the water? What are the sources?

Sewage is main source to rivers and streams.

3. What can result from excess nitrates in water?

Excessive amounts contribute to Eutrophication - algae growth.

4. What other parameters are affected by high nitrate levels?

Often correspond to high total phosphate and low dissolved oxygen.

Turbidity

1. What is turbidity?

Relative clarity of water - high turbidity means more cloudy.

2. What causes water to be turbid? What are the sources?

Suspended solids in the water - from soil erosion, algae.

3. What problems can result from excessive turbidity?

Decrease photosynthesis and O₂, increase temp.-smother habitat and clog gills.

4. What other parameters may also be associated with highly turbid water?

Low dissolved oxygen and high total phosphorus.

E. coli

1. What is E. coli ?

Particular species of found in feces of warm-blooded animals.

2. How does it get into the water? What are some sources?

Combined sewer overflows (CSOs), poorly maintained septic tanks, animal waste.

3. Why do we test for it?

E.coli are not necessarily pathogenic themselves, they signal the presence of other dangerous pathogens/fecal contamination.

4. What other parameters are high E. coli levels often associated with?

High nutrient levels - phosphorus and nitrogen.