

Registration form

WATER MONITORING TRAINING COURSE \$100.00
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I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

Grading Information

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WATER MONITORING Answer Key

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Multiple Choice. Pick only one answer per question.
Circle, Mark off, underline or Bold the answer.

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| 51. A B C D E F | 73. A B C D E F | 95. A B C D E F |
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This course contains general EPA's SDWA federal rule requirements. Please be aware that each state implements water / sampling procedures/safety/ environmental / building regulations that may be more stringent than EPA's regulations.

Check with your state environmental/health agency for more information. These rules change frequently and are often difficult to interpret and follow. Be careful to be in full compliance and do not follow this course for proper compliance.

Please e-mail or fax this survey with your final exam

**WATER MONITORING CEU COURSE
CUSTOMER SERVICE RESPONSE CARD**

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Water Monitoring Training Course Assignment

The Assignment (Exam) is also available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e- mail it back to TLC.

You will have 90 days from the start of this course to complete in order to receive your Professional Development Hours (**PDHs**) or Continuing Education Unit (**CEU**). A score of 70 % is necessary to pass this course. We prefer if this exam is proctored. No intentional trick questions. If you should need any assistance, please email all concerns and the completed manual to info@tlch2o.com.

We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your Answer Key and make copy for yourself. You can e-mail or fax your Answer Key along with the Registration Form to TLC. **(S) Means answer may be plural or singular. Multiple Choice Section - One answer per question and please use the answer key.**

Safe Drinking Water Act (SDWA) Review

1. States are expected to administer and enforce these regulations for public water systems (systems that either have 25 or more service connections or regularly serve an average of 50 or more people daily for at least 60 days each year).
A. True B. False
2. Public water systems must provide water treatment, ensure proper drinking water quality through monitoring, and provide public notification of contamination problems.
A. True B. False

Relating to prevention of waterborne disease, the SDWA required EPA to:

3. Set numerical standards, referred to as Maximum Contaminant Levels (MCLs — the highest allowable contaminant concentrations in drinking water) or treatment technique requirements for contaminants in public water supplies;
A. True B. False
4. Issue regulations requiring monitoring of all regulated and certain unregulated contaminants, depending on the number of people served by the system, the source of the water supply, and the contaminants likely to be found;
A. True B. False
5. Set criteria under which systems are obligated to filter water from surface water sources; it must also develop procedures for states to determine which systems have to filter.
A. True B. False
6. Through the Surface Water Treatment Rule (SWTR), EPA has set treatment requirements to control microbiological contaminants in public water systems using surface water sources (and ground-water sources under the direct influence of surface water).
A. True B. False
7. Treatment must remove or inactivate at least 99.9% of *Giardia lamblia* cysts and 99.99% of viruses.
A. True B. False

8. All systems must disinfect, and are not required to filter if certain source water quality criteria and site-specific criteria are met.
A. True B. False
9. The regulations set guidelines for determining if treatment, including turbidity (suspended particulate matter) removal and disinfection recommendations, is adequate for filtered systems.
A. True B. False

New EPA Rules

Arsenic

10. Long-term exposure of this compound/element/substance in drinking water to a variety of cancers in humans.
A. Arsenic D. THHMMS
B. Copper E. Silica
C. Basalt F. None of the Above
11. The EPA set a standard limit or the amount of _____ in drinking water to 10 ppb.
A. Arsenic D. Copper
B. Trihalomethanes E. Disinfection byproducts (DBPs)
C. Disinfection F. None of the Above
12. This compound/element/substance is a chemical that occurs naturally in the earth's crust. When rocks, minerals, and soil erode, they release this compound/element/substance into water supplies.
A. Arsenic D. Basalt
B. Trihalomethanes E. Granite
C. Disinfection byproducts F. None of the Above
13. The EPA has collected data required by the Information Collection Rule (ICR) to support future regulation of Microbial contaminants, disinfectants, and disinfection byproducts.
A. True B. False
14. The rule is intended to provide EPA with information on chemical byproducts that form when disinfectants used for microbial control react with chemicals already present in source water (disinfection byproducts (DBPs)); Disease-causing microorganisms (pathogens), including Cryptosporidium; and engineering data to control these contaminants.
A. True B. False
15. _____ are a group of chemicals that are formed along with other disinfection byproducts when chlorine or other disinfectants are used.
A. Disinfectant residual D. Giardia and viruses
B. Chlorite E. Disinfection By-Products (DBPs)
C. Haloacetic Acids (HAA5) F. None of the Above
16. Which compound/element/substance is a chemical that is formed when ozone, used to disinfect drinking water, reacts with naturally occurring bromide found in source water?
A. Bromate D. From the results of coliform testing
B. Counter pathogens E. Bacteria, Virus and Intestinal parasites
C. Monobromoacetic acid F. None of the Above

17. Trihalomethanes are regulated at a maximum allowable annual average level of 100 ppb for water systems serving more than 10,000 people under which of the following rules?

- A. Cryptosporidium
- B. Trihalomethanes
- C. Disinfection byproduct
- D. Total Trihalomethane
- E. Stage 1 Disinfectant/Disinfection Byproduct
- F. None of the Above

18. Which rule standards became effective for trihalomethanes and other disinfection byproducts listed above back in December 2001 for large surface water public water systems?

- A. Cryptosporidium
- B. Trihalomethanes
- C. Disinfection byproduct
- D. Total Trihalomethane
- E. Stage 1 Disinfectant/Disinfection Byproduct
- F. None of the Above

19. _____ are formed when disinfectants used in water treatment plants react with bromide and/or natural organic matter (i.e., decaying vegetation) present in the source water.

- A. Cryptosporidium
- B. Trihalomethanes
- C. Chlorine byproduct
- D. Total Trihalomethane
- E. Disinfection byproducts (DBPs)
- F. None of the Above

20. According to the text, different disinfectants produce different types or amounts of?

- A. Cryptosporidium
- B. Trihalomethanes
- C. Chlorine byproduct
- D. Total Trihalomethane
- E. Disinfection byproducts (DBPs)
- F. None of the Above

21. Which rule standards have been established have been identified in drinking water, including trihalomethanes, haloacetic acids, bromate, and chlorite?

- A. Cryptosporidium Rule
- B. Trihalomethanes Rule
- C. Acceptable standard
- D. Total Trihalomethane Rule
- E. Disinfection byproducts (DBPs)
- F. None of the Above

22. _____ are chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

- A. Cryptosporidium
- B. Trihalomethanes
- C. HAAs
- D. Total HAA5s
- E. Maximum Contaminant Levels MCLs
- F. None of the Above

Stage 2 DBP Rule Federal Register Notices

23. Which Rule is one part of the Microbial and Disinfection Byproducts Rules (MDBPs), which are a set of interrelated regulations that address risks from microbial pathogens and disinfectants/disinfection byproducts?

- A. Groundwater Rule
- B. Compliance
- C. The Stage 2 DBP
- D. Long Term 2 Enhanced Surface Water Treatment
- E. Interim Enhanced Surface Water Treatment
- F. None of the Above

24. _____ focuses on public health protection by limiting exposure to DBPs, specifically total trihalomethanes (TTHM) and five haloacetic acids (HAA5), which can form in water through disinfectants used to control microbial pathogens.

- A. Stage 2 DBPR
- B. DBP exposure
- C. The Stage 2 DBP
- D. Long Term 2 Enhanced Surface Water Treatment
- E. Traditional disinfection practices
- F. None of the Above

25. This rule will apply to all community water systems and nontransient non-community water systems that add a primary or residual disinfectant other than _____ or deliver water that has been disinfected by a primary or residual disinfectant other than UV.

- A. Ultraviolet (UV) light
- B. The open-channel system
- C. UV rather than ozone
- D. UV source
- E. UV radiation
- F. None of the Above

26. In the past 30 years, the _____ has been highly effective in protecting public health and has also evolved to respond to new and emerging threats to safe drinking water.

- A. Stage 2 DBPR
- B. DBP exposure
- C. The Stage 2 DBP rule
- D. Long Term 2 Enhanced Surface Water Treatment Rule
- E. Safe Drinking Water Act (SDWA)
- F. None of the Above

27. There are specific microbial pathogens, such as _____, which can cause illness, and are highly resistant to traditional disinfection practices.

- A. Enteric virus(es)
- B. Oocyst(s)
- C. Cryptosporidium
- D. C. perfringens
- E. E. coli host culture
- F. None of the Above

28. Which Rule strengthens public health protection for customers by tightening compliance monitoring requirements for two groups of DBPs, trihalomethanes (TTHM) and haloacetic acids (HAA5)?

- A. Major public health advances
- B. The Stage 3 DBPR
- C. Stage 2 Disinfection Byproducts
- D. Amendments to the SDWA in 1996
- E. Primary or residual disinfectant
- F. None of the Above

29. _____ targets systems with the greatest risk and builds incrementally on existing rules. This regulation will reduce DBP exposure and related potential health risks and provide more equitable public health protection?

- A. Stage 2 DBPR
- B. The rule
- C. The Stage 1 DBP rule
- D. Long Term 2 Enhanced Surface Water Treatment Rule
- E. Traditional disinfection practices
- F. None of the Above

30. _____ is being promulgated simultaneously with the Long Term 2 Enhanced Surface Water Treatment Rule to address concerns about risk tradeoffs between pathogens and DBPs.

- A. Major public health advances
- B. The Stage 2 DBPR
- C. This final rule
- D. Amendments to the SDWA in 1996
- E. Primary or residual disinfectant
- F. None of the Above

What does the rule require?

31. Under which Rule, systems will conduct an evaluation of their distribution systems, known as an Initial Distribution System Evaluation (IDSE), to identify the locations with high disinfection byproduct concentrations?

- A. Stage 2 DBPR
- B. DBP exposure
- C. The Stage 1 DBP rule
- D. Long Term 2 Enhanced Surface Water Treatment Rule
- E. Traditional disinfection practices
- F. None of the Above

32. Compliance with the maximum contaminant levels for two groups of disinfection byproducts referred to as the _____, differs from current requirements, which determine compliance by calculating the running annual average of samples from all monitoring locations across the system.

- A. TTHM and HAA5
- B. DBP MCLs
- C. Locational running annual average
- D. Disinfection byproducts (DBPs)
- E. Trihalomethanes and haloacetic acids
- F. None of the Above

33. _____ requires each system to determine if they have exceeded an operational evaluation level, which is identified using their compliance monitoring results.

- A. Stage 2 DBPR
- B. DBP exposure
- C. The Stage 1 DBP rule
- D. Long Term 2 Enhanced Surface Water Treatment Rule
- E. Traditional disinfection practices
- F. None of the Above

34. A system that exceeds an operational evaluation level is required to review their operational practices and submit a report to their state that identifies actions that may be taken to mitigate future high _____, particularly those that may jeopardize their compliance with the DBP MCLs.

- A. TTHM5 and HTAA5
- B. Halos
- C. DBP levels
- D. UV
- E. Amounts of rainfall
- F. None of the Above

Who must comply with the rule?

35. Entities potentially regulated by the _____ are community and nontransient noncommunity water systems that produce and/or deliver water that is treated with a primary or residual disinfectant other than ultraviolet light.

- A. DBPs from chlorination
- B. Chlorine and chloramine
- C. Stage 2 DBPR
- D. Classes of DBPs
- E. TTHM and HAA5
- F. None of the Above

Acronyms

36. Maximum Contaminant Level Goal (MCLG) - The highest level of a contaminant that is allowed in drinking water.

- A. True
- B. False

37. Maximum Contaminant Level (MCL)- The level of a contaminant in drinking water below which there is no known or expected risk to health.

- A. True
- B. False

38. Action Level (AL)- A required process intended to reduce the level of a contaminant in drinking water.

- A. True
- B. False

39. Treatment Technique (TT) - The concentration of a contaminant that, if exceeded, triggers treatment or other requirements which a water system must follow.

- A. True
- B. False

**New EPA Rules for Distribution
Reduction of Lead in Drinking Water Act**

40. The Reduction of Lead in Drinking Water Act means municipalities, water districts and developers who work with and pay for water infrastructure need to be preparing.

- A. True B. False

Pervasive Environmental Contaminant

41. Lead can be ingested from various sources, including lead paint and house dust contaminated by lead paint, as well as soil, drinking water, and food.

- A. True B. False

42. Because lead accumulates in the body, all sources of lead should be controlled or eliminated to prevent childhood lead poisoning.

- A. True B. False

43. Beginning in the 1970s, lead concentrations in air, tap water, food, dust, and soil began to be substantially reduced, resulting in significantly reduced blood lead levels in children throughout the United States.

- A. True B. False

44. Homes built before the 1978 homes might contain lead paint hazards, as well as drinking water service lines made from lead, or plumbing materials that contain lead.

- A. True B. False

45. Which of the following terms control reduces the leaching of lead plumbing components or solder into drinking water?

- | | |
|------------------------|-----------------------------------|
| A. Lead concentrations | D. Water infrastructure |
| B. Adequate corrosion | E. Safe Drinking Water Act (SDWA) |
| C. Lead enforcement | F. None of the Above |

Composite Meters

46. Composite meters are one example of a _____ alternative that is not susceptible to no-lead regulations.

- | | |
|-----------------------|-----------------------------------|
| A. Lead free | D. Zero lead |
| B. New lead-free law | E. Lead-free alternative material |
| C. New low-lead brass | F. None of the Above |

47. Composite meters do not depend on metal pricing fluctuations and have zero lead as opposed to low lead or even _____ meters.

- | | |
|----------------|--------------------------------------|
| A. Bronze | D. "Friction feeling" |
| B. "Lead-free" | E. A blend of plastic and fiberglass |
| C. Zero lead | F. None of the Above |

48. Which of the following terms does this type of meter boast longevity and resistance to corrosion from aggressive water?

- | | |
|----------------|--------------------------------------|
| A. Bronze | D. Composite |
| B. "Lead-free" | E. A blend of plastic and fiberglass |
| C. Zero lead | F. None of the Above |

49. Composite meters are constructed using a blend of plastic and?
- A. Bronze
 - B. "Lead-free"
 - C. Zero lead
 - D. "Friction feeling"
 - E. Fiberglass
 - F. None of the Above
50. Which of the following terms have been found to eliminate the "friction feeling" typically experienced with metal threads and metal couplings, facilitating easier installation?
- A. Bronze
 - B. "Lead-free"
 - C. Zero lead
 - D. Composite threads
 - E. A blend of plastic and fiberglass
 - F. None of the Above
51. With comprehensive testing, composite meters have demonstrated a burst pressure that is significantly greater than?
- A. Bronze
 - B. "Lead-free"
 - C. Zero lead
 - D. Composite
 - E. A blend of plastic and fiberglass
 - F. None of the Above
52. Composite technology today allows for better, more environmentally friendly composite products that will last up to 10 years in residential applications.
- A. True
 - B. False
53. Which of the following term or zero lead products on the market and it is critical that utilities consider all of their options when selecting a new fleet of meters?
- A. Bronze
 - B. Lead-free
 - C. Zero lead
 - D. Friction
 - E. Plastic and fiberglass
 - F. None of the Above
54. Everyone deserves access to safe, clean water.
- A. True
 - B. False
55. According to the text, it is essential that manufacturers deliver products that meet the highest standards for safety, quality, reliability and accuracy to ensure availability to, and conservation of?
- A. Frequency of sampling
 - B. Their personal health
 - C. Water system customers
 - D. An adequate chlorine residual
 - E. This most precious resource
 - F. None of the Above
56. To ensure that drinking water supplied by all public water supply systems as defined by the EPA meet Federal and State requirements, water system operators are required to collect samples regularly and?
- A. Frequency of sampling
 - B. Their personal health
 - C. Have the water tested
 - D. An adequate chlorine residual
 - E. Byproduct chemicals
 - F. None of the Above
57. The regulations specify maximum sampling frequencies, sampling locations, testing procedures, methods of keeping records, and frequency of reporting to the State.
- A. True
 - B. False
58. The regulations also mandate special reporting procedures if a contaminant exceeds?
- A. An MCL
 - B. Chemical analyses
 - C. Turbidity
 - D. Continuous chlorine residual
 - E. No concern for byproducts
 - F. None of the Above

59. According to the text, about half the distribution systems must provide periodic monitoring for microbiological contaminants and some chemical contaminants.

- A. True B. False

60. The frequency of sampling and the chemicals that must be tested for depend on the physical size of the water system, _____, and the history of analyses.

- A. Frequency of sampling D. An adequate chlorine residual
B. The water source E. Byproduct chemicals
C. Water system customers F. None of the Above

General Disinfection Requirements

61. According to the text, disinfection is absolutely required for all water systems using surface water sources.

- A. True B. False

62. As the water enters the distribution system, it must carry a _____ that will be retained throughout the distribution system.

- A. Disinfectant like UV D. Continuous chlorine residual
B. Chemical analyses E. Byproduct of chlorine
C. Ozone F. None of the Above

63. Water samples from points on the distribution system must be analyzed periodically to make sure _____ is being maintained.

- A. Frequency of sampling D. An adequate chlorine residual
B. Their personal health E. Byproduct chemicals
C. Water system customers F. None of the Above

64. The use of chlorine has almost completely eliminated occurrences of waterborne diseases in the United States.

- A. True B. False

65. The disinfection byproducts are formed when chlorine reacts with naturally occurring substances in raw water such as decaying vegetation containing?

- A. An MCL D. Humic and fulvic acids
B. Chemical analyses E. No concern for byproducts
C. Turbidity F. None of the Above

66. Which of the following terms was identified was trihalomethane a group of organic chemicals that are known carcinogens to some animals, so they are assumed also to be carcinogenic to humans?

- A. MCLs D. Chlorine residual
B. HAAA5s E. Chlorine byproduct chemicals
C. Chloramines F. None of the Above

67. Which of the following terms have been identified that may be harmful, and may cause some adverse health reactions.

- A. Other byproducts of disinfection D. Continuous chlorine residual
B. Chemical analyses E. Chloramines
C. Turbidity F. None of the Above

Consumer Confidence Reports

68. One of the very significant provisions of the 1996 SDWA amendments is Continuous chlorine residual requirement.

- A. True B. False

69. Information on the source water and _____ must be furnished to the satellite system by the system selling the water (parent company).

- A. An MCL D. Continuous chlorine residual
B. Chemical analyses E. No concern for byproducts
C. Turbidity F. None of the Above

70. According to the text, some States are preparing much of the information for their water systems, but the system operator still must add local information.

- A. True B. False

Distribution System Water Quality Problems

Turbidity

71. Turbidity in water is significant from a public health standpoint because _____ could shelter microorganisms from the disinfectant and allow them to still be viable when they reach the customer.

- A. Germs D. Turbidity
B. Hardness E. Suspended particles
C. Chlorine F. None of the Above

72. EPA regulations direct that, for most water systems, the turbidity of water entering the distribution system must be equal or less than 0.5 ntu in at least 95 percent of the measurements taken each month; at no time may the turbidity exceed 5 ntu.

- A. True B. False

73. Increases in turbidity may be caused by changes in velocity or inadequate flushing following main replacement.

- A. True B. False

Hardness

74. Water hardness usually comes from water contacting rock formations, such as water from wells in?

- A. Turbidity D. Concentration of calcium and magnesium
B. Hard and soft water E. Limestone formations
C. Ferrous iron F. None of the Above

75. Most surface water is of _____.

- A. Hard hardness D. Hard and soft water
B. Hardness E. Soft hardness
C. Medium hardness F. None of the Above

76. Water with 300 mg/L of hardness usually is considered soft.

- A. True B. False

77. Hard water usually is quite corrosive, and may have to be treated to reduce the corrosivity.

- A. True B. False

Iron

78. Ferrous iron (Fe²⁺) is in a _____, and water containing ferrous iron is colorless.

- A. Corrosivity
- B. Hardness
- C. Dissolved state
- D. Turbidity
- E. Rust-colored
- F. None of the Above

79. Ferric iron (Fe³⁺) has been oxidized, and water containing it is?

- A. Corrosivity
- B. Hardness
- C. Medium hardness
- D. Turbidity
- E. Rust-colored
- F. None of the Above

80. Gallionella can cause _____, tastes and odors, clogged pipes, and pump failure.

- A. Bacteriological safety
- B. System failure
- C. Bacteria
- D. Entry of contaminants
- E. Red water
- F. None of the Above

81. Water samples show increased iron concentrations between the point where water enters the distribution system and the consumer's tap, either corrosion, Iron bacteria, or both are probably taking place.

- A. True
- B. False

82. If the problem is caused by system pressure, flushing mains, shock chlorination, and carrying increased residual chlorine are alternatives to consider.

- A. True
- B. False

Manganese

83. The NSDWR recommend a concentration not to exceed 0.05 mg/L to avoid?

- A. Corrosion
- B. Customer complaints
- C. Pressure loss
- D. Harmful effects on humans
- E. Water system contamination
- F. None of the Above

Water Quality Safeguards

84. Which of the following terms are recommended above is necessary to prevent back siphonage and the entry of contaminants?

- A. Bacteriological safety
- B. Static pressure
- C. Chlorine
- D. Monitoring
- E. Continuous positive pressure
- F. None of the Above

85. Either water use must be restricted or the water system must be upgraded to be capable of supplying more water, if water demands are so great during peak demand periods that pressure declines in parts of the systems.

- A. True
- B. False

86. Which of the following terms also may be reduced during a main break because of the large amount of escaping water?

- A. Bacteriological safety
- B. System pressure
- C. Backpressure
- D. Cross connection
- E. Backflow
- F. None of the Above

Water Hammer

87. Water hammer is a pressure surge or wave caused by the static energy of a fluid in motion when it is forced to stop or change direction suddenly.

- A. True B. False

88. Moving water in a pipe has kinetic energy proportional to the mass of the water in a given volume times the square of the velocity of the water.

- A. True B. False

Water Sampling Terms and Definitions

Microbes

89. Coliform bacteria are common in the environment and are considered harmful.

- A. True B. False

90. The presence of coliform bacteria in drinking water indicates that the water may be contaminated with germs that can cause disease.

- A. True B. False

91. Microbes that are in human wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms and are caused by?

- A. Fecal Coliform and E coli D. Cryptosporidiosis
B. Giardia lamblia E. Coliform bacteria
C. Microorganisms F. None of the Above

92. What is the bacteria whose presence indicates that the water may be contaminated with human or animal wastes?

- A. Fecal Coliform and E coli D. Bac-T
B. Protozoa E. Coliform bacteria
C. Thermophilic F. None of the Above

93. What is the parasite that enters lakes and rivers through sewage and animal waste? It causes cryptosporidiosis, a mild gastrointestinal disease?

- A. Fecal Coliform and E coli D. Cryptosporidiosis
B. Giardia lamblia E. Cryptosporidium
C. Microorganisms F. None of the Above

94. What does Giardia lamblia causes?

- A. Fecal Coliform and E coli D. Cryptosporidiosis
B. Gastrointestinal illness E. Coliform bacteria
C. Microorganisms F. None of the Above

Waterborne Pathogens and Disease Section

95. Bacteria, viruses and protozoan that cause disease are known as pathogens.

- A. True B. False

96. Most pathogens are generally associated with diseases that _____ and affect people in a relatively short amount of time, generally a few days to two weeks.

- A. Limits the treatment process D. Will cause fatalities
B. Are mild in nature E. Limit the travel of pathogens
C. Cause intestinal illness F. None of the Above

How Diseases Are Transmitted.

97. Waterborne pathogens are primarily spread by the?

- A. Fecal-oral, or feces-to-mouth, route
- B. Dermal to fecal route
- C. Oral to fecal route
- D. Influenza route
- E. Waterborne mishaps
- F. None of the Above

98. When infected humans or animals pass the bacteria, viruses, and _____ in their stool, pathogens may get into water and spread disease.

- A. Fecal Coliform and E coli
- B. Protozoa
- C. Macroorganisms
- D. Cryptosporidiosis
- E. Bioslime
- F. None of the Above

99. For another person to become infected, he or she must take that pathogen in through the mouth.

- A. True
- B. False

100. _____ when in nature it is different from other types of pathogens such as the viruses that cause influenza (the flu) or the bacteria that cause tuberculosis.

- A. Fecal Coliform and E coli
- B. Giardia lamblia
- C. Microorganism(s)
- D. Waterborne Pathogen(s)
- E. Coliform bacteria
- F. None of the Above

101. According to the text, _____ are spread by secretions that are coughed or sneezed into the air by an infected person.

- A. Fecal Coliform and E coli
- B. Giardia lamblia
- C. Microorganisms
- D. Influenza virus and tuberculosis bacteria
- E. Coliform bacteria
- F. None of the Above

Chain of Transmission

102. Which pathogen may survive for months such as Giardia or?

- A. Illness
- B. Cryptosporidium
- C. Bacteria
- D. Campylobacteriosis
- E. Tampylobacteriosis
- F. None of the Above

103. This chain lists the events that must occur for the transmission of disease via drinking water. By breaking the chain at any point, the Transmission of disease will be prevented.

- A. True
- B. False

104. Water must have feces and must contain this term to cause a waterborne disease.

- A. Campylobacteriosis
- B. Pathogens
- C. Waterborne illness(es)
- D. Fecal-oral material
- E. Contaminated water
- F. None of the Above

105. The pathogens must survive in the water, that will depend on the temperature of the water and the length of time the _____ are in the water.

- A. Stomach bugs
- B. Turbidity
- C. Microscopic particles
- D. Germs
- E. Pathogens
- F. None of the Above

Bacterial Diseases

106. Which of the following terms is the most common diarrhea illness caused by bacteria? Symptoms include abdominal pain, malaise, fever, nausea and vomiting, and they usually begin three to five days after exposure?

- A. Pathogen
- B. Yersiniosis
- C. Hepatitis A
- D. Campylobacteriosis
- E. Incubation period
- F. None of the Above

107. _____ is been the cause of outbreaks have most often been associated with food, especially chicken and unpasteurized milk, as well as un-chlorinated water.

- A. Pathogen
- B. Yersiniosis
- C. Hepatitis A
- D. Campylobacteriosis
- E. Beaver fever
- F. None of the Above

Types of Bacteria

108. Which of the following terms is an important cause of travelers' diarrhea? Medical treatment generally is not prescribed because recovery is usually rapid.

- A. Illness
- B. Cryptosporidium
- C. Bacteria
- D. Campylobacteriosis
- E. Transmission of disease
- F. None of the Above

109. Cholera, Legionellosis, salmonellosis, _____, and yersiniosis are other bacterial diseases that can be transmitted through water.

- A. Shigellosis
- B. Cysts
- C. Hepatitis A
- D. Campylobacteriosis
- E. HIV
- F. None of the Above

110. Which of the following terms lives in water, readily killed or inactivated with chlorine or other disinfectants?

- A. Cysts
- B. Cryptogiardia
- C. Bacteria
- D. Viral Plaques
- E. Oocysts
- F. None of the Above

Viral-Caused Diseases

111. Which of the following terms is an example of a common viral disease that may be transmitted through water? The onset is usually abrupt with fever, malaise, loss of appetite, nausea and abdominal discomfort, followed within a few days by jaundice.

- A. Pathogen
- B. Yersiniosis
- C. Hepatitis A
- D. Campylobacteriosis
- E. Incubation period
- F. None of the Above

112. Most _____ in drinking water can be inactivated by chlorine or other disinfectants.

- A. Illnesses
- B. Giardiasis
- C. Viruses
- D. Pathogen(s)
- E. Infections
- F. None of the Above

Protozoan Caused Diseases

113. Which of the following bugs is larger than bacteria and viruses but still microscopic; they invade and inhabit the gastrointestinal tract?

- A. HIV infections
- B. Symptoms
- C. Giardiasis
- D. Hepatitis A
- E. Protozoan pathogens
- F. None of the Above

114. A few of the parasites enter the environment in a dormant form, with a protective cell wall, called a?

- A. Lamblia
- B. Shell
- C. Case
- D. Cyst
- E. Infection
- F. None of the Above

115. Which of the following terms can survive in the environment for long periods of time and is extremely resistant to conventional disinfectants such as chlorine?

- A. HIV
- B. Symptoms
- C. Infection
- D. Hepatitis A cyst
- E. Cyst
- F. None of the Above

116. Which of the following terms is a commonly reported protozoan-caused disease, it has also been referred to as backpacker's disease?

- A. Giardia lamblia
- B. Giardiasis
- C. Malaise
- D. Cryptosporidiosis
- E. Anti-water Infection
- F. None of the Above

117. The backpacker's disease incubation period is 5-25 days or longer, with an average of 7-10 days, many infections are _____ (no symptoms).

- A. Total
- B. Weak
- C. Strong
- D. Asymptomatic
- E. Unisymptomatic
- F. None of the Above

118. Which of the following bugs/disease terms occurs worldwide primarily because customers are receiving their drinking water from streams or rivers without adequate disinfection or a filtration system?

- A. HIV infections
- B. Symptoms
- C. Giardiasis
- D. Hepatitis A symptoms
- E. Cryptosporidiosis symptoms
- F. None of the Above

Giardia lamblia

119. Which of the following bugs has been responsible for more community-wide outbreaks of disease in the U.S. than any other, drug treatment is not 100% effective?

- A. HIV infection
- B. Giardia lamblia
- C. Giardiasis
- D. Hepatitis A
- E. Cryptosporidiosis
- F. None of the Above

Cryptosporidiosis

120. The mode of transmission of _____ is fecal-oral, either by person-to-person or animal-to-person, there is no specific treatment.

- A. HIV infection
- B. Giardia lamblia
- C. Giardiasis
- D. Hepatitis A
- E. Cryptosporidiosis
- F. None of the Above

121. All of these diseases, with the exception of _____, have one symptom in common: diarrhea. They also have the same mode of transmission, fecal-oral, whether through person-to-person or animal-to-person contact.

- A. HIV infection
- B. Giardia lamblia
- C. Giardiasis
- D. Hepatitis A
- E. Cryptosporidiosis
- F. None of the Above

122. Which of the following is an example of a protozoan disease that is common worldwide, but was only recently recognized as causing human disease?

- A. HIV infection
- B. Giardia lamblia symptom
- C. Giardiasis
- D. Hepatitis A
- E. Cryptosporidiosis
- F. None of the Above

123. Which of the following usually come and go, and end in fewer than 30 days in most cases, the incubation period is 1-12 days, with an average of about seven days?

- A. HIV infections
- B. Symptoms
- C. Giardiasis
- D. Hepatitis A
- E. Cryptosporidiosis
- F. None of the Above

Bacteriological Monitoring Section

124. _____ are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media.

- A. Indicator bacteria
- B. Bacteria tests
- C. Contaminate
- D. Microbiological analysis
- E. Presence of an indicator
- F. None of the Above

125. Indicators in common use today for routine monitoring of drinking water include total coliforms, fecal coliforms, and?

- A. Sample container
- B. Bacteria tests
- C. Coliform bacteria
- D. Escherichia coli (E. coli)
- E. Iron bacteria
- F. None of the Above

126. According to the text, the routine microbiological analysis of your water is for?

- A. Indicator bacteria
- B. Bacteria tests
- C. Contamination
- D. Coliform bacteria
- E. Presence of an indicator
- F. None of the Above

127. Which of the following terms is used as an indicator organism to determine the biological quality of your water?

- A. Microbiological analysis
- B. Bac-T
- C. Coliform bacteria
- D. Escherichia coli (E. coli)
- E. Presence of an indicator
- F. None of the Above

128. The presence of an indicator or _____ in your drinking water is an important health concern.

- A. Indicator bacteria
- B. Pathogenic bacteria
- C. Contaminate
- D. Microbiological analysis
- E. Presence of an indicator
- F. None of the Above

129. Which of the following terms is used to signal possible fecal contamination, and therefore, the potential presence of pathogens?

- A. Indicator bacteria
- B. Pathogenic bacteria
- C. Contaminate
- D. Microbiological analysis
- E. Presence of an indicator
- F. None of the Above

Bacteria Sampling

130. Water samples for _____ must always be collected in a sterile container.

- A. Indicators
- B. Bacteria tests
- C. Contamination
- D. pH analysis
- E. Presence of an indicator
- F. None of the Above

131. Refrigerate the sample and transport it to the testing laboratory within eight hours (in an ice chest). Many labs will accept bacteria samples on Friday. Mailing Indicator bacteria is not recommended because laboratory analysis results are not as reliable.

- A. True
- B. False

132. Which bug forms an obvious slime on the inside of pipes and fixtures. A water test is not needed for identification. Check for a reddish-brown slime inside a toilet tank or where water stands for several days.

- A. Colonies
- B. Algae
- C. Coliform bacteria
- D. Escherichia coli (E. coli)
- E. Iron bacteria
- F. None of the Above

133. Which of the following are common in the environment and are generally not harmful, but the presence of these bacteria in drinking water is usually a result of a problem with the treatment system or the pipes which distribute water, and indicates that the water may be contaminated with germs that can cause disease?

- A. Diseases
- B. Germs
- C. Coliform bacteria
- D. Escherichia coli (E. coli)
- E. Iron bacteria
- F. None of the Above

Laboratory Procedures

134. The laboratory may perform the _____ in one of four methods approved by the U.S. EPA and your local environmental or health division.

- A. Colilert
- B. Coliform
- C. Sample time
- D. Total coliform analysis
- E. Pathogen test
- F. None of the Above

Methods

135. The MMO-MUG test, a product marketed as _____, is the most common. The sample results will be reported by the laboratories as simply coliforms present or absent.

- A. Colilert
- B. Coliform
- C. Sample stuff
- D. Total coliform analysis
- E. Pathogen media
- F. None of the Above

136. If coliforms are present, the laboratory will analyze the sample further to determine if these are _____ and _____ and report their presence or absence.

- A. Colilert, E. coli
- B. Coliforms, E. coli
- C. Fecal coliforms, E. coli
- D. Total coliform analysis, Pathogens
- E. Pathogens, Total coliform analysis
- F. None of the Above

Types of Water Samples

137. It is important to properly identify the type of _____ you are collecting.

- A. Colilert D. Total coliform analysis
- B. Coliforms E. Pathogens
- C. Sample F. None of the Above

The three (3) types of samples are:

138. Samples collected following a coliform present' routine sample. The number of repeat samples to be collected is based on the number of _____ samples you normally collect.

- A. Repeat D. Total coliform analysis
- B. Special E. Routine
- C. QA QC F. None of the Above

139. What type of samples can be collected for other reasons? Examples would be a sample collected after repairs to the system.

- A. Repeat D. Total coliform analysis
- B. Special E. Routine
- C. Sample F. None of the Above

140. What type of samples can be collected on a routine basis to monitor for contamination? Collection should be in accordance with an approved sampling plan.

- A. Repeat D. Total coliform analysis
- B. Special E. Routine
- C. Sample F. None of the Above

Repeat Sampling

141. If a _____ is total coliform or fecal coliform present, a set of repeat samples must be collected within 24 hours after being notified by the laboratory.

- A. MCL compliance D. Original sampling location
- B. Distribution system E. Repeat sample(s)
- C. Routine sample F. None of the Above

The follow-up for repeat sampling is:

142. If only one _____ per month or quarter is required, four (4) repeat samples must be collected.

- A. Special Sample D. Coliform present
- B. Routine sample E. Original sampling location
- C. Repeat sample(s) F. None of the Above

143. For systems collecting two (2) or more routine samples per month, three (3) _____ must be collected.

- A. Compliance sample D. QA/QC Split
- B. Distribution sample E. Repeat sample(s)
- C. Routine sample F. None of the Above

144. Repeat samples must be collected from: Within five (5) service connections upstream from the?

- A. MCL compliance D. Original sampling location
- B. Distribution system E. Repeat sample(s)
- C. Routine sample F. None of the Above

145. Repeat samples must be collected from: Within five (5) service connections downstream from the?

- A. Special Sample
- B. Routine sample
- C. Repeat sample(s)
- D. Coliform present
- E. Original sampling location
- F. None of the Above

146. Repeat samples must be collected from: If the system has only one service connection, the _____ must be collected from the same sampling location over a four-day period or on the same day.

- A. Special Sample
- B. Routine sample
- C. Repeat sample(s)
- D. Coliform present
- E. Original sampling location
- F. None of the Above

147. Repeat samples must be collected from: All _____ are included in the MCL compliance calculation.

- A. Special Sample
- B. Routine sample
- C. Repeat sample(s)
- D. Coliform present
- E. Original sampling location
- F. None of the Above

Sampling Procedures

148. What must be followed and all operating staff must be clear on how to follow the sampling plan?

- A. Seal individual samples
- B. Chain of custody
- C. Distribution system
- D. Sample siting plan
- E. Positive for total coliform
- F. None of the Above

149. Staff must be aware of how often sampling must be done, the _____ to be used for collecting the samples, and the proper procedures for identification, storage and transport of the samples to an approved laboratory.

- A. Multiple sources
- B. Sample siting plan
- C. Total coliform
- D. Proper procedures and sampling containers
- E. Sampling containers
- F. None of the Above

150. In addition, proper procedures must be followed for repeat sampling whenever a routine sample result is _____.

- A. Seal individual samples
- B. Chain of custody
- C. Distribution system
- D. Sample siting plan
- E. Positive for total coliform
- F. None of the Above

Maximum Contaminant Levels (MCLs)

151. State and federal laws establish standards for drinking water quality. Under normal circumstances when these guidelines are being met, the water is somewhat safe to drink with little threat to human health.

- A. True
- B. False

152. EPA had developed standards which are known as maximum contaminant levels (MCL). When a particular contaminant exceeds its _____ a potential health threat may occur.

- A. Coliform bacteria count
- B. MCL
- C. Standards
- D. HPC
- E. CFU
- F. None of the Above

153. Which acronym generally expresses properties of the contaminants, risk assessments and factors, short-term exposure and long term exposure?

- A. Coliform bacteria
- B. MCLs
- C. Standards
- D. HPC
- E. CFU
- F. None of the Above

154. When you as the operator take samples to ensure your water is in compliance with the MCL, there are two types of _____ for coliform bacteria.

- A. Coliform bacteria
- B. MCLs
- C. Standards
- D. MCL violations
- E. CFU
- F. None of the Above

155. _____ is for total coliform; the second is an acute risk to health violation characterized by the confirmed presence of fecal coliform or E. coli.

- A. Coliform bacteria
- B. MCLs
- C. Standards
- D. MCL violations
- E. CFU
- F. None of the Above

Positive or Coliform Present Results

156. According to the text, if you are notified of a positive test result you need to contact either the Drinking Water Program or your local county health department within 24 hours, or by the next business day after the?

- A. Results are reported to you
- B. Positive violation
- C. Repeat sampling immediately
- D. Sample violation
- E. MCL compliance violation
- F. None of the Above

157. Ideally speaking, your Drinking Water Program Agency should contract with health departments to provide _____ to water systems.

- A. Assistance
- B. Harassment
- C. Hostility
- D. Sample help
- E. Compliance calculation
- F. None of the Above

158. Hopefully after you have contacted an agency for assistance, you will be instructed as to the proper repeat sampling procedures and possible corrective measures for solving the problem. It is very important to initiate the _____ as the corrective measures will be based on those results.

- A. Storage and distribution
- B. Repeat sampling immediately
- C. Upgrading of the wellhead area
- D. Perform routine procedures
- E. Corrective measures
- F. None of the Above

Heterotrophic Plate Count HPC

159. Heterotrophic Plate Count (HPC) --- formerly known as the Standard Plate Count, is a procedure for estimating the number of live heterotrophic bacteria and measuring changes during water treatment and distribution in water or in swimming pools.

- A. True
- B. False

160. Colonies may arise from pairs, chains, clusters, or single cells, all of which are included in which term?

- A. Coliform bacteria units
- B. MCLs units
- C. Standards
- D. HPC units
- E. Colony-forming units
- F. None of the Above

Spread Plate Method

161. During this method, colonies are on the _____ where they can be distinguished readily from particles and bubbles.

- A. Agar surface
- B. Surface growth area
- C. Top
- D. Bottom
- E. Material
- F. None of the Above

162. During the Spread Plate Method, colonies can be transferred quickly, and _____ easily can be discerned and compared to published descriptions.

- A. Colonies grow
- B. Surface growth
- C. Low counts
- D. Heterotrophic organisms will grow
- E. Colony morphology
- F. None of the Above

Membrane Filter Method

163. This method permits testing large volumes of _____ and is the method of choice for low-count waters.

- A. Colonies
- B. Surface water
- C. Low-turbidity water
- D. Heterotrophic organisms
- E. MCL
- F. None of the Above

Heterotrophic Plate Count (Spread Plate Method)

164. Which of the following terms use inorganic carbon sources this is in contrast to heterotrophic organisms utilize organic compounds as their carbon source?

- A. Colonies
- B. Surface growth
- C. AGAR
- D. Heterotrophic organisms
- E. Autotrophic organisms
- F. None of the Above

165. Which of the following terms provides a technique to quantify the bacteriological activity of a sample?

- A. Colonies
- B. Heat
- C. Agar
- D. Heterotrophic Plate Count
- E. MCL
- F. None of the Above

166. The R2A agar provides a medium that will support a large variety of _____.

- A. Colonies
- B. Bugs
- C. Germs
- D. Heterotrophic bacteria
- E. MCL
- F. None of the Above

Total Coliforms

167. This MCL is based on the presence of total coliforms, and compliance is on a daily or weekly basis, depending on your water system type and state rule.

- A. True
- B. False

168. For systems which collect fewer than _____ samples per month, no more than one sample per month may be positive. In other words, the second positive result (repeat or routine) in a month or quarter results in a MCL violation.

- A. 5
- B. 10
- C. 100
- D. 200
- E. 40
- F. None of the Above

169. For systems which collect _____ or more samples per month, no more than five (5) percent may be Positive?
- A. 5
 - B. 10
 - C. 100
 - D. 200
 - E. 40
 - F. None of the Above

Acute Risk to Health (Fecal coliforms and E. coli)

170. A(n) _____ to human health violation occurs if either one of the following happens: questions #171-174

- A. Routine analysis
- B. Drinking violation
- C. Acute risk
- D. Human health violation
- E. Fecal coliform or E. coli is present
- F. None of the Above

171. A routine analysis shows total coliform present and is followed by a repeat analysis which indicates _____.

- A. Routine analysis
- B. Drinking violation
- C. Water penalty
- D. Human health violation
- E. Fecal coliform or E. coli present
- F. None of the Above

172. A routine analysis shows total and _____ is followed by a repeat analysis which indicates total coliform present.

- A. Routine analysis
- B. Drinking water violation
- C. MCL violation
- D. Human health violations
- E. Fecal coliform or E. coli present
- F. None of the Above

173. Which of the following terms requires the water system to provide public notice via radio and television stations in the area?

- A. Routine analysis violation
- B. Drinking water rule violation
- C. MCL violation
- D. Human health violation
- E. Acute health risk violation
- F. None of the Above

174. According to the text, the type of contamination can pose an immediate threat to human health and notice must be given as soon as possible, but no later than 24 hours after notification from your laboratory of the test results.

- A. True
- B. False

Public Notice

175. A public notice is required to be issued by a water system whenever it fails to comply with an applicable MCL or _____, or fails to comply with the requirements of any scheduled variance or permit.

- A. Routine analysis
- B. Drinking water rule
- C. Treatment technique
- D. Human health violation
- E. Fecal coliform or E. coli present
- F. None of the Above

176. This term best describes what also is required whenever a water system fails to comply with its monitoring and/or reporting requirements or testing procedure.

- A. Routine analysis
- B. Drinking water rule
- C. MCL violation
- D. Public notice
- E. Fecal coliform or E. coli present count
- F. None of the Above

177. There shall be certain information, be issued properly and in a timely manner, and contain certain _____ on the public notice.

- A. Legal analysis
- B. Drinking water rule information
- C. NOVs
- D. Mandatory language
- E. Fecal language
- F. None of the Above

178. If there is a(n) _____ present to users, the timing and place of posting of the public notice may have different priorities.

- A. Routine analysis
- B. Drinking water rule
- C. Acute risk
- D. Human health violation
- E. Fecal coliform or E. coli present
- F. None of the Above

pH Section

179. What is the term associated with a charged species, an atom or a molecule, that has lost or gained one or more electrons?

- A. A proton
- B. Ion
- C. Anti-matter
- D. An electron
- E. A cation
- F. None of the Above

180. What is a substance that has the ability to reduce other substances and is said to be reductive in nature?

- A. Protons
- B. An electron donor
- C. Anti-matter
- D. Electrons
- E. Cations
- F. None of the Above

181. In chemistry, pH is a measure of the acidity or basicity of an aqueous solution. Solutions with a pH less than 7 are said to be acidic and solutions with a pH greater than 7 are basic or alkaline. Pure water has a pH very close to?

- A. 5
- B. 6
- C. 7
- D. 7.7
- E. 7.5
- F. None of the Above

182. According to the manual, which of the following parameter/methods/measurements determine a parameter using a concentration cell with transference by measuring the potential difference.

- A. Primary pH standard values
- B. Alkalinity
- C. pH
- D. pH measurement(s)
- E. Measurement of pH
- F. None of the Above

183. Mathematically speaking, pH is the negative logarithm of the activity of the (solvated) hydronium ion, often expressed as the measurement of?

- A. Electrons
- B. Alkalinity
- C. Hydronium ion concentration
- D. Cation measurement(s)
- E. Ions
- F. None of the Above

184. When measuring alkalinity in determining a stream's ability to neutralize acidic pollution from rainfall or wastewater, this measurement can be one of the best measures of the sensitivity of the stream to acid inputs.

- A. True
- B. False

185. One definition of pH is that it is defined as the decimal logarithm of the reciprocal of the _____, a_{H^+} , in a solution.

- A. Hydrogen ion activity
- B. Ion-selective electrode(s)
- C. (Solvated) hydronium ion
- D. Brønsted–Lowry acid–base theory
- E. Acid-base behavior
- F. None of the Above

186. With respect to standard buffer values, when more than two buffer solutions are used the electrode can be calibrated by fitting observed pH values to a straight line.

- A. True
- B. False

187. Commercial standard buffer solutions usually comes with information about value and a correction factor to be applied for what temperatures?

- A. 4 °C
- B. 25 °C
- C. 39 °F
- D. 10 °C
- E. 70 °F
- F. None of the Above

188. Because the pH scale is logarithmic, therefore pH is?

- A. Universal indicator
- B. A dimensionless quantity
- C. A Spectrophotometer
- D. Excess of Ion concentrations
- E. A set of non-linear equations
- F. None of the Above

189. What is the new pH scale is referred to as?

- A. Total scale
- B. POH
- C. P3H
- D. Ph₃
- E. POE
- F. None of the Above

190. Alkalinity is able to neutralize _____ and is measured in a quantitative capacity in an aqueous solution.

- A. Acid
- B. Base
- C. pH
- D. pH measurement(s)
- E. Bond formation
- F. None of the Above

191. When using a visual comparison of the test solution with a standard color chart, measuring pH values should be done to the?

- A. Universal indicator
- B. Colorwheel measurement
- C. Nearest whole number
- D. Spectrophotometer Example
- E. Lab test
- F. None of the Above

192. According to the manual, this device/method/calculation consists of a mixture of indicators which shows a continuous color change from pH 2 to pH 10.

- A. Universal indicator
- B. Colorimeter of spectrophotometer
- C. Spectrophotometer
- D. Excess of alkaline earth metal concentrations
- E. A set of non-linear simultaneous equations
- F. None of the Above

193. A(n) _____ is an example of a mathematical procedure for calculating the concentrations of all chemical species that are present in the solution.

- A. Universal indicator
- B. pH log
- C. A set of linear equations
- D. Chemical speciation calculation
- E. A set of non-linear simultaneous equations
- F. None of the Above

194. According to the manual, under normal circumstances strong acids and bases are compounds that, for practical purposes, are completely dissociated in water, this means that the concentration of hydrogen ions in acidic solution can be taken to be equal to the concentration of the acid. The pH is then equal to minus the logarithm of?

- A. The concentration value
- B. The pH
- C. The Spectrophotometer
- D. End-point pH
- E. A set of non-linear simultaneous equations
- F. None of the Above

195. The sum of all the titratable bases is the Alkalinity of water and its acid-neutralizing capacity. What would cause the measured value to vary significantly?

- A. Acid
- B. Alkalinity
- C. pH
- D. pH measurement(s)
- E. End-point pH
- F. None of the Above

196. For strong acids and bases no calculations are necessary except in extreme situations. The pH of a solution containing a weak acid requires the solution of a quadratic equation.

- A. True
- B. False

197. If the pH of a solution contains a weak base, this may require?

- A. The solution of a cubic equation
- B. The solution of a linear equation
- C. The solution of a squared equation
- D. A set of linear simultaneous equations
- E. A set of non-linear simultaneous equations
- F. None of the Above

198. While the general case requires the pH solution of?

- A. The solution of a cubic equation
- B. The solution of a linear equation
- C. The solution of a squared equation
- D. A set of linear simultaneous equations
- E. A set of non-linear simultaneous equations
- F. None of the Above

199. Because alkalinity is significant in many uses and treatments of natural waters and wastewaters, the measured values also may include contributions from _____ or other bases if these are present.

- A. Acids
- B. Light metals
- C. Rare earths
- D. Borates, phosphates, silicates
- E. Caustics
- F. None of the Above

200. Calculations are not necessary except in extreme situations for strong acids and bases. The pH of a solution containing a weak acid requires?

- A. The concentration value
- B. The solution of a quadratic equation
- C. The Spectrophotometer
- D. Visual comparison
- E. The solution of a cubic equation
- F. None of the Above