NEHA Water Supply Practice Test (Sample)

Study Guide

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Questions

1. What does the term “potable water” refer to?

A. Water that is bottled for sales

B. Water that is safe to drink and use for food preparation

C. Water that is primarily used for irrigation

D. Non-treated water from natural sources

2. What is the pH of a solution where the hydrogen ion concentration is 1 x 10^8 moles per liter?

A. 6

B. 7

C. 8

D. 9

3. Which organism is primarily identified in fecal coliform tests?

A. Salmonella typhi

B. Escherichia coli

C. Shigella flexneri

D. Vibrio cholerae

4. What is backflow prevention?

A. A method to test water quality

B. A technique to enhance water pressure

C. A method to prevent contaminated water from flowing back into the clean water supply

D. A process for recycling wastewater

5. Which gases are frequently found in water that encourage corrosion?

A. Nitrogen and helium

B. Hydrogen and sulfur

C. Oxygen and carbon dioxide

D. Methane and phosphine

6. What does "hydraulic fracturing" pose a risk for?

- **A. Pest infestation in water systems**
- **B. Potential groundwater contamination from chemicals used in the fracking process**
- **C. Reduced water table levels**
- **D. Increased water flow rates**

7. What characteristic does not vary in water used for domestic purposes?

- **A. Temperature**
- **B. Source of the water**
- **C. Amount of minerals in the water**
- **D. pH level**

8. What is not commonly used to disinfect water?

- **A. Silver nitrate**
- **B. Chlorine**
- **C. Ultraviolet light**
- **D. Ozone treatment**

9. In water treatment, what does “coagulation” do?

- **A. It prevents the growth of algae**
- **B. It helps remove suspended particles and colloids from water**
- **C. It adds minerals for taste**
- **D. It enhances the acidity of the water**

10. Which of the following is a typical indicator of water quality?

- **A. Color variation**
- **B. Temperature fluctuations**
- **C. Levels of coliforms**
- **D. Presence of algae**

Answers

1. B
2. C
3. B
4. C
5. C
6. B
7. C
8. A
9. B
10. C

Explanations

1. What does the term “potable water” refer to?

A. Water that is bottled for sales

B. Water that is safe to drink and use for food preparation

C. Water that is primarily used for irrigation

D. Non-treated water from natural sources

The term “potable water” specifically refers to water that is safe for human consumption and suitable for use in food preparation. It must meet certain health and safety standards set by regulatory bodies to ensure that it does not pose any health risks to individuals. This includes being free from harmful contaminants and pathogens. In contrast, bottled water while often potable, is not defined as such solely because it is bottled and sold. Water used for irrigation may not be treated to the same standards and could contain pathogens or pollutants that make it unsafe for consumption. Non-treated water from natural sources may also contain contaminants or pollutants, making it unsuitable for drinking without proper treatment. Thus, the focus on safety and applicability for human consumption is what distinctly qualifies "potable water."

2. What is the pH of a solution where the hydrogen ion concentration is 1 x 10^8 moles per liter?

A. 6

B. 7

C. 8

D. 9

To determine the pH of a solution, you use the formula pH = -log[H^+], where [H^+] represents the concentration of hydrogen ions in moles per liter. In this case, the hydrogen ion concentration is given as 1 x 10^8 moles per liter. Calculating the pH involves taking the negative logarithm of the hydrogen ion concentration: pH = -log(1 x 10^8) = -(-8) (since log(1 x 10^8) simplifies to 8) = 8 This value indicates that the solution is basic since a pH greater than 7 indicates a basic solution. Thus, the correct answer is 8. This means that the answer aligns with the pH scale, where a pH of 7 is neutral, values lower than 7 are acidic, and values higher than 7 are basic.

3. Which organism is primarily identified in fecal coliform tests?

A. Salmonella typhi

B. Escherichia coli

C. Shigella flexneri

D. Vibrio cholerae

The organism primarily identified in fecal coliform tests is Escherichia coli. This specific bacterium is a key indicator of fecal contamination in water sources. The reason E. coli is used as a standard in these tests is due to its significant presence in the intestines of humans and warm-blooded animals, making it a reliable marker for fecal matter. Detection of E. coli in water suggests that there may be a presence of pathogens that can cause illness. Consequently, E. coli serves as a practical tool to assess the safety of drinking and recreational water, indicating potential health risks due to contamination. In contrast, the other organisms listed are pathogenic bacteria associated with specific diseases but are not general indicators of fecal contamination. Salmonella typhi is known for typhoid fever, Shigella flexneri causes dysentery, and Vibrio cholerae is responsible for cholera. While these organisms can indicate the presence of pathogens in contaminated water, they are not specifically associated with routine fecal coliform testing, which is why E. coli is the primary focus.

4. What is backflow prevention?

A. A method to test water quality

B. A technique to enhance water pressure

C. A method to prevent contaminated water from flowing back into the clean water supply

D. A process for recycling wastewater

Backflow prevention refers to the methods and devices used to ensure that contaminated water does not flow back into the clean water supply, protecting drinking water quality and public health. This is vital because backflow can occur due to changes in pressure within the plumbing system, which could inadvertently allow harmful substances from wastewater or other contaminated sources to reverse their flow and enter the potable water supply. The significance of backflow prevention is underscored by the potential health risks associated with contaminated water. For instance, if backflow occurs, it could result in pathogens, chemicals, or other hazardous materials mixing with clean water, posing serious health risks to consumers. Thus, adequate backflow prevention measures are essential in water supply systems to maintain the quality and safety of drinking water. Other options may address various aspects of water management or treatment processes, but they do not relate to the specific function of preventing contamination in the water supply, which is the core objective of backflow prevention. Understanding and implementing effective backflow prevention techniques is a critical component of maintaining a safe and reliable water supply system.

5. Which gases are frequently found in water that encourage corrosion?

A. Nitrogen and helium

B. Hydrogen and sulfur

C. Oxygen and carbon dioxide

D. Methane and phosphine

The presence of oxygen and carbon dioxide in water plays a significant role in promoting corrosion. Oxygen is a well-known oxidizing agent that can react with metals, leading to the formation of metal oxides. This process is especially relevant in the case of iron, which readily rusts when exposed to oxygen and moisture. Carbon dioxide, on the other hand, can dissolve in water to form carbonic acid, which lowers the pH and increases the corrosive potential of water. This acidic environment can accelerate the deterioration of metallic surfaces in contact with water pipelines, tanks, and other structures. Understanding the impact of these gases on water chemistry is crucial for managing corrosion and ensuring the longevity of water supply systems. In contrast, nitrogen and helium are inert gases and do not contribute to corrosion processes, while hydrogen and sulfur do not have the same widespread effect on corrosion in water as oxygen and carbon dioxide. Methane and phosphine are generally not involved in corrosion mechanisms associated with water supplies.

6. What does "hydraulic fracturing" pose a risk for?

A. Pest infestation in water systems

B. Potential groundwater contamination from chemicals used in the fracking process

C. Reduced water table levels

D. Increased water flow rates

Hydraulic fracturing, commonly known as fracking, is a method used to extract natural gas and oil from underground rock formations. One of the main concerns associated with this process is the potential for groundwater contamination. During fracking, a mixture of water, sand, and chemicals is injected into the ground at high pressure to create fractures in the rock, allowing fossil fuels to flow more freely. The chemicals used in this fluid can potentially migrate into nearby groundwater supplies, posing significant health risks to communities that rely on this water for drinking and irrigation. Contaminants can include various toxic and hazardous substances, which may lead to long-term environmental and public health issues. While other concerns like pest infestations or reduced water table levels may be relevant in broader environmental discussions, the direct risk of groundwater contamination from the chemicals employed in hydraulic fracturing is a more immediate and pressing concern tied specifically to this extraction method. Thus, this is considered the most significant risk posed by hydraulic fracturing.

7. What characteristic does not vary in water used for domestic purposes?

A. Temperature

B. Source of the water

C. Amount of minerals in the water

D. pH level

The characteristic that does not vary in water used for domestic purposes is the amount of minerals in the water. This is because, while different sources of water can indeed have different mineral compositions, once the water has been treated and meets regulatory standards for domestic use, it tends to maintain a relatively consistent range of mineral content suitable for consumers. For example, municipal water supplies are treated to ensure they have specific levels of minerals, which helps maintain safety and palatability. This standardization is crucial as it helps to prevent fluctuations that might otherwise occur with varying input sources like groundwater or surface water, which can contain different levels of hardness or specific mineral content. In contrast, the temperature of water can vary significantly based on environmental conditions or heating systems, water sources can differ widely (ranging from well water to rivers), and the pH can fluctuate due to various factors such as contamination or the presence of certain minerals. Thus, the amount of minerals remains the most consistent characteristic in treated domestic water.

8. What is not commonly used to disinfect water?

A. Silver nitrate

B. Chlorine

C. Ultraviolet light

D. Ozone treatment

Silver nitrate is not commonly used to disinfect water primarily due to its limitations compared to other disinfectants. While silver ions do possess some antimicrobial properties and can inhibit bacterial growth, their effectiveness as a standalone disinfectant is relatively low and is generally insufficient for ensuring the safety of drinking water on a large scale. Moreover, silver can lead to the formation of precipitates or affect the taste and color of water, making it less desirable for routine disinfection purposes. In contrast, chlorine is widely utilized in water treatment processes due to its effectiveness in killing a broad spectrum of pathogens and providing residual protection against future contamination. Ultraviolet light is another effective method for disinfection, using radiation to inactivate microorganisms without adding chemicals to the water. Similarly, ozone treatment is recognized for its strong oxidizing properties, making it effective in removing contaminants and pathogens from water. Given these considerations, silver nitrate's limited application and effectiveness in comparison to other well-established disinfection methods clarify why it is not commonly used for this purpose.

9. In water treatment, what does “coagulation” do?

A. It prevents the growth of algae

B. It helps remove suspended particles and colloids from water

C. It adds minerals for taste

D. It enhances the acidity of the water

Coagulation is a critical process in water treatment that primarily serves to remove suspended particles and colloids from water. During this process, coagulants, such as aluminum sulfate or ferric chloride, are added to the water. These substances have a positive charge that neutralizes the negative charges of suspended particles, allowing them to clump together into larger aggregates known as flocs. This aggregation makes it significantly easier to remove these particles during subsequent steps in the treatment process, such as sedimentation and filtration. Removing suspended solids and colloids is essential for improving water clarity and quality, as these impurities can harbor pathogens, lead to taste and odor issues, and cause problems in disinfection processes. Thus, coagulation plays a pivotal role in ensuring that the treated water is safe for consumption. Other options do not accurately describe the coagulation process; for example, while the process may indirectly affect algae growth by improving water quality, preventing algae growth is not its primary function. Similarly, coagulation does not add minerals for taste or enhance acidity, as its focus is specifically on the removal of particulates rather than altering the chemical composition of the water in these ways.

10. Which of the following is a typical indicator of water quality?

A. Color variation

B. Temperature fluctuations

C. Levels of coliforms

D. Presence of algae

Levels of coliforms serve as a key indicator of water quality because they reflect the potential presence of harmful pathogens. Coliform bacteria are commonly found in the environment, particularly in soil and the feces of warm-blooded animals. Their presence in water suggests possible contamination by fecal matter, which can carry disease-causing microorganisms. Thus, testing for coliform levels is a standard method used by water quality professionals to evaluate the safety of drinking water and indicate the effectiveness of water treatment processes. While color variation, temperature fluctuations, and the presence of algae can provide some information about water quality, they are not as direct an indicator of potential health risks as coliform levels. Color changes can result from natural organic matter or sediments and do not necessarily indicate contamination. Temperature can influence water chemistry and biological activity but does not directly measure the safety or quality of the water itself. The presence of algae may indicate nutrient loading but does not inherently imply that the water is unsafe for drinking. Therefore, coliform levels are a more reliable and direct indicator of water quality.