North Carolina Surface Water Practice Exam (Sample)

Study Guide

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Questions

1. What is another reason for the presence of total coliforms in drinking water?

A. the potential presence of pathogens

B. the presence of pathogens

C. the absence of an adequate chlorine residual

D. an urgent public health problem exists

2. Check valves are used primarily to prevent what?

A. Excessive pump pressure

B. Priming

C. Water from flowing in two directions

D. Water hammer

3. The primary source of synthetic organic compound (SOC) contamination in water supplies is...

A. industrial solvents and agricultural pesticides

B. mammalian fecal contamination of surface water

C. agricultural fertilizers and natural mineral deposits

D. disinfection by-products

4. What is the main purpose of presedimentation in water treatment?

A. Increase oxygen content of water

B. Increase alkalinity of water

C. Reduce the oxygen content of the water

D. Reduce the silt in the water

5. A public water system's compliance with the Safe Water Drinking Act (SWDA) is based on which of the following?

A. Population served

B. Number of connections

C. Both A and B

D. None of the above

6. The flow of electrical current is measured in which unit?

- **A. Amperes**
- **B. Ohms**
- **C. Volts**
- **D. Watts**

7. Which of the following is a characteristic of pathogens?

- **A. A. They are always multicellular**
- **B. B. They can cause disease in hosts**
- **C. C. They are beneficial to human health**
- **D. D. They only reproduce in laboratory conditions**

8. Disease-producing organisms are commonly called...

- **A. A. Inorganic**
- **B. B. Protozoa**
- **C. C. Pathogens**
- **D. D. Microbiota**

9. The primary health risk associated with synthetic organic compounds (SOCs) is...

- **A. acute respiratory disease**
- **B. cancer**
- **C. blue baby syndrome**
- **D. reduced I.Q.**

10. If a fuse continues to blow, what should you do?

- **A. Replace it with a higher capacity fuse**
- **B. Inspect the affected equipment to determine the cause**
- **C. Provide a jumper box**
- **D. Replace it with a fuse of lower capacity**

Answers

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

Explanations

1. What is another reason for the presence of total coliforms in drinking water?

A. the potential presence of pathogens

B. the presence of pathogens

C. the absence of an adequate chlorine residual

D. an urgent public health problem exists

The presence of total coliforms in drinking water serves as an important indicator for potential contamination, particularly the possible presence of pathogens. Total coliforms are a group of bacteria found in the environment and in the intestines of warm-blooded animals. While not all coliforms are harmful, their presence suggests that there may be a pathway for pathogens to enter the drinking water supply. This is because coliforms can indicate that there has been fecal contamination, which also raises the likelihood of waterborne diseases. Monitoring for total coliforms allows water utilities to gauge whether their water is safe for consumption, as these bacteria often signal that further testing for pathogens may be necessary. Moreover, if total coliforms are detected, it prompts further investigation into the water source, treatment processes, and distribution systems to ensure public health is not at risk. Understanding this context highlights the significance of monitoring total coliform levels as part of maintaining safe drinking water standards. The concern over adequate chlorine residual is related but focuses more on chemical disinfection effectiveness rather than directly indicating potential pathogens. Therefore, the connection of total coliforms to the potential presence of pathogens is a crucial aspect of water quality management.

2. Check valves are used primarily to prevent what?

A. Excessive pump pressure

B. Priming

C. Water from flowing in two directions

D. Water hammer

Check valves are specifically designed to allow fluid to flow in one direction while preventing backflow. This function is crucial in various applications, such as water supply systems and pump operations, where it's essential to maintain the intended flow path and avoid the complications that can arise from reverse flow. By ensuring that water does not flow in two directions, check valves help protect equipment, maintain system efficiency, and prevent potential contamination of the source water. Priming, excessive pump pressure, and water hammer are important operational considerations in fluid dynamics and plumbing systems, but they do not describe the primary function of a check valve. Check valves do not regulate pressure directly; rather, they are concerned with the direction of flow. They also do not serve the purpose of priming pumps, which involves removing air to establish fluid flow, nor do they directly mitigate the effects of water hammer, which is a pressure surge that occurs when the flow of fluid in a pipe is suddenly stopped or redirected.

3. The primary source of synthetic organic compound (SOC) contamination in water supplies is...

A. industrial solvents and agricultural pesticides

B. mammalian fecal contamination of surface water

C. agricultural fertilizers and natural mineral deposits

D. disinfection by-products

The primary source of synthetic organic compound (SOC) contamination in water supplies is industrial solvents and agricultural pesticides. These compounds are widely used in various industries and agricultural practices, and they can enter waterways through runoff, spills, and improper disposal. Industrial solvents, used in manufacturing processes, often contain volatile organic compounds that can leach into surface water sources. Similarly, agricultural pesticides, which are applied to crops to control pests and diseases, can wash off fields during rain events and contaminate nearby streams, rivers, and lakes. Recognizing that these sources are significant contributors to water contamination is crucial for the development of effective water quality management practices. It underscores the need for regulatory measures to control the usage and release of these chemicals to protect water supplies. Understanding the impact of these synthetic organic compounds is vital for addressing public health concerns and ensuring the safety of our drinking water.

4. What is the main purpose of presedimentation in water treatment?

A. Increase oxygen content of water

B. Increase alkalinity of water

C. Reduce the oxygen content of the water

D. Reduce the silt in the water

The main purpose of presedimentation in water treatment is to reduce the silt in the water. This process involves allowing suspended solids, particularly larger particles such as silt and sediment, to settle out of the water before it undergoes further treatment processes like filtration or disinfection. By removing these particles early on, presedimentation helps improve the overall efficiency of the water treatment process, as it decreases the load on subsequent treatment steps and minimizes the risk of clogging filters. This results in clearer water, which is easier to treat and leads to higher quality drinking water. In addition, a reduction in silt can also help to mitigate taste and odor issues, as well as reduce the presence of pathogens that may be associated with particulate matter. Overall, by focusing on reducing silt, presedimentation plays a crucial role in the successful treatment and purification of surface water.

5. A public water system's compliance with the Safe Water Drinking Act (SWDA) is based on which of the following?

A. Population served

B. Number of connections

C. Both A and B

D. None of the above

The compliance of a public water system with the Safe Drinking Water Act (SDWA) is primarily determined by the population served. The SDWA outlines the standards for drinking water quality and is designed to protect public health by regulating the nation's public drinking water supply. The relevant regulations apply specifically to public water systems that serve a certain number of people. Population served is critical because it determines whether a water system is classified as a public water system and thus subject to federal or state regulations. Public water systems are categorized based on the number of year-round residents they serve, which directly influences the requirements they must meet for monitoring, treatment, and reporting, among other mandates. While the number of connections may provide some insight into the scale of the system, it is the population served that ultimately determines compliance with the SDWA. Therefore, focusing on population is essential for understanding the framework of compliance within the act.

6. The flow of electrical current is measured in which unit?

A. Amperes

B. Ohms

C. Volts

D. Watts

The flow of electrical current is measured in amperes, which is the standard unit for quantifying the amount of electric charge that passes through a conductor in a given period of time. One ampere corresponds to one coulomb of charge moving past a point in a circuit in one second. This unit is crucial in electrical engineering and physics as it helps in understanding how much current is flowing in a circuit, which can influence the design and safety of electrical systems. Other units mentioned are related to electrical concepts but serve different purposes. Ohms measure electrical resistance, providing insight into how much a material opposes the flow of current. Volts measure electrical potential (voltage), indicating the difference in electric potential energy between two points in a circuit. Watts are a unit of power, representing the rate at which electrical energy is consumed or generated in a system. This distinction is essential for understanding electrical principles and calculations in various applications.

7. Which of the following is a characteristic of pathogens?

A. A. They are always multicellular

B. B. They can cause disease in hosts

C. C. They are beneficial to human health

D. D. They only reproduce in laboratory conditions

The characteristic that pathogens can cause disease in hosts is critical to understanding their role in public health and ecology. Pathogens include a wide variety of microorganisms, such as bacteria, viruses, fungi, and parasites, that can invade host organisms and cause illness. This pathogenic behavior is what differentiates harmful organisms from non-pathogens or beneficial microbes. Understanding that pathogens can cause disease is essential for recognizing their impact on human health, agriculture, and the environment. This knowledge underlines the importance of monitoring water quality, as pathogens in surface water can lead to serious health risks for humans and animals. The other options present characteristics that do not align with the general definition of pathogens. For example, not all pathogens are multicellular; many are unicellular microorganisms. Furthermore, while some microorganisms may be beneficial to human health, pathogens are specifically harmful. Lastly, pathogens do not only reproduce under laboratory conditions; they often reproduce in natural environments, including water, soil, and within host organisms.

8. Disease-producing organisms are commonly called...

A. A. Inorganic

B. B. Protozoa

C. C. Pathogens

D. D. Microbiota

The term "pathogens" specifically refers to disease-causing organisms, which include a broad range of biological agents such as bacteria, viruses, fungi, and parasites. Understanding this terminology is essential in fields like public health, microbiology, and environmental science, particularly in the study of water quality. Pathogens can contaminate surface waters and pose significant health risks to humans and wildlife. Identifying and managing the presence of these organisms in water systems is crucial to prevent outbreaks of waterborne diseases. This distinction emphasizes the critical role that pathogens play in health-related issues tied to surface water, making the correct answer particularly relevant in environmental health contexts. In contrast, inorganic materials are non-living chemical components, protozoa represent a specific group of microorganisms which can be pathogens, but not all are disease-causing, and microbiota refers to the collection of microorganisms living in a specific environment, including both beneficial and harmful organisms. Therefore, while other options relate to microorganisms, "pathogens" is the most accurate term for those specifically responsible for disease.

9. The primary health risk associated with synthetic organic compounds (SOCs) is...

A. acute respiratory disease

B. cancer

C. blue baby syndrome

D. reduced I.Q.

Synthetic organic compounds (SOCs) are a class of chemical compounds that include a wide variety of chemicals, such as solvents, pesticides, and industrial chemicals. One of the most concerning health risks associated with exposure to many SOCs is an increased risk of developing cancer. Various studies have linked certain SOCs to different types of cancer, demonstrating their ability to cause mutations in DNA or disrupt cellular processes that can lead to malignant transformations. The mechanism through which SOCs contribute to cancer development often involves their interaction with cellular components that can result in alterations in gene expression or the promotion of uncontrolled cell division. Long-term exposure to these compounds, even at low levels, can accumulate risk factors that significantly increase the likelihood of cancerous growth over time. While other health concerns, such as respiratory issues, developmental effects, or other specific syndromes like blue baby syndrome, are associated with different types of pollutants or chemicals, the association between SOCs and cancer is particularly prominent and well-documented in environmental health literature. This makes cancer the primary health risk linked with synthetic organic compounds.

10. If a fuse continues to blow, what should you do?

A. Replace it with a higher capacity fuse

B. Inspect the affected equipment to determine the cause

C. Provide a jumper box

D. Replace it with a fuse of lower capacity

When a fuse continues to blow, inspecting the affected equipment to determine the cause is the most appropriate action. This approach allows you to identify any underlying issues that may be causing the excessive current draw, such as a short circuit, equipment malfunction, or other electrical problems. Simply replacing the fuse without understanding the root cause could lead to further damage to the equipment or create safety hazards, as the underlying issue would remain unresolved. Ensuring that the electrical system operates correctly and safely is crucial, as persistent fuse failures often indicate a more significant problem that needs addressing. Therefore, a thorough investigation should be the first step before making any additional changes to the electrical setup or components.