

Registration form

**WATER TREATMENT \$100.00
48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL \$50.00**

Start and Finish Dates: _____

You will have 90 days from this date in order to complete this course

List number of hours worked on assignment must match State Requirement. _____

Name _____ **Signature** _____

I have read and understood the disclaimer notice on page 2. Digitally sign XXX

Address _____

City _____ **State** _____ **Zip** _____

Email _____ **Fax (____)** _____

Phone:
Home (____) _____ **Work (____)** _____

Operator ID # _____ **Exp. Date** _____

Class/Grade _____

Your certificate will be emailed to you in about two weeks.

Please circle/check which certification you are applying the course CEU's.

Water Treatment ___ Water Distribution ___ Other _____

**Technical Learning College TLC PO Box 3060, Chino Valley, AZ 86323
Toll Free (866) 557-1746 Fax (928) 272-0747 info@tlch2o.com**

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Please pay with your credit card on our website under Bookstore or Buy Now. Or call us and provide your credit card information.

We will stop mailing the certificate of completion so we need either your fax number or e-mail address. We will e-mail the certificate to you, if no e-mail address; we will fax it to you.

DISCLAIMER NOTICE

I understand that it is my responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. I understand State laws and rules change on a frequent basis and I believe this course is currently accepted in my State for CEU or contact hour credit, if it is not, I will not hold Technical Learning College responsible. I fully understand that this type of study program deals with dangerous, changing conditions and various laws and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable in any fashion for any errors, omissions, advice, suggestions or neglect contained in this CEU education training course or for any violation or injury, death, neglect, damage or loss of your license or certification caused in any fashion by this CEU education training or course material suggestion or error or my lack of submitting paperwork. It is my responsibility to call or contact TLC if I need help or assistance and double-check to ensure my registration page and assignment has been received and graded. It is my responsibility to ensure all information is correct and to abide with all rules and regulations.

State Approval Listing Link, check to see if your State accepts or has pre-approved this course. Not all States are listed. Not all courses are listed. Do not solely trust our list for it may be outdated. It is your sole responsibility to ensure this course is accepted for credit

Professional Engineers; Most states will accept our courses for credit but we do not officially list the States or Agencies. Please check your State for approval.

You can obtain a printed version of the course manual from TLC for an additional \$69.95 plus shipping charges.

AFFIDAVIT OF EXAM COMPLETION

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

In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

Many States and employers require the final exam to be proctored.

Do not solely depend on TLC's Approval list for it may be outdated.

A second certificate of completion for a second State Agency \$50 processing fee.

All downloads are electronically tracked and monitored for security purposes.

Water Treatment Answer Key

Name _____

Phone _____

You are solely responsible in ensuring that this course is accepted for credit by your State. No refunds. Did you check with your State agency to ensure this course is accepted for credit?

Method of Course acceptance confirmation. Please fill this section

Website ___ Telephone Call___ Email___ Spoke to_____

Do not solely depend on TLC's Approval list for it may be outdated.

What is the approval number if Applicable? _____

Please use Adobe Acrobat DC or Pen to complete this answer Key

Please Circle, Bold, Underline or X, one answer per question.

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| 3. A B C D E F | 24. A B C D E F | 45. A B C D E F |
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| 18. A B C D E F | 39. A B C D E F | 60. A B C D E F |
| 19. A B C D E F | 40. A B C D E F | 61. A B C D E F |
| 20. A B C D E F | 41. A B C D E F | 62. A B C D E F |
| 21. A B C D E F | 42. A B C D E F | 63. A B C D E F |

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200. A B C D E F

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 not be in non-compliance and do not follow this course for proper compliance.

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

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

NAME: _____

E-MAIL _____ PHONE _____

PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE ANSWER IN THE AREA BELOW.

1. Please rate the difficulty of your course.
Very Easy 0 1 2 3 4 5 Very Difficult
2. Please rate the difficulty of the testing process.
Very Easy 0 1 2 3 4 5 Very Difficult
3. Please rate the subject matter on the exam to your actual field or work.
Very Similar 0 1 2 3 4 5 Very Different
4. How did you hear about this Course? _____
5. What would you do to improve the Course?

How about the price of the course?

Poor ____ Fair ____ Average ____ Good ____ Great ____

How was your customer service?

Poor ____ Fair ____ Average ____ Good ____ Great ____

Any other concerns or comments.

Please fax the answer key to TLC Western Campus Fax (928) 272-0747
Always call us after faxing the paperwork to ensure that we've received it.

Rush Grading Service

If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush service handling fee of \$50.00.

Water Treatment CEU 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.**

Preliminary Treatment

1. If not removed, weeds, leaves, and trash will cause problems to the treatment plant's pumps and equipment, the best way to protect the plant is?
A. Screening D. Change source
B. Settling E. Pump groundwater
C. Coagulation F. None of the Above
2. Sand and grit will damage plant equipment and pipes, so it must be removed with either rectangular or round shaped basin prior to?
A. Filtration D. Flocculation
B. Coagulation E. Sedimentation basin(s)
C. Purification F. None of the Above
3. Which of the following treatment terms is used after the flocculation process?
A. Filtration D. Flocculation
B. Coagulation E. Sedimentation basin(s)
C. Purification F. None of the Above
4. Flights and chains remove the scum from the _____ of the basin.
A. Supernatant D. Armature
B. Surface E. A and B
C. Scum box F. None of the Above
5. The most common type of circular clarifier has a center pier or column.
A. True B. False
6. Which of the following processes uses Alum and cationic polymer to neutralize the charge?
A. Filtration D. Flocculation
B. Reconditioning E. Conventional
C. Purification F. None of the Above

7. Which of the following compounds combines with alkalinity in the raw water to form a white precipitate that neutralizes suspended particles' electrical charge?
- A. Activated sodium D. Dissolved organic carbon
 B. PAC E. Alum
 C. Activated carbon F. None of the Above
8. Which of the following systems uses a 30 to 50 mg/L alum dosage to form a large floc that requires extensive retention time to permit settling?
- A. Conventional technology D. All of the above except C
 B. Reconditioning cycle E. Chemical pretreatment
 C. Traditional sand filter F. None of the Above
9. Which part of the reconditioning cycle lasts about 5 to 10 minutes?
- A. Conventional technology D. Fast rinse
 B. Reconditioning cycle E. Chemical pretreatment
 C. Traditional F. None of the Above
10. Which of the following terms may increase filtered water clarity, measured in NTU, by 90% compared with filtration alone?
- A. Conventional technology D. Fast rinse
 B. Reconditioning cycle E. Chemical pretreatment
 C. Traditional F. None of the Above
11. According to the text, if an operator is present to make adjustments for variations in the Sedimentation process, clarity improvements in the range of 93 to 95% are achievable.
- A. True B. False

Direct Filtration Plant vs. Conventional Plant

12. The primary difference between Direct Filtration Plant vs. Conventional Plant is that the _____ or step is omitted from the Direct Filtration plant.
- A. Conventional technology D. Fast rinse
 B. Reconditioning cycle E. Chemical pretreatment
 C. Sedimentation process F. None of the Above

Rapid Sand Filtration

13. Which of the following terms is the most prevalent form of water treatment technology in use today?
- A. Conventional technology D. Rapid Sand filtration
 B. Reconditioning cycle E. Chemical pretreatment
 C. Sedimentation process F. None of the Above

Coagulation

14. The alum and the water are mixed rapidly by the?
- A. Cationic polymers D. Shaker
 B. Flash mixer E. All of the Above
 C. Coagulant chemicals F. None of the Above

15. What is the process of joining together particles in water to help remove organic matter called?

- A. Cationic polymers
- B. Coagulation
- C. Coagulant chemicals
- D. Flocculation
- E. All of the Above
- F. None of the Above

16. Coagulation is necessary to meet the current regulations for almost all potable water plants using surface water.

- A. True
- B. False

17. Coagulant chemicals such as "alum" work by neutralizing the negative charge, which allows the particles to come together.

- A. True
- B. False

18. In water treatment, large microorganisms, including algae and amoebic cysts, are readily removed by which missing term and filtration?

- A. Cationic polymers
- B. Coagulation helpers
- C. Salts
- D. Coagulation
- E. All of the Above
- F. None of the Above

19. According to the text, more than 98% of poliovirus type 1 was removed by conventional _____ and filtration.

- A. Cationic polymers
- B. Coagulation helpers
- C. Salts
- D. Coagulation
- E. All of the Above
- F. None of the Above

Flocculation

20. Flocculation is the process of bringing together destabilized or coagulated particles to form larger masses which can be settled and/or filtered out of the water being treated.

- A. True
- B. False

21. Flocculation is the process where the suspended particles can collide, _____, and form heavier particles called "floc".

- A. Equalization
- B. Agitation of the water
- C. Agglomerate
- D. Destabilized or coagulated particles
- E. All of the Above
- F. None of the Above

Pre-Sedimentation

22. According to the text, depending on the quality of the source water, some plants have pre-sedimentation, this allows larger _____ in a reservoir or lake reducing solid removal loads.

- A. Equalize the basin
- B. Agitate the water
- C. Floc particles mix
- D. Coagulated particles
- E. Particles time to settle
- F. None of the Above

Sedimentation

23. Sedimentation is the process of destabilizing coagulated particles in water.

- A. True
- B. False

Filtration

24. Which of the following terms will also remove turbidity, but would not be recommended for that purpose only?

- A. Activated carbon filters
- B. Cartridge filters
- C. Anthracite coal
- D. Rapid-sand filters
- E. Granular synthetic material
- F. None of the Above

25. According to the text, water is filtered at a rate of between 2 and 10 gpm per square foot, the water is filtered through an approximate 36" depth of graded sand.

- A. True
- B. False

Declining Rate Filters

26. The flow rate will vary with?

- A. Head loss
- B. Uniform media
- C. Effluent control
- D. Post-disinfection
- E. All of the Above
- F. None of the Above

27. The declining rate filters system requires _____ to provide adequate media submergence.

- A. Head loss
- B. Uniform media
- C. Effluent control structure
- D. Post-disinfection
- E. Pre-disinfection
- F. None of the Above

Detention Time

28. Detention time is the actual time required for a small amount of water to pass through a sedimentation basin at a given rate of flow, or the calculated time required for a small amount of liquid to pass through a tank at a given rate of flow.

- A. True
- B. False

Jar Testing

29. Jar testing has been done on a monthly basis in most water treatment plants to control THMs.

- A. True
- B. False

pH

30. According to the text, pH is an expression of a basic or acid condition of a liquid. The range is from 0-14, zero being the most acid and 14 being the most alkaline. A pH of 7 is considered to be neutral.

- A. True
- B. False

Caustic

31. NaOH is a strong chemical used in the treatment process to neutralize acidity, and to lower the pH value.

- A. True
- B. False

Polymer

32. Polymer is a water treatment chemical that when combined with other types of coagulants, aids in binding small _____ to larger particles to help in the settling and filtering processes.

- A. Excess floc
- B. Coagulants
- C. Suspended particles
- D. Color
- E. Solids
- F. None of the Above

Post-Chlorine

33. The operator should make sure that the chlorinated water holds a residual in the distribution system.

- A. True
- B. False

Pre-Chlorination

34. Before the filtration process, chlorination will help control fish and vegetation.

- A. True
- B. False

Hydrofluosilicic Acid

35. H_2SiF_6 is a clear _____, with a pH ranging from 1 to 1.5 and used in water treatment to fluoridate drinking water.

- A. Gas
- B. But colored liquid
- C. Fluoridating drinking water liquid
- D. Fuming corrosive liquid
- E. Dark pleasant liquid
- F. None of the Above

Corrosion Control

36. The pH of the water is adjusted with?

- A. Acid
- B. Sodium carbonate
- C. Fluoride acid
- D. Soda acid
- E. Subsequent treatment processes
- F. None of the Above

37. Which of the following terms is fed into the water after filtration?

- A. Acid
- B. Sodium Chloride
- C. Fluoride acid
- D. Soda ash
- E. Subsequent treatment processes
- F. None of the Above

Taste and Odor Control

38. Which of the following chemicals is occasionally added for taste and odor control?

- A. Turbidity powder
- B. Powdered activated carbon (PAC)
- C. Fluoride
- D. HOCL
- E. All of the Above
- F. None of the Above

Water Quality

39. Water quality-testing is conducted throughout the water treatment process.

- A. True
- B. False

Chemical Feed and Rapid Mix

40. To improve the subsequent treatment processes, chemicals are added to the water, and may include pH adjusters and coagulants.

- A. True
- B. False

Short-Circuiting

41. Short-circuiting is a condition that occurs in tanks or basins when some of the water travels faster than the rest of the flowing water.
A. True B. False

New EPA Water Rules

42. In October 2001, the EPA decided to move forward with implementing the 10ppb standard for _____ in drinking water.
A. Arsenic D. Copper
B. Trihalomethanes E. Disinfection byproducts (DBPs)
C. Disinfection F. None of the Above

Stage 2 DBP Rule Federal Register Notices

43. Which Rule is 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 (GWR) D. Long Term 2 Enhanced Surface Water Treatment
B. Compliance E. Interim Enhanced Surface Water Treatment
C. The Stage 2 DBP F. None of the Above

44. Which Rule will reduce potential cancer and reproductive and developmental health risks from disinfection byproducts (DBPs) in drinking water, which form when disinfectants are used to control microbial pathogens?

- A. Stage 3 DBPR D. Long Term 2 Enhanced Surface Water
B. DBP exposure E. Traditional disinfection practices
C. Stage 2 Disinfection Byproducts F. None of the Above

45. 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 D. Amendments to the SDWA in 1996
B. The Stage 3 DBPR E. Primary or residual disinfectant
C. Stage 2 Disinfection Byproducts F. None of the Above

What does the rule require?

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

Who must comply with the rule?

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

Bacteriological Monitoring Section

48. Which of the following 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

49. 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

Bacteria Sampling

50. Water samples for this process 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

Laboratory Procedures

51. 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

52. 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

53. If coliforms are present, the laboratory will analyze the sample further to determine if these are _____ or _____ 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

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

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

The three (3) types of samples are:

55. 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
- B. Special
- C. QA QC
- D. Total coliform analysis
- E. Routine
- F. None of the Above

Repeat Sampling

56. 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
 - B. Distribution system
 - C. Routine sample
 - D. Original sampling location
 - E. Repeat sample(s)
 - F. None of the Above

The follow-up for repeat sampling is:

57. 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

Sampling Procedures

58. The _____ 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

Chain of Custody Procedures

59. Each custody sample requires a _____ record and may require a seal. If you do not seal individual samples, then seal the containers in which the samples are shipped.
- 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
60. Because a sample is physical evidence, _____ procedures are used to maintain and document sample possession from the time the sample is collected until it is introduced as evidence.
- A. Multiple sources
 - B. Sample siting plan
 - C. Total coliform
 - D. TCR
 - E. Chain of custody
 - F. None of the Above

Heterotrophic Plate Count HPC

61. 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

62. 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

**Heterotrophic Plate Count
(Spread Plate Method)**

63. Which term uses inorganic carbon sources as their carbon source?
- A. Colonies
 - B. Surface growth
 - C. AGAR
 - D. Heterotrophic organisms
 - E. Autotrophic organisms
 - F. None of the Above

Total Coliforms

64. 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

Public Notice

65. 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

66. Which missing 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

67. 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. NOV's
- D. Mandatory language
- E. Fecal language
- F. None of the Above

68. 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

The following are acute violations:

69. Which is violation of nitrate?

- A. Presence
- B. MCL
- C. MCLG
- D. Count
- E. Acute violations
- F. None of the Above

70. An _____ occurs if a routine analysis shows total coliform present and is followed by a repeat analysis which indicates fecal coliforms or E. coli present.

- A. Presence
- B. MCL
- C. MCLG
- D. Count
- E. Acute violation
- F. None of the Above

71. An acute violation is any outbreak of _____, as defined by the rules.
- A. Total coliforms
 - B. MCL
 - C. Waterborne disease
 - D. Radioactive bacteria
 - E. Acute violations
 - F. None of the Above

Pathogen Section

72. Bacteria, viruses and protozoan that cause disease are known as pathogens.
- A. True
 - B. False

73. 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
 - B. Are mild in nature
 - C. Cause intestinal illness
 - D. Will cause fatalities
 - E. Limit the travel of pathogens
 - F. None of the Above

How Diseases Are Transmitted

74. 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

75. 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

76. For another person to become infected, he or she must take the pathogen in through the mouth.
- A. True
 - B. False

77. This term means 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

78. 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

Bacterial Diseases

79. 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

80. Which of the following terms 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

81. 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

82. 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

83. 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

84. 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

85. 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

86. 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

87. 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

88. 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

89. 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

90. The backpacker's disease incubation period is 5-25 days or longer, with an average of 7-10 days, many infections are which missing term?

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

91. 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

92. 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

93. The mode of transmission of this protozoan disease 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

94. All of these diseases, with the exception of this bug, 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

95. 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

96. 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

TCR

97. Which of the following requires all Public Water Systems (PWS) to monitor their distribution system for coliform bacteria according to the written sample siting plan for that system.

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

98. The sample siting plan identifies sampling frequency and locations throughout the distribution system that are selected to be representative of conditions in the entire system.

- A. True
- B. False

Number of Monthly Samples

99. The TCR specifies the minimum number of _____ collected but it may be necessary to take more than the minimum number in order to provide adequate monitoring.

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

100. According to the text, timely detection of _____ is the purpose of the sample-siting plan, sample sites should be selected to represent the varying conditions that exist in the distribution system.

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

Sampling Procedures

101. Which of the following 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

102. 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

103. 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

Microbial Regulations

104. Which missing regulations developed and implemented by the USEPA to counter pathogens in drinking water is the Surface Water Treatment Rule?

- A. Bromate
- B. Counter pathogens
- C. Monobromoacetic acid
- D. From the results of coliform testing
- E. Bacteria, Virus and Intestinal parasites
- F. None of the Above

105. Which rule specifies treatment criteria to assure that these performance requirements are met; they include turbidity limits, disinfectant residual, and disinfectant contact time conditions?

- A. Long Term 1 Rule
- B. Maximum Contaminant Level Goal (MCLG)
- C. Stage 1 Byproducts Rule
- D. Surface Water Treatment Rule
- E. Interim Enhanced Surface Water
- F. None of the Above

106. Color is an indicator of the physical removal of particulates, including pathogens.

- A. True
- B. False

107. Which rule improves physical removal of Cryptosporidium, and to maintain control of pathogens?

- A. Long Term 1 Enhanced Surface Water Treatment Rule
- B. Maximum Contaminant Level Goal (MCLG)
- C. Stage 1 Disinfectants/Disinfection Byproducts Rule
- D. Surface Water Treatment Rule
- E. Interim Enhanced Surface Water Treatment Rule
- F. None of the Above

Bromate

108. Fill in the missing information in order. _____ is a chemical that is formed when _____ used to disinfect drinking water reacts with naturally occurring _____ found in source water.

- A. Bromate, Ozone, Chlorite
- B. Bromide, Bromate, Ozone
- C. Bromate, Bromate, Bromate
- D. Hydrogen sulfide, Water, Nitrogen
- E. Bromate, Ozone, Bromide
- F. None of the Above

109. What is the annual average for Bromate that was established in the Stage 1 Disinfectants/Disinfection Byproducts Rule?

- A. 1 part per billion
- B. 10 parts per billion
- C. 100 parts per billion
- D. 10 parts per million
- E. 500 parts per million
- F. None of the Above

Chlorite

110. According to the Stage 1 Disinfectants/Disinfection Byproducts Rule, what is the monthly average level of chlorite in drinking water?

- A. 1 part per million
- B. 10 parts per billion
- C. 100 parts per billion
- D. 10 parts per million
- E. 500 parts per million
- F. None of the Above

Chlorine Gas Section

111. When chlorine is added into the water stream, chlorine hydrolyzes into?

- A. HCL
- B. Sodium hypochlorite
- C. Bromoform
- D. Chlorine Acid
- E. Hypochlorous acid (HOCl), and hydrochloric acid (HCl)
- F. None of the Above

112. When chlorine hydrolyzation occurs, it provides an active toxicant, _____, which is pH-dependent. In alkaline cooling systems, it readily dissociates to form the hypochlorite ion (OCl⁻).

- A. HCl
- B. HOCl
- C. High chlorine concentrations
- D. pH of 7.0 than at pH 8.5
- E. the hypochlorite ion (OCl⁻)
- F. None of the Above

113. In alkaline conditions, this term becomes the predominant species and lacks the biocidal efficacy of the non-dissociated form.

- A. Chlorine
- B. Sodium hypochlorite
- C. OCl⁻
- D. Chlorine gas
- E. Hypochlorous acid (HOCl), and hydrochloric acid (HCl)
- F. None of the Above

114. Considerably more _____ is present at a pH of 7.0 than at pH 8.5.

- A. HCl
- B. HOCl
- C. High chlorine concentrations
- D. Alkalinity
- E. Hypochlorite ion (OCl⁻)
- F. None of the Above

115. Which missing term, organic acids and organic compounds, sulfides, iron and manganese all easily react with HOCl?

- A. Chlorine
- B. Sodium hypochlorite
- C. Ammonia
- D. Chlorine gas
- E. Hypochlorous acid (HOCl), and hydrochloric acid (HCl)
- F. None of the Above

116. What is the term that best describes the amount of chlorine needed to react with contamination species and it must be satisfied before active HOCl is available to provide a free chlorine residual?

- A. Chlorine demand
- B. HOCl
- C. High chlorine concentration
- D. Total residual
- E. The hypochlorite ion (OCl⁻)
- F. None of the Above

117. The combination of high chlorine demand in process-contaminated systems and the dissociation process in alkaline systems creates the need for greater chlorine feed to obtain the same microbial efficacy. This results in a higher concentration of HCl in the cooling system.

- A. True
- B. False

118. Since _____ removes alkalinity, pH depression and system corrosion could occur. In low pH water the passive metal oxide layers protecting the metal may resolubilize, exposing the surface to corrosion.

- A. HCl
- B. HOCl
- C. High chlorine concentrations
- D. pH of 7.0 than at pH 8.5
- E. the hypochlorite ion (OCl⁻)
- F. None of the Above

119. According to the text, which substance can damage or penetrate the passive oxide layer, leading to localized damage of the metal surface?

- A. Chlorine
- B. Sodium hypochlorite
- C. The chloride ion (Cl⁻)
- D. Chlorine gas
- E. Hypochlorous acid (HOCl), and hydrochloric acid (HCl)
- F. None of the Above

Pathophysiology

120. As far as chlorine safety and respiratory protection, the intermediate _____ of chlorine accounts for its effect on the upper airway and the lower respiratory tract.

- A. Generation of free oxygen radicals
- B. Vapor from Chlorine gas
- C. Effects of Hydrochloric acid
- D. Water solubility
- E. The odor threshold for chlorine
- F. None of the Above

121. According to the text, respiratory exposure to _____ may be prolonged because its moderate water solubility may not cause upper airway symptoms for several minutes.

- A. Hydrochloric acid
- B. Chlorine gas
- C. The gas
- D. The chemical species produced
- E. Plasma exudation
- F. None of the Above

122. Because chlorine gas is so dangerous, the odor threshold for chlorine is approximately _____; however, distinguishing toxic air levels from Permissible air levels may be difficult until irritative symptoms are present.

- A. 1 parts per million (ppm)
- B. 3 parts per million (ppm)
- C. 10 parts per million (ppm)
- D. 3-5 parts per million (ppm)
- E. 0.3-0.5 parts per million (ppm)
- F. None of the Above

Mechanism of Activity

123. The mechanisms of cellular injury are believed to result from the oxidation of functional groups in cell components, from reactions with tissue water to form?

- A. Generation of free oxygen radicals
- B. Chlorine acid
- C. Hydrochloric acid
- D. A caustic effect
- E. Hypochlorous and hydrochloric acid
- F. None of the Above

124. Chlorine gas feeds out of the cylinder through a gas regulator. The cylinders are on a scale that operators use to measure the amount used each day.

- A. True
- B. False

125. Chlorine gas should be stored in vented rooms that have panic bar equipped doors.

- A. True
- B. False

Solubility Effects

126. Which term is used that is highly soluble in water. The predominant targets of the acid are the epithelia of the ocular conjunctivae and upper respiratory mucus membranes.

- A. Hydrochloric acid
- B. H₂SO₄
- C. Hypocaloric acid
- D. Sodium hypochlorite solution
- E. Sulfuric Acid
- F. None of the Above

127. Because it is highly water soluble, Hypochlorous acid has an injury pattern similar to?

- A. Hydrochloric acid
- B. H₂SO₄
- C. Hypocaloric acid
- D. Sodium hypochlorite solution
- E. Sulfuric Acid
- F. None of the Above

128. Which term is used that may account for the toxicity of elemental chlorine and hydrochloric acid to the human body?

- A. Hydrochloric acid
- B. H₂SO₄
- C. Hypocaloric acid
- D. Hypochlorous acid
- E. Sulfuric Acid
- F. None of the Above

Early Response to Chlorine Gas

129. If you mix ammonia with chlorine gas, this compound reacts to form?

- A. Hypochlorous acid
- B. Chlorine gas
- C. Hydrochloric acid
- D. Sulfuric acid
- E. Chloramine gas
- F. None of the Above

Immediate Effects

130. Which of the following answers is the best choice for the immediate effects of this substance's toxicity include acute inflammation of the conjunctivae, nose, pharynx, larynx, trachea, and bronchi?

- A. Hydrochloric acid
- B. Chlorine gas
- C. Hypochlorous acid
- D. Sulfuric acid
- E. HOCL
- F. None of the Above

131. Chlorine is a highly reactive gas.

- A. True
- B. False

Types of Residual

132. Which term is used for all the chlorine that is available for disinfection?

- A. Chlorine residual
- B. Chlorine demand
- C. Free chlorine
- D. Break-point chlorination
- E. Total chlorine
- F. None of the Above

133. Total chlorine residual = free + _____.

- A. Chlorine residual
- B. Chlorine demand
- C. Free chlorine
- D. Combined chlorine residual
- E. Total chlorine residual
- F. None of the Above

Residual Concentration/Contact Time (CT) Requirements

134. Since monitoring for very low levels of pathogens in treated water is analytically very difficult, utilizing the _____ is recommended to demonstrate satisfactory treatment.

- A. Free chlorine
- B. Total residual
- C. Free chlorine residual
- D. "CT" disinfection concept
- E. T10 of the process unit
- F. None of the Above

Calculation and Reporting of CT Data

135. Reduction Ratio should be reported, along with the appropriate pH, temperature, and?

- A. Reduction Ratio
- B. CT actual
- C. Free chlorine residual
- D. Disinfectant residual
- E. T10 of the process unit
- F. None of the Above

136. Which term is used that must be greater than 1.0 to be acceptable?

- A. Reduction Ratio
- B. CT actual
- C. Free chlorine residual
- D. "CT" disinfection concept
- E. T10 of the process unit
- F. None of the Above

Chlorine (DDBP)

137. These term means that chlorine is present as Cl , HOCl , and OCl^- is called _____, and that which is bound but still effective is _____.

- A. Free available chlorine and Total
- B. Free and Residual
- C. Break point and Free
- D. Free available chlorine and Combined Chlorine
- E. Combined chlorine and Readily available
- F. None of the Above

138. Chloramines are formed by reactions with?

- A. Acid and Cl_2
- B. Ammonia and Cl_2
- C. THMS and Cl_2
- D. Folic Acid and Cl_2
- E. THMs and Hypochlorous acid
- F. None of the Above

Chlorine By-Products

139. The most common chlorination by-products found in U.S. drinking water supplies are?

- A. Chlorate and Chlorite
- B. CO_2 and H_2SO_4
- C. Trihalomethanes (THMs)
- D. Ammonia and THMS
- E. Chloramines
- F. None of the Above

The Principal Trihalomethanes are:

140. Chloroform, bromodichloromethane, chlorodibromomethane, and bromoform. Other less common chlorination by-products include the haloacetic acids and haloacetonitriles. The amount of THMs formed in drinking water can be influenced by a number of factors, including the season and the source of the water.

- A. True
- B. False

Health Effects

141. The available studies on health effects do not provide conclusive proof of a relationship between exposure to THMs and cancer or reproductive effects, but indicate the need for further research to confirm their results and to assess the potential health effects of chlorination by-products other than THMs.

- A. True
- B. False

Risks and Benefits of Chlorine

142. Many cities utilize the use of ozone to disinfect their source water and to reduce formation of this parameter?

- A. Chlorate and Chlorite
- B. CO_2 and H_2SO_4
- C. Trihalomethanes (THMs)
- D. Ammonia and THMS
- E. Chloramines
- F. None of the Above

143. _____ is a highly effective disinfectant, it breaks down quickly, so that small amounts of _____ or other disinfectants must be added to the water to ensure continued disinfection as the water is piped to the consumer's tap.

- A. Ozone, Chlorine
- B. UV, Chlorine
- C. Chlorite, Chlorine
- D. Chlorine Dioxide, Chlorine
- E. Chloramines, Chlorine
- F. None of the Above

Disinfection Byproduct Regulations Summary

144. Regulators and the general public have focused greater attention on potential health risks from chemical contaminants in drinking water..

- A. True
- B. False

145. Water system managers may also consider switching from chlorine to alternative disinfectants to reduce formation of THMs and HAAs.
A. True B. False

Alternate Disinfectants - Chloramine

146. It is recommended that Chloramine be used in conjunction with a stronger disinfectant. It is best utilized as a?
A. Chloramine D. Stable distribution system disinfectant
B. T10 value disinfectant E. Sodium chlorite (NaClO₂)
C. Free chlorine residual F. None of the Above

147. In the production of which missing term, the ammonia residuals in the finished water, when fed in excess of stoichiometric amount needed, should be limited to inhibit growth of nitrifying bacteria?
A. Dry sodium chlorite D. Ammonia residual(s)
B. Chloramines E. Free and/or combined chlorine
C. Chlorinated byproducts F. None of the Above

Chlorine Dioxide

148. Which term provides good Giardia and virus protection but its use is limited by the restriction on the maximum residual of 0.5 mg/L ClO₂/chlorite/chlorate allowed in finished water?
A. Dry sodium chlorite D. Ammonia residual(s)
B. Chlorine dioxide E. Free and/or combined chlorine
C. Chlorinated byproducts F. None of the Above

149. If chlorine dioxide is being used as an oxidant, the preferred method of generation is to entrain which missing term into a packed reaction chamber with a 25% aqueous solution of NaClO₂?
A. Chloramine D. Chlorine dioxide
B. Chlorine gas E. Sodium chlorite (NaClO₂)
C. Free chlorine F. None of the Above

Ozone

150. When determining Ozone CT values must be determined for the ozone basin alone; an accurate _____ must be obtained for the contact chamber, and residual levels.
A. Chloramine amount D. Contact time
B. T10 value E. Residual
C. Free chlorine F. None of the Above

151. Ozone does not provide a system residual and should be used as a primary disinfectant only in conjunction with?
A. Dry sodium chlorite D. Ammonia residual(s)
B. Chlorine dioxide E. Free and/or combined chlorine
C. Chlorinated byproducts F. None of the Above

152. Ozone does not produce chlorinated byproducts but it may cause an increase in such byproduct formation if it is fed ahead of free chlorine; ozone may also produce its own oxygenated byproducts such as Cl₂ + NH₄.
A. True B. False

Chlorine Exposure Limits

153. OSHA PEL _____

- A. 10 PPM
- B. 1 PPM
- C. 00.1 PPM
- D. 1,000 PPM
- E. 100 PPM
- F. None of the Above

154. Physical and chemical properties of which missing term is a yellowish green, nonflammable and liquefied gas with an unpleasant and irritating smell?

- A. Cl₃
- B. Chlorine
- C. HOCl and OCl-
- D. Combined Available Chlorine
- E. Monochloramine
- F. None of the Above

155. This can be readily compressed into a clear, amber-colored liquid, a _____, and a strong oxidizer.

- A. Cl₂
- B. Cl
- C. HOCl and OCl-
- D. Combined Available Chlorine
- E. Noncombustible gas
- F. None of the Above

156. Solid chlorine is about _____ times heavier than water and gaseous chlorine is about 2.5 times heavier than air.

- A. 1.5
- B. 1.0
- C. 0.5
- D. 2.5
- E. 3.0
- F. None of the Above

157. Emergency procedures in the case of a large uncontrolled chlorine leak are to: notify local emergency response team, warn and evacuate people in adjacent areas, and be sure that no one enters the leak area without adequate self-contained breathing equipment.

- A. True
- B. False

Symbiotic Protozoa

Parasites

158. Which term means or comprises a unique group of obligate, intracellular parasitic protozoa?

- A. Foraminifera
- B. Protozoan fauna
- C. Cytoplasm of protozoa
- D. Soil biomass
- E. Microsporidia
- F. None of the Above

159. Which term means or comprises amazingly diverse organisms with more than 700 species and 80 genera that are capable of infecting a variety of plant, animal, and even other protist hosts?

- A. Foraminifera
- B. Protozoan fauna
- C. Cytoplasm of protozoa
- D. Soil biomass
- E. Microsporidia
- F. None of the Above

160. There are four different genera of microsporidia (Encephalitozoon, Nosema, Pleistophora, and _____).

- A. Foraminifera
- B. Protozoan fauna
- C. Cytoplasm of protozoa
- D. Enterocytozoon
- E. Microsporidia
- F. None of the Above

Protozoan Reservoirs of Disease

161. The presence of bacteria in which missing term is well known, whereas that of viruses is less frequently reported?

- A. Foraminifera
- B. Protozoan fauna
- C. Cytoplasm of protozoa
- D. Soil biomass
- E. Microsporidia
- F. None of the Above

162. Most of these reports simply record the presence of bacteria or viruses and assume some sort of symbiotic relationship between them and the?

- A. Flagella
- B. Bacteria or viruses
- C. Protozoa
- D. Free-living amoebae
- E. Cell's cytoplasm
- F. None of the Above

Symbionts

163. According to the text, some of these creatures are harmless or even beneficial symbionts.

- A. Amoeba
- B. Viruses
- C. Protozoa
- D. Free-living amoebae
- E. Bacterium Legionella pneumophila
- F. None of the Above

Contractile Vacuoles

164. Many protozoa have _____, which collect and expel excess water, and extrusomes, which expel material used to deflect predators or capture prey.

- A. Flagella
- B. Contractile vacuoles
- C. Vacuole or tonoplast
- D. Free-living amoebae
- E. Cell's cytoplasm
- F. None of the Above

165. Which bug/creature/organism are entirely distinct from prokaryotic flagella?

- A. Eukaryotes
- B. Bacteria or viruses
- C. Protozoa
- D. Free-living amoebae
- E. Centrioles
- F. None of the Above

Centrioles

166. Which of the following terms may also be associated in the formation of a spindle during nuclear division?

- A. Contractile vacuoles
- B. Centrioles
- C. Paramecium
- D. Microtubule-supported organelles
- E. Vacuole or tonoplast
- F. None of the Above

167. Which bug/creature/organism produces axopodia that is used in flotation or to capture prey, and the haptophytes, which have a peculiar flagellum-like organelle called the haptonema?

- A. Paramecium
- B. Haptonema
- C. Paramecium
- D. Protozoan pathogens
- E. Radiolaria and heliozoa
- F. None of the Above

Paramecium

168. Which bug/creature/organism are single-celled, freshwater organisms in the kingdom Protista?

- A. Kinetosome or centriole
- B. E-coli
- C. Paramecium
- D. Eukaryotes
- E. Bacterium Legionella pneumophila
- F. None of the Above

169. Paramecium exist in an environment in which the osmotic concentration in their external environment is much lower than that in their?

- A. Contractile vacuoles
- B. Haptonema
- C. Cyst
- D. Protozoan pathogilens
- E. Cytoplasm
- F. None of the Above

170. Paramecium are subjected to a continuous influx of water, as water diffuses inward to a region of higher _____ concentration.

- A. Contractile vacuoles
- B. Cytoplasm
- C. Homeostasis
- D. Osmotic
- E. Hypotonic to their cytoplasm
- F. None of the Above

Protozoan Diseases

171. Which bug/creature/organism are larger than bacteria and viruses, but still microscopic?

- A. Paramecium(s)
- B. Parasite(s)
- C. Amoeba
- D. Protozoan pathogens
- E. Centriole(s)
- F. None of the Above

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

- A. Paramecium
- B. Host
- C. Cyst
- D. Protozoan pathogen
- E. Cytoplasm
- F. None of the Above

Giardiasis

173. Which bug/creature/organism has been responsible for more community-wide outbreaks of disease in the U.S. than any other pathogen?

- A. Legionella
- B. Giardia lamblia
- C. Cryptosporidium organisms
- D. E-coli
- E. Hepatitis A
- F. None of the Above

174. Symptoms include chronic diarrhea, abdominal cramps, bloating, frequent loose and pale greasy stools, fatigue and weight loss.

- A. Giardia lamblia
- B. Cytoplasm disease
- C. Paramecium disease
- D. Giardiasis
- E. Protozoan-caused disease
- F. None of the Above

Cryptosporidiosis

175. The mode of transmission is fecal-oral, either by person-to-person or animal-to-person. There is no specific treatment for which missing term?

- A. Giardia lamblia treatment
- B. Incubation period
- C. Animal-to-person contact
- D. Major symptom
- E. Cryptosporidium infections
- F. None of the Above

Giardia Lamblia

176. Which bug/creature/organism absorb their nutrients from the lumen of the small intestine, and are anaerobes?

- A. Water-borne sources
- B. Giardia trophozoites
- C. Giardia cysts
- D. Giardia infections
- E. Giardia parasites
- F. None of the Above

Cryptosporidium

177. According to the text, municipal drinking water utilities may meet federal standards for safety and quality of drinking water, but complete protection from _____ is not guaranteed.

- A. Symptoms
- B. Ameba
- C. Cryptosporidial infection
- D. Prokaryotes
- E. Entamoeba histolytica or E. histolytica
- F. None of the Above

178. The modified acid-fast stain is traditionally used to most reliably, and specifically detect the presence of?

- A. Cyst of C. parvum
- B. Outbreaks
- C. C. parvum
- D. Entamoeba histolytica
- E. Cryptosporidial oocysts
- F. None of the Above

179. There have been at least six major outbreaks of _____ in the United States as a result of contamination of drinking water.

- A. E. Coli
- B. Entamoeba histolytica
- C. Cryptosporidial infection
- D. Cryptosporidiosis
- E. Shigellosis (bacillary dysentery)
- F. None of the Above

Entamoeba histolytica

180. Which bug/creature/organism/species/disease invades the liver and forms an abscess. Even less commonly, it spreads to other parts of the body, such as the lungs or brain?

- A. Symptoms
- B. Ameba
- C. Cryptosporidiosis
- D. Shigellosis (bacillary dysentery)
- E. Entamoeba histolytica or E. histolytica
- F. None of the Above

181. Which bug/creature/organism/species/disease may eat the dead cell or just absorb nutrients released from the cell?

- A. Symptoms
- B. Ameba
- C. Endoplasmic reticulum
- D. Prokaryotes
- E. Cells
- F. None of the Above

182. Which bug/creature/organism/species/disease on the average, only about one in 10 people who are infected will become sick from the infection?

- A. Cyst of C. parvum
- B. Shigellosis (bacillary dysentery)
- C. E. histolytica
- D. Cryptosporidiosis
- E. Cryptosporidial oocysts
- F. None of the Above

183. Which bug/creature/organism/species/disease can cause diarrhea or a more serious invasive liver abscess?

- A. Cyst of C. parvum
- B. Shigellosis (bacillary dysentery)
- C. Entamoeba histolytica
- D. Cryptosporidiosis
- E. Cryptosporidial oocysts
- F. None of the Above

184. There is a rapid influx of _____ into the contacted cell, it quickly stops all membrane movement save for some surface blebbing. Internal organization is disrupted, organelles lyse, and the cell dies.

- A. Zinc
- B. Calcium
- C. Glucosamine
- D. Iron
- E. Magnesium
- F. None of the Above

185. Amebic dysentery is a severe form of _____ associated with stomach pain, bloody stools, and fever.

- A. Cyst of *C. parvum*
- B. Amebiasis
- C. *C. parvum*
- D. Cryptosporidiosis
- E. Amebic dysentery
- F. None of the Above

Mitochondria

186. Which term means that the bacterial cell is surrounded by a lipid membrane, or cell membrane, which encloses the contents of the cell and acts as a barrier to hold nutrients?

- A. Ciliate group
- B. Unicellular ciliate protozoa
- C. Endoplasmic reticulum
- D. Prokaryotes
- E. Cytoplasm
- F. None of the Above

187. Which bug/creature/organism/species/disease do not tend to have membrane-bound organelles in their cytoplasm and thus contain few large intracellular structures?

- A. Ciliate group
- B. Unicellular ciliate protozoa
- C. Endoplasmic reticulum
- D. Prokaryotes
- E. Bacterial cell
- F. None of the Above

188. Which bug/creature/organism/species/disease lack a nucleus, mitochondria, chloroplasts and the other organelles present in eukaryotic cells, such as the Golgi apparatus and endoplasmic reticulum?

- A. Ciliate group
- B. Unicellular ciliate protozoa
- C. Endoplasmic reticulum
- D. Prokaryotes
- E. Bacterial cell
- F. None of the Above

Bacteriophage

189. According to the text, bacteriophages consist of _____ enclosing genetic material.

- A. Bacteriophages
- B. Phages
- C. Microbial mats
- D. Peptidoglycan
- E. An outer protein hull
- F. None of the Above

190. One of the densest natural sources for phages and other viruses is sea water, where up to 9×10^8 virions per milliliter have been found in _____ at the surface, and up to 70% of marine bacteria may be infected by phages.

- A. Bacteriophages
- B. Phages
- C. Microbial mats
- D. Peptidoglycan
- E. Virions
- F. None of the Above

191. The genetic material can be ssRNA (single stranded RNA), dsRNA, ssDNA, or dsDNA between 5 and 500 kilo base pairs long with linear arrangement. Bacteriophages are much smaller than the Plasma membrane they destroy - usually between 20 and 200 nm in size.

- A. True
- B. False

192. Which creature or substance is estimated to be the most widely distributed and diverse entities in the biosphere?

- A. Bacteriophages
- B. Phages
- C. Microbial mats
- D. Peptidoglycan
- E. Virions
- F. None of the Above

Escherichia coli EPEC

E-Coli Section

193. Escherichia coli. There are several pathogenic strains of Escherichia coli, which are classified under enterovirulent E. coli. They are enterohemorrhagic, enteroinvasive, enterotoxigenic, enteropathogenic, and enteroaggregative.

- A. True B. False

194. Prevention strategies for Salmonella include source protection, halogenation of water, and also _____.

- A. KNMO4 D. Eliminating snails with a molluscicide
B. Source protection E. Boiling water for one minute
C. Chlorine dioxide F. None of the Above

Maximum Contaminant Levels (MCLs)

195. 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

196. EPA had developed standards that are known as maximum contaminant levels (MCL). When a particular contaminant exceeds this term a potential health threat may occur.

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

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

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

198. 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 D. MCL violations
B. MCLs E. CFU
C. Standards F. None of the Above

199. The first type of MCL violations is for total coliform; the second is _____ violation characterized by the confirmed presence of fecal coliform or E. coli.

- A. Coliform bacteria D. MCL violations
B. MCLs E. An acute risk to health
C. Standards F. None of the Above

What is Escherichia coli O157:H7?

200. Systems serving 25 to 1,000 people typically take one sample per month. Some states reduce this frequency to quarterly for ground water systems if a recent sanitary survey shows that the system is free of sanitary defects.

- A. True B. False