Ohio Sanitarian Practice Exam (Sample)

Study Guide

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Questions

1. What is a common consequence of excessive water hardness?

A. Scaling in pipes and appliances

B. Coloration of water

C. Increased bacterial growth

D. Reduced pH levels

2. Which testing parameter is crucial for evaluating water quality related to particulate matter?

A. pH levels

B. Conductivity

C. Turbidity

D. Chlorine concentration

3. What is the primary organism identified in the fecal coliform test?

A. Fecal streptococci

B. Enterobacter aeroaenes

C. Salmonella typhosa

D. Escherichia coli

4. What has the greatest potential for reducing the demand for water?

A. Better conservation practices in homes

B. Development of recycling plants by industry

C. Better use of technology in agricultural irrigation

D. More use of home sewage disposal units

5. Diatomaceous earth filters should be augmented by which of the following?

A. Chlorination

B. Reverse osmosis

C. Filtration

D. Carbon adsorption

6. It has been estimated that waterborne diseases worldwide account for how many illnesses per year?

A. 250 million illnesses per year

B. 20 million illnesses per year

C. 150 million illnesses per year

D. 400 million illnesses per year

7. Which of the following compounds would not contribute to water hardness?

A. calcium sulfate

B. magnesium sulfate

C. calcium chloride

D. sodium chloride

8. What is one of the best things that could be done to improve the health and living standards among Third World populations?

A. Increase their food supply

B. Decrease the land pollution

C. Increase the quantity of readily available safe water

D. Decrease the rate of population growth

9. What is the primary source of drinking water for over 95% of all farm families?

A. Rivers

B. Lakes

C. Groundwater

D. Reservoirs

10. What does a high Methylene Blue Active Substance (MBAS) level indicate?

A. Heavy metal contamination

B. Presence of organic pollutants

C. Clarity of water

D. Presence of detergents

Answers

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

Explanations

1. What is a common consequence of excessive water hardness?

A. Scaling in pipes and appliances

B. Coloration of water

C. Increased bacterial growth

D. Reduced pH levels

Excessive water hardness is primarily characterized by high concentrations of calcium and magnesium minerals in the water. One of the most common consequences of this condition is scaling in pipes and appliances. When hard water is heated or allowed to evaporate, these minerals precipitate out and adhere to surfaces, leading to the formation of scale. This scaling can accumulate in pipes, water heaters, dishwashers, and other plumbing fixtures, which may result in reduced water flow, increased energy consumption, and potentially costly repairs or replacements. Although other options may relate to water quality issues, they do not directly associate with the primary effects of high water hardness. For example, coloration of water typically stems from different contaminants, while increased bacterial growth is usually linked to other factors such as nutrient availability or poor sanitation practices. Similarly, reduced pH levels are often connected to acidic conditions rather than hardness itself. Thus, the scaling in pipes and appliances stands out as the most direct and common consequence of excessive water hardness.

2. Which testing parameter is crucial for evaluating water quality related to particulate matter?

A. pH levels

B. Conductivity

C. Turbidity

D. Chlorine concentration

Turbidity is a key parameter for evaluating water quality in relation to particulate matter because it directly measures the clarity of water, which can be affected by the presence of suspended particles. High levels of turbidity indicate a greater concentration of particles, such as silt, clay, algae, and other microorganisms, that can cause water quality issues. These particles can carry pathogens, chemicals, and other pollutants, making turbidity an important factor in assessing the potential health risks associated with water consumption or use. By measuring turbidity, water quality managers can gain valuable insights into the physical safety of water sources, as high turbidity often correlates with increased risk of waterborne diseases. This parameter helps identify the need for filtration and treatment processes, ensuring that water meets safety standards before being distributed for public use. In environments such as rivers, lakes, or reservoirs, turbidity levels may fluctuate due to rainfall, land use practices, or seasonal changes, emphasizing the importance of regular monitoring.

3. What is the primary organism identified in the fecal coliform test?

A. Fecal streptococci

B. Enterobacter aeroaenes

C. Salmonella typhosa

D. Escherichia coli

The primary organism identified in the fecal coliform test is Escherichia coli. This test is specifically designed to detect the presence of coliform bacteria in water, which are indicators of fecal contamination. Among coliform bacteria, E. coli is the most significant as it is commonly found in the intestines of warm-blooded animals and is indicative of fecal contamination that may pose a health risk. E. coli is used as a reliable indicator because of its specific association with animal feces and its relatively high concentration in such samples compared to other pathogens. While other organisms like fecal streptococci or Enterobacter aerogenes might also be present in fecal matter, E. coli is specifically utilized to determine safety standards for potable water and evaluate sanitation processes. It's also important to note that while pathogens like Salmonella typhosa are of concern regarding waterborne illnesses, they are not the primary organism tested for in a fecal coliform test. Instead, the focus remains on E. coli due to its role as a strong indicator of fecal pollution and the potential presence of harmful pathogens that may accompany it in contaminated environments.

4. What has the greatest potential for reducing the demand for water?

A. Better conservation practices in homes

B. Development of recycling plants by industry

C. Better use of technology in agricultural irrigation

D. More use of home sewage disposal units

The choice emphasizing better use of technology in agricultural irrigation is particularly significant because agriculture accounts for a large portion of freshwater use globally, often exceeding 70% in many regions. By improving irrigation techniques, such as adopting drip irrigation systems or precision watering, it becomes possible to significantly reduce water waste and enhance water efficiency. This approach allows for more targeted application of water, improving crop yields with less water usage, which can help alleviate the pressure on freshwater resources. In contrast, while conservation practices in homes, recycling plants in industry, and home sewage disposal units do contribute to overall water management, their potential for water demand reduction is generally less impactful than advancing agricultural technology. Home conservation practices can reduce usage, but the scale is limited compared to large-scale agricultural water use. Industrial recycling plants are important for managing industrial water use, but they may not address the primary agricultural water consumption issues. Home sewage disposal units, while necessary for sanitation, do not directly contribute to reducing water demand in significant ways. Thus, enhanced agricultural irrigation technology stands out as the most effective method for achieving a substantial reduction in overall water demand.

5. Diatomaceous earth filters should be augmented by which of the following?

A. Chlorination

B. Reverse osmosis

C. Filtration

D. Carbon adsorption

Diatomaceous earth filters are widely used in water treatment processes for their ability to remove a variety of contaminants, particularly small particles and microorganisms. However, while they effectively filter out particles, they do not provide disinfection against pathogens such as bacteria and viruses. This is where chlorination comes into play. Chlorination is a well-established method for disinfecting water, as chlorine is a powerful oxidizing agent that can kill or inactivate harmful microorganisms. When used in conjunction with diatomaceous earth filters, chlorination ensures that any pathogens that may have passed through or settled in the water are effectively dealt with, ensuring that the water is safe for consumption. In contrast, reverse osmosis is primarily a type of filtration that removes dissolved solids and certain contaminants, but it does not specifically target microbial disinfection or augment the filtration capability of diatomaceous earth. Similarly, carbon adsorption is effective for removing certain organic compounds and improving taste and odor but does not address disinfection needs. Additional filtration does not augment the processes in a manner that specifically addresses the need for pathogen control. Therefore, chlorination is the most suitable and effective augmentation for diatomaceous earth filters to ensure both physical filtration and microbial safety.

6. It has been estimated that waterborne diseases worldwide account for how many illnesses per year?

A. 250 million illnesses per year

B. 20 million illnesses per year

C. 150 million illnesses per year

D. 400 million illnesses per year

The estimation that waterborne diseases account for 20 million illnesses per year reflects a more conservative figure based on research regarding the prevalence of such diseases globally. This figure is supported by numerous studies and reports from health organizations that focus on the health burden posed by unsafe drinking water and inadequate sanitation. Waterborne diseases are typically caused by pathogens present in contaminated water sources, leading to a range of illnesses, particularly in developing regions with limited access to clean water and sanitation facilities. While the actual number can vary based on reporting, outbreaks, and improvements in sanitary conditions, the figure of 20 million provides a grounded understanding in a global context. Other options suggest significantly higher estimates for annual illnesses attributed to waterborne diseases, which may not align as closely with available data in epidemiological studies. Therefore, the figure of 20 million is considered a sustainable and realistic estimate reflecting ongoing public health challenges.

7. Which of the following compounds would not contribute to water hardness?

A. calcium sulfate

B. magnesium sulfate

C. calcium chloride

D. sodium chloride

Water hardness is primarily caused by the presence of certain metal ions in water, specifically calcium and magnesium ions. Compounds that dissociate in water to release these ions will contribute to the overall hardness of the water. Calcium sulfate, magnesium sulfate, and calcium chloride all contain either calcium or magnesium, which when dissolved in water release ions that contribute to hardness. Calcium sulfate releases calcium ions, magnesium sulfate releases magnesium ions, and calcium chloride releases calcium ions; all of these ions increase water hardness. On the other hand, sodium chloride, which is common table salt, does not contribute to water hardness as it dissociates into sodium and chloride ions. Neither of these ions is responsible for increasing hardness in water. Therefore, sodium chloride is the compound that would not contribute to water hardness. This makes it the correct choice in this scenario.

8. What is one of the best things that could be done to improve the health and living standards among Third World populations?

A. Increase their food supply

B. Decrease the land pollution

C. Increase the quantity of readily available safe water

D. Decrease the rate of population growth

Increasing the quantity of readily available safe water is a crucial factor in improving health and living standards among populations in developing countries. Access to safe drinking water has a direct impact on public health, as it significantly reduces the risk of waterborne diseases, which are prevalent in regions where clean water is scarce. When communities have access to safe water, it leads to lower incidence rates of illnesses such as cholera, typhoid, and dysentery. This improvement in health can result in higher productivity, as individuals are less likely to suffer from debilitating diseases. Furthermore, safe water access can enhance sanitation practices, as better hygiene is achievable when there is reliable access to clean water for washing and other daily needs. Improvements in water supply can also reduce the time spent collecting water, which often falls disproportionately on women and children in these communities. This can free up time for education, economic activities, and other productive endeavors that contribute to the overall development of the population. While increasing food supply and decreasing land pollution are also important for health and living conditions, the immediate and far-reaching benefits of increasing access to safe water make it one of the most effective interventions in enhancing health and living standards in Third World populations. Reducing population growth is significant too, but it often

9. What is the primary source of drinking water for over 95% of all farm families?

A. Rivers

B. Lakes

C. Groundwater

D. Reservoirs

The primary source of drinking water for over 95% of all farm families is groundwater. Groundwater is accessed through wells that tap into aquifers, which are underground layers of water-bearing rock. This source is favored for several reasons, including reliability and quality. Groundwater tends to be less susceptible to contamination compared to surface water sources like rivers, lakes, and reservoirs, making it a safer option for drinking water, especially in rural areas where farm families often reside. Moreover, groundwater can be more readily available in many agricultural regions, as it can be extracted directly from the land where farms operate. The geological formations in many rural areas also support the presence of aquifers, providing a sustainable source of water for both drinking and agricultural use.

10. What does a high Methylene Blue Active Substance (MBAS) level indicate?

A. Heavy metal contamination

B. Presence of organic pollutants

C. Clarity of water

D. Presence of detergents

A high Methylene Blue Active Substance (MBAS) level indicates the presence of detergents in water. The MBAS test measures the concentration of surfactants, which are active components in household and industrial detergents. When these surfactants are present in elevated levels, it can suggest pollution from sources such as wastewater discharges or runoff containing cleaning products. Understanding the significance of MBAS levels is crucial for assessing water quality, especially in environments where cleanliness and the management of chemical substances are vital. High MBAS readings specifically point to contamination from detergents rather than indicating issues related to heavy metals or organic pollutants, which would require different testing methods to identify. Clarity of water is generally assessed using different parameters, such as turbidity, rather than by MBAS levels.