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Continuing Education Course #392  
Protecting Drinking Water from Pathogens

1. Which of the following is a disinfection method from the antiquity era?
  - a. Boiling water
  - b. Chlorination
  - c. UV light
  - d. Filtration
  
2. Throughout history, the vast majority of waterborne diseases came from what source?
  - a. Soil
  - b. Plant matter
  - c. Human feces
  
3. In the 20th century, what allowed for treating and disinfecting large flows of drinking water?
  - a. Reverse osmosis
  - b. Technology advancements
  - c. New water sources
  
4. Which are the four categories of contaminants?
  - a. Physical, chemical, biological, radiological
  - b. Solid, chemical, biological, thermal
  - c. Chemical, plant, animal, radiological
  - d. Solid, liquid, biological, radiological
  
5. What does "inactivated" mean?
  - a. Turned off
  - b. Blown apart
  - c. Killed
  
6. What organism is responsible for the greatest increase in water-borne outbreaks in the US in the 21st Century?
  - a. Salmonella
  - b. E. Coli
  - c. Legionella
  
7. Which of the following can result in an outbreak?
  - a. Poor system design
  - b. 4 log disinfection
  - c. Chlorine burns
  
8. Which of the following is NOT a standard microbial indicator?
  - a. Cryptosporidium
  - b. Salmonella

- c. Giardia Lamblia
- d. Turbidity

9. Surface water treatment regulations require what removal of viruses?

- a. 2 log (99%)
- b. 3 log (99.9%)
- c. 4 log (99.99%)

10. Where is Legionella NOT commonly found?

- a. Hot water heaters
- b. High velocity pipes
- c. Water storage tanks
- d. Stagnant pipes

11. What percent of positive coliform tests are allowed per EPA standards?

- a. None
- b. 1%
- c. 5%
- d. 10%

12. How can a deep well be monitored for potential biological contamination?

- a. Check for increases in TOC
- b. Check for increases in H<sub>2</sub>S
- c. Check the water level in monitoring wells

13. Which of the following water sources is most likely NOT under the direct influence of surface water?

- a. Lake
- b. Shallow well
- c. Ocean offshore intake

14. Which of the following is not a common source of groundwater contamination?

- a. Septic leachate
- b. Bird droppings
- c. Surface water runoff
- d. Injection well

15. Which is true about human pathogens in seawater?

- a. Pathogens cannot survive for long, for the most part
- b. Pathogens survive similar to being in freshwater
- c. Pathogens grow more rapidly

16. Which is true of indirect potable reuse?

- a. Sends wastewater straight to the water treatment plant
- b. Uses backflow prevention
- c. Uses an environmental buffer

17. What is the maximum logs of credit for removal of virus with conventional filtration?

- a. 1 log
- b. 2 log
- c. 3 log
- d. 4 log

18. Which of the following is NOT a typical disinfection method?
- a. Free Chlorine
  - b. Chloramines
  - c. UV
  - d. Ultrafiltration
19. Which of the following is an advantage to using chloramines?
- a. Maintains stable residual in the distribution system
  - b. Nitrification potential
  - c. Removes VOCs and SOCs
20. Free chlorine is to be maintained in what range?
- a. 0.2 and 4 mg/L
  - b. 0.2 and 6 mg/L
  - c. 0 and 2 mg/L
21. What percent removal is 7 log?
- a. 99.999
  - b. 99.9999
  - c. 99.99999
22. What value is needed from an EPA table in order to calculate the contact time for disinfection?
- a. Maximum velocity
  - b. Baffling factor
  - c. Chlorine effectiveness
23. Which of the following is NOT a result of biofilm?
- a. Nitrification
  - b. pH fluctuations
  - c. Radiological contamination
24. Which of the following is NOT a design approach to reduce biofilm?
- a. Avoid dead ends
  - b. Provide flushing locations
  - c. Provide mixing systems in storage tanks
  - d. Provide redundant pressure indicators
25. Which of the following is NOT a design approach to prevent biological contamination in a storage tank?
- a. Maximize height to diameter ratio
  - b. Include a mixing system
  - c. Ensure overflows and drains are not connected to sewers
  - d. Specify long lasting screens on overflows and vents

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