edcetera engineering

Final Exam

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 H2S
- ○ 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 chlorimines?
- 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 calculated 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