Registration form

WATER TREATMENT CERTIFICATION PREPARATION TRAINING COURSE $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

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

Water Treatment _____ Distribution _____ Groundwater _____

Well Drillers_____ Pump Installer_____ Other _____
Your certificate will be mailed to you in about two weeks.

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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State Approval Listing URL…
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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.

For security purposes, please fax or e-mail a copy of your driver's license and always call us to confirm we've received your assignment and to confirm your identity.

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WT Prep Answer Key

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You are solely responsible to ensure that this course is accepted for credit by your State. 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_____

Did you receive the approval number if Applicable? _____

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Please Circle, Underline, or X or in Word, highlight or bold.

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Please fax the answer key to TLC Western Campus Fax (928) 272-0747.

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 serve handling fee of $50.00.

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

Water Treatment Certification Preparation CEU Training Course
CUSTOMER SERVICE RESPONSE CARD

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Water Treatment Certification Preparation 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'll 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 manual 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**

1. This term means the aliquot of finished drinking water that is examined for the presence of coliform bacteria. This sample volume is 100 milliliters and is commonly referred to as?
A. Surface Water Sample
B. Standard Sample
C. Eplilimnion
D. None of the Above

2. This term means 1 of the family of organic compounds, named as derivatives of methane, wherein 3 of 4 hydrogen atoms in methane are substituted by a halogen atom in the molecular structure?
A. Trihalomethanes
B. TTHM
C. VOC
D. SOC
E. None of the Above

3. What term best represents an oxidant, including chlorine, chlorine dioxide, chloramines, ozone, or an equivalent agent or process such as ultraviolet light, that kills or inactivates pathogenic organisms?
A. Halogen
B. Disinfectant
C. Dihydrogen Oxide
D. O2
E. None of the Above

4. Reservoirs which are nutrient-poor and contain little plant or animal life are known as?
SAC. WT-V1 Sec. 3.10
A. Littoral Zone
B. Threshold Reservoir
C. Mesotrophic
D. Stratification type
E. Oligotrophic

5. Many water quality problems in domestic water supply reservoirs occur in reservoirs containing moderate or large quantities of nutrients such as phosphate, _____compounds. SAC. WT-V1 Sec. 3.10
A. Nitrate, and organic nitrogen
B. Iron, and oxygen
C. DO and calcium
D. Calcium and iron
E. None of the Above

6. _____filtration rates and increased frequency of filter backwashing are reflected in an inability to meet system water demands and increased water treatment costs. SAC. WT-V1 Sec. 3.13
A. Reduced
B. Increased
C. Reverse
D. Greensand

7. A major problem associated with algal blooms is that certain species of algae tend to clog filters at water treatment plants and thereby reduce both filtration rates and the duration of filter runs. Normal filter runs will last _____ before cleaning is required SAC. WT-V1 Sec. 3.13
A. 30 – 100 hours
B. 10-20 hours
C. 100-200 hours
D. 500 –1000 hours
E. None of the Above

8. When anaerobic conditions exist in either the metalimnion or hypolimnion of a stratified lake or reservoir, water quality problems may make the water unappealing for domestic use without costly water treatment procedures. Most of these problems are associated with this term in the stratified waters. SAC. WT-V1 Sec. 3.18
A. Precipitate
B. Turbidity
C. Reduction
D. Alkalinity
E. All of the above

9. When significant levels of dissolved oxygen are present, iron and manganese exist in an _____state and normally precipitate into the reservoir bottom sediments. SAC. WT-V1 Sec. 3.18
A. Oxidized
B. Reduced
C. Precursor
D. Logarithm
E. None of the Above

10. One of the more important considerations in the construction of intake facilities is the ease of operation and maintenance over the expected lifetime of the facility. Every intake structure must be constructed with consideration for operator safety and for ? SAC. WT-V1 Sec. 3.50
A. Fish habitat
B. Reagents
C. Cathodic protection
D. Supernatant
E. None of the above

11. The proper pH range must be maintained because coagulants generally react with the alkalinity in water. What is the pH range for the best coagulation? SAC. WT-V1 Sec. 4.22
A. 11-12
B. 7-9
C. 5-7
D. 3-5
E. 99

12. The information furnished by a sanitary survey is essential to evaluating the bacteriological and chemical quality data. Which of the following items are essential or considered in a sanitary survey. SAC. WT-V1 Sec. 2.20
A. Identify potential hazards
B. Determine factors which affect which affect water quality
C. Select treatment requirements.
D. All of the above
E. None of the Above

13. The minimum detention time recommended for flocculation ranges from about? SAC. WT-V1 Sec. 4.320
A. 30 - 40 minutes
B. 40 – 60 minutes
C. 120 minutes
D. 5 – 20 minutes for direct filtration and up to 30 minutes for conventional filtration
E. None of the above

14. This substance or mixture is a pure chemical substance that is used to make new products or is used in chemical tests to measure, detect, or examine other substances. Jar test _____ can be prepared at several concentrations depending upon desired dosage. SAC. WT-V1 Sec. 4.623
A. Reagent
B. Cathodic protection
C. Supernatant
D. Logarithm
E. None of the Above

15. Which of the following terms best represents the definition of the property of a material or soil that permits considerable movement of water through it when it is saturated? SAC. WT-V1 Sec. 6.30
A. Media
B. Alluvial
C. Permeability
D. Reverse Omission
E. None of the Above

16. Which of the following are desirable filter media characteristics? SAC. WT-V1 Sec. 6.30
A. Hard and durable
B. Insoluble in water
C. Free of impurities
D. All of the above
E. None of the above

17. The volume of a reservoir is estimated to be 581,000 cubic feet. Estimate the volume in acre-feet. SAC. WT-V1 Sec. A.132 Example 9
A. 13.3 Acre feet
B. .133 Acre feet
C. 10 Acre feet
D. None of the Above

18. Determine the actual chemical feed in pounds per day from a dry chemical feeder. A. bucket placed under the chemical feeder weighed 0.3 pounds empty and 2.1 pounds after 30 minutes. SAC. WT-V1 Sec. A.131 Example 5
A. 86 lbs./day
B. 8.6 lbs./day
C. 860 lbs./day
D. 6.3 lbs./day
E. None of the Above

19. A small chemical feed pump lowered the chemical solution in a three-foot diameter tank one foot and seven inches during an eight-hour period. Estimate the flow delivered by the pump in gallons per minute. SAC. WT-V1 Sec. A.131 Example 7
A. 0.28 GPM
B. 28 GPM
C. .280 GPM
D. 0.17 GPM
E. None of the Above

20. The optimum liquid alum dose from the jar tests is 12 mg/L. Determine the setting on the liquid alum chemical feeder in milliliters per minute when the plant flow is 4.7 MGD. The liquid alum delivered to the plant contains 642.3 milligrams per milliliter of liquid solution. SAC. WT-V1 Sec. A.131 Example 3
A. 231 mL/min
B. 198 mL/min
C. 321 mL/min
D. 2.31 mL/min
E. None of the Above

21. Convert a flow of 800 gallons per minute to million gallons per day? SAC. WT-V1 Sec. A.130 Example 1
A. 800
B. .80
C. 0.8
D. 1.15
E. None of the Above

22. Determine the chlorinator setting in pounds per 24 hours to treat a flow of 2 MGD with a chlorine dose of 3.0 mg/L? SAC. WT-V1 Sec. A.131 Example 2
A. 50 lbs./day
B. 8.34 lbs./day
C. 60 lbs./day
D. .50 lbs./day
E. None of the Above

23. A reservoir has a volume of 6.8-acre feet. What is the reservoir in million gallons? SAC. WT-V1 Sec. A.132 Example 10
A. 1.1 Million gallons
B. 2.2 Million gallons
C. 3.3 Million gallons
D. 4.4 Million gallons
E. None of the Above

24. To check an ion exchange unit for iron fouling the operator should make careful observations during the backwash cycle and look for ? SAC. WT-V1 Sec 10.21
A. An orange color on the resin and backwash water
B. A black color on the filters
C. A black color on the resin surface
D. A fine shimmery powder
E. None of the Above

25. According to the Sacramento manual, identify which of the following as a physical characteristic of water. SAC. WT-V1 Sec 2.22
A. Hardness
B. Turbidity
C. Alkalinity
D. All of the above
E. None of the Above

26. How is groundwater produced? SAC. WT-V1 Sec 2.140
A. Through artesian pressure
B. Through percolation
C. Through evapotranspiration
D. Through impoundment intrusion
E. None of the above

27. Which of the following are plant nutrients which may cause an increase in the growth of algae? SAC. WT-V1 Sec 3.10
A. Nitrogen and phosphorus
B. Sulfur and carbon
C. Water and fertilizer
D. None of the above

28. Fluoride is added to a water supply? SAC. WT-V1 Sec 13.0
A. To prevent dental caries in children
B. To remove tastes and odors
C. To combine with chlorine
D. To hide other additives
E. None of the Above

29. What are the essential factors that should be considered during a Sanitary Survey? SAC. WT-V1 Sec 2.0
A. Factors which affect water quality
B. Identify potential hazards
C. Both A & B
D. None of the above

30. What is the chemical symbol for chlorine? SAC. WT-V1 Sec 11.20
A. C
B. Cl
C. Cr
D. Ch
E. None of the Above

31. A rotometer measures gallons per hour or pounds per day, and is commonly used to determine chemical feed rates for? SAC. WT-V1 Sec 19.24
A. GAC
B. Most fluids
C. VOCs
D. Powders
E. None of the Above

32. A cross-connection in a water supply is? SAC. WT-V1 Sec 2.20
A. Connection between a chlorinator and fluorinator
B. Connection between safe and unsafe water
C. A four way water connection
D. Logarithm
E. None of the Above

33. Pneumatic systems are not reliable as transmission lines over? SAC. WT -V1 Sec. 10.312
A. 100 feet
B. 1000 feet
C. 5000 feet
D. None of the above

34. Surface water such as rivers and lakes are the result of which of the following processes?
SAC. WT -V1 Sec. 2.130
A. Evapotranspiration
B. Percolation
C. BOR
D. Runoff
E. None of the Above

35. Which of the following will result when calcium carbonate or limestone is added to water?
SAC. WT -V1 Sec. 8.213
A. Corrosion will be inhibited
B. The pH will decrease
C. DO will increase
D. Photosynthesis

36. Before entering the chlorine room to check on a chlorine leak, the operator should?
SAC. WT-V1 Sec 7.0
A. Use a self-contained breathing apparatus and check to see that the ventilation system is working
B. Wear gloves, goggles and boots
C. Check the lights and ventilation systems
D. Use a gas canister mask and ventilate the room for fifteen minutes
E. None of the Above

37. What are the two forms of activated carbon which are used in water treatment?
SAC. WT-V1 Sec 9.440
A. Powered and granular
B. Slurry and granular
C. Activated and GAC
D. Reduced and regular
E. None of the Above

38. Powered Activated Carbon, or PAC is commonly used in water plants for what purpose?
SAC. WT-V1 Sec 9.440
A. Absorbing moister
B. Metalimnion
C. Turbidity
D. Taste and odor control
E. None of the Above

39. What is the chemical name of Cu ? SAC. WT-V1 Sec. 11.02
A. Chlorine
B. Copper
C. Chloride
D. Carbon
E. None of the Above

40. Which of the following pieces of labware may have a glass stopcock that must be lubricated?
SAC. WT-V1 Sec. 11.11
A. A buret
B. A graduated cylinder
C. A boiling flask
D. A pipette
E. None of the Above

Some questions may repeat for QA/QC purposes.

41. The simplest way to define an organic compound is that an organic compound?
SAC. WT-V1 Sec. 11.02
A. Will not burn
B. Contains carbon
C. Is a halogen
D. All of the above
E. None of the Above

42. A water sample may be collected from a surface water or basin by hand. To do this, the sample bottle should be plunged mouth down below the surface then tilted upward to allow _____ to escape from the bottle. SAC. WT-V1 Sec. 11.240
A. Air
B. Preservative
C. Sodium Thiosulfate
D. Epilimnion
E. None of the Above

43. The Safe Drinking Water Amendments include MCLs. MCLs can be defined as? SAC. WT-V1 Sec. 7.25
A. Maximum Chlorine Level
B. Maximum Carbon Level
C. Maximum Contaminant Level
D. None of the above

44. Excessive turbidity during disinfection will? SAC. WT-V1 Sec. 7.12
A. Reduce the effectiveness of the chlorine
B. Help the filter process
C. Decease the chlorine demand
D. Reduce the effectiveness of the water
E. None of the Above

45. What should be used to test for chlorine leaks around valves and piping? SAC. WT-V1 Sec. 7.441
A. An ammonia soaked rag
B. A spray bottle of sulfuric acid
C. Your nose
D. Lantern ring
E. None of the Above

46. When the temperature of a chlorine cylinder is increased, the chlorine will?
SAC. WT-V1 Sec. 7.220
A. Expand in volume
B. Increase in density
C. Become flammable
D. All of the above.
E. None of the Above

47. Why do many operators chlorinate past the breakpoint? SAC. WT-V1 Sec. 7.25
A. It will form chloramines
B. It will form chlororganics
C. The free chlorine residual gives the best disinfection
D. To help decrease the demand
E. None of the Above

48. If you cannot open the valve on a chlorine cylinder because it is too tight, you should? SAC. WT-V1 Sec. 7.451
A. Use a pair of vise-grips
B. Loosen the packing gland around the valve, and tap the valve gently with your hand
C. Remove the valve and replace it
D. Spray a lubricant on it.
E. None of the Above

49. If there is a chlorine leak in the chlorine tank, the chlorine gas will accumulate? SAC. WT-V1 Sec. 7.220
A. Near the floor
B. Near the vents
C. Near the public
D. Near the ceiling
E. None of the Above

50. Which of the following laboratory tests should be done immediately with no holding time? SAC. WT-V1 Sec. 11.25
A. Bac-T
B. Copper
C. Nitrate
D. None of the above

51. The best place to take a water sample from the distribution system is from? SAC. WT-V1 Sec. 11.213
A. Front yard faucets which have allot of organic and vegetation matter around
B. Fire hydrant
C. Kitchen sinks
D. Front yard faucet on a short service
E. None of the Above

52. A Grab Sample should be used when testing for? SAC. WT-V1 Sec. 11.220
A. Dissolved gases
B. Residual Chlorine
C. Coliform bacteria, pH and Temperature
D. All of the above
E. None of the Above

53. You should never use a composite sample when testing for? SAC. WT-V1 Sec. 11.221
A. Chlorinated hydrocarbons
B. Oil and grease
C. Bacteriological examinations
D. BOD
E. None of the Above

54. If an operator was to put water on a leaking chlorine cylinder, which of the following is most likely to occur? SAC. WT-V1 Sec. 7.52
A. Corrosion will occur and the leak will get larger
B. A cloud of white smoke will occur
C. The water will neutralize the liquid
D. The water will temporally seal the leak
E. None of the Above

55. If the chlorination system goes out of service or operation, what should be done? SAC. WT-V1 Sec. 7.53
A. Service may be interrupted for a short time but add additional chlorine when the system is back on line
B. Notify the Operator that the service may be interrupted
C. Back-up disinfection units should be brought on-line immediately with no interruption of service
D. Service may be interrupted for a short period
E. None of the Above

56. Chlorine gas enters the injector; this makes the chlorine? SAC. WT-V1 Sec. 7.41
A. A more dilute gas
B. A solution which is ready for application
C. A little warmer
D. Turn into water
E. None of the Above

57. What is the purpose of the ejector on a hypochlorinator? SAC. WT-V1 Sec. 7.40
A. Discharges chlorine into the atmosphere
B. Draws in additional water for dilution of the hypochlorite solution
C. Regulates the chlorine dose
D. Provides an atmospheric break in the piping to prevent backflow
E. None of the Above

58. Which of the following is a safety device found on chlorine cylinders? SAC. WT-V1 Sec 7.421
A. Seat belt
B. Fusible plug
C. Fusible link
D. Tripod
E. None of the Above

59. Sodium Hypochlorite compounds have all of the following properties except? SAC. WT-V1 Sec 7.84
A. 2.5 times heavier than air
B. Non-flammable
C. Corrosive
D. May cause fires when in contact with organic material
E. None of the Above

60. What chemical may be added to water to reduce corrosivity? SAC. WT-V1 Sec. 8.40
A. Alum
B. Ferric chloride
C. Lime
D. None of the Above

61. Corrosive water may cause? SAC. WT-V1 Sec. 8.0
A. Red or dirty water
B. High levels of lead
C. Leaks in the distribution system
D. None of the Above

62. When a hypochlorinator is taken out of service, the most important and very first step should be ? SAC. WT-V1 Sec 7.440
A. Turn off the water supply pump
B. Make sure the solution tank level is adequate to prevent backflow
C. Unplug the unit
D. Call the Distribution Supervisor/Water Master
E. None of the Above

63. What type of fittings and gaskets should be used when making connections to chlorine containers? SAC. WT-V1 Sec 7.430
A. Fittings and gaskets supplied by the chlorine manufacturer
B. Standard plumbing fittings
C. System fittings
D. All of the above
E. None of the Above

64. When determining the chlorine use rate, the scales or meters should be read? SAC. WT-V1 Sec 7.450
A. At the same time every day
B. During the average flow
C. During high demands
D. At a different time, every other day
E. None of the Above

65. A major problem with air in aerobic water is when iron and manganese passes in solution. What will occur? SACWT-V1 Sec 3.18
A. Oxidation
B. Reduction
C. Biofouling
D. Precipitation
E. None of the above

66. What is the purpose of a sanitary survey? SAC. WT-V1 Sec 2.20
A. To identify possible biological and chemical pollutants which may affect a water supply
B. To measure the safe yield of a water supply
C. To identify the source of backflow
D. None of the Above

67. Which of the following condition may occur when filters are clogging? SAC. WT-V1 Sec 3.13
A. Reduction in chemicals
B. Increased corrosion in the system
C. Inability to meet demand
D. All of the above
E. None of the Above

68. Cascade systems and spray aerators may develop what types of maintenance problems? SAC. WT-V1 Sec 9.422
A. Clogging
B. Water Hammer
C. Biological growth
D. All of the above
E. None of the Above

69. What will the combination of moisture and potassium permanganate produce? SAC. WT-V1 Sec 9.433
A. A very corrosive environment
B. An explosive environment
C. A hostile environment
D. Greenhouse effect
E. None of the Above

70. What strong oxidant can be used to control taste and odor problems? SAC. WT-V1 Sec 9.432
A. Potassium permanganate
B. Alum
C. Sodium Chloride
D. Dihydrogen oxide
E. None of the Above

71. Which of the following chemicals removes tastes and odors by absorption only? SAC. WT-V1 Sec. 9.440
A. Chlorine
B. PAC
C. TOC
D. Ozone
E. None of the Above

72. Why is potassium permanganate used in water treatment? SAC. WT-V1 Sec. 9.432
A. Taste and odor control
B. pH adjustment
C. For favor
D. Corrosion control
E. None of the Above

73. Aeration can remove volatile substances from water. Increasing the aeration rate in such systems will? SAC. WT-V1 Sec. 9.420
A. Cause binding of the aeration system
B. Increase the removal of volatile compounds
C. Increase system efficiency at low temperatures
D. None of the above

74. A standard solution is a prepared chemical solution in which? SAC. WT-V1 Sec. 11.12
A. The exact chemical concentration is known
B. The pH is known
C. The alkalinity is known
D. The temperature and volume are known
E. None of the Above

75. What precautions are necessary when mixing dry polymer solutions? SAC. WT-V1 Sec. 4.632
A. A dust collector or closed system should be used to prevent dust from escaping
B. A cooling system is needed to prevent excessive heat build-up
C. Mixing should be done in a spark proof container to prevent fire
D. The polymer should be mixed slowly to prevent an explosion
E. None of the Above

76. Powered activated carbon is frequently used for taste and odor control because?
SAC. WT-V1 Sec. 9.441
A. It has no limitations on use
B. It is non-specific and removes a broad range of compounds
C. It readily mixes with water
D. It is a strong oxidant
E. None of the Above

77. What are the necessary emergency procedures in case of a large uncontrolled chlorine leak?
SAC. WT-V1 Sec 3.50
A. Notify the local emergency response team
B. Warn and evacuate people in adjacent areas
C. Be sure that no one enters the leak area without adequate self-contained breathing equipment
D. All of the above

78. The water temperature decreases from 70° F (21° C) to 40° F (4°C). To maintain good disinfection? SAC. WT-V1 Sec. 7.11
A. A shorter contact time is necessary
B. A longer contact time is necessary
C. A shorter filter run is necessary
D. Raise the temperature
E. None of the Above

79. Chlorine reacts with phenol which can cause? SAC. WT-V1 Sec. 7.25
A. A drop in water alkalinity
B. A strong medicinal odor
C. A color in the water
D. Incrustation in the distribution system
E. None of the Above

80. When making a new connection on a chlorine feed system, the gaskets should be? SAC. WT-V1 Sec. 7.430
A. Oiled
B. Dried
C. Inspected and knurled
D. Replaced
E. None of the Above

81. The best pH range for coagulation is? SAC. WT-V1 Sec. 4.22
A. Below a pH of 2
B. Between a pH of 5 and 7
C. Between a pH of 2 and 6
D. Above a pH of 9
E. None of the Above

82. Good coagulation and flocculation processes promote the removal of natural organic compounds from the water which also aids the treatment process by? SAC. WT-V1 Sec. 4.4
A. Increasing the water production capacity of the plant
B. Reducing the formation of THMs
C. Adding more dissolved gases to the water
D. All of the above
E. None of the Above

83. Large, light floc particles which are formed in the coagulation flocculation process are more likely to? SAC. WT-V1 Sec. 4.623
A. Remove color from the water
B. Settle quickly
C. Be subject to floc shearing
D. All of the above
E. None of the Above

84. _____ is undesirable and may result in shortened filter runs and loss of media during backwash. SAC. WT-V1 Sec. 6.82
A. Air binding
B. Dihydrogen oxide
C. Hypolimnion
D. Epilimnion
E. None of the Above

85. The _____ detention time recommended for flocculation ranges from about _____ minutes for direct filtration systems and up to 30 minutes for conventional filtration.
SAC. WT-V1 Sec. 4.320
A. Minimum, 5-20
B. Maximum, 60-90
C. Average 90-120
D. Minimum, 120-600
E. None of the Above

86. The two factors which determine whether or not a change in filter media size should be made are? SAC. WT-V1 Sec. 6.30
A. Time for turbidity breakthrough and maximum head loss
B. Type of coagulants and disinfectant used
C. Filter backwash rate and surface washing
D. None of the Above

87. If an increase in raw water turbidity and an increase in coagulation feed rate creates additional loading on the filter, which of the following operational changes may be helpful? SAC. WT-V1 Sec. 6.81
A. Increase the filtration rate
B. Backwash the filters more frequently
C. Increase the speed of the paddle rotation
D. “Bump” the filter in between backwash cycles
E. None of the Above

88. A detailed evaluation and inspection of a new water supply source should be made to identify and protect against sources of pollution. What would you call this type of evaluation? SAC. WT-V1 Sec. 2.20
A. A sanitary survey
B. A cross-connection survey
C. A pretreatment survey
D. A hydro-geological survey
E. None of the Above

89. If you exceed the “safe yield” what may happen? SAC. WT-V1 Sec. 2.141
A. Depletion of the aquifer
B. An OSHA violation
C. An Operator 1 may get a ticket
D. A watershed contour
E. All of the above

90. Organic chemicals such as pesticides may enter a surface water supply through? SAC. WT-V1 Sec. 2.131 Capillary discharges
A. Artesian pressure
B. Overflow from wells
C. Industrial discharges, agricultural drainage, and spills
D. All of the above
E. None of the Above

91. Acid rain is the result of? SAC. WT-V1 Sec. 2.0
A. Airborne pollutants
B. Runoff from abandoned mines
C. Fluorocarbon release
D. Ozone depletion
E. None of the Above

92. Under normal plant conditions the flow is 3.0 MGD and a one-minute fast mixing in the jar test is adequate. If the plant flow increases to 4.0 MGD, how long of fast mix is needed in the jar test? SAC. WT-V1-Sec. 4.623
A. Less than one minute is necessary
B. One minute is still adequate
C. More than one minute is necessary
D. The speed should be increased by one third
E. None of the Above

93. An organic chemical is causing taste and odor problems in the water distribution system. What might cause these problems? SAC. WT-V1 Sec 9.23
A. A backflow situation / a cross-connection
B. Backpressure and /or backsiphonage
C. All of the above
D. None of the Above

94. A very small percentage of chlorine in the air is most likely to? SAC WT-V1 Sec 7.80
A. Cause serve coughing
B. Be undetectable
C. Cause headaches and gout
D. Cause white smoke
E. None of the Above

95. The chlorine storage ventilation equipment should be checked? SAC. WT-V1 Sec. 7.450
A. Weekly
B. Before replacing or ordering new cylinders
C. Daily
D. On a logarithm
E. None of the Above

96. What would happen if a full chlorine cylinder is increased by a temperature of 50^{o}F or 30^{o}C? SAC. WT-V1 Sec. 7.220
A. The cylinder will rupture
B. Corrosion will occur
C. This is an increased fire hazard
D. All of the above
E. None of the Above

97. The effectiveness of disinfection may be determined by? SAC. WT -V1 Sec. 7.453
A. Lack of consumer complaints
B. Turbidity of finished water
C. Results of coliform testing
D. The thermocline
E. All of the above

98. The chlorine gas lines connected to the evaporator have been incorrectly connected to the liquid side of the liquid side of the chlorine container. When this happens the most likely result will be? SAC. WT-V1 Sec. 7.451
A. The chlorine flow will increase and the residual will double
B. The chlorine flow will be restricted and frost may appear on the valves
C. Nothing
D. None of the above

99. What should be the target value for the free chlorine residual in the distribution system? SAC. WT-V1 Sec. 7.453
A. There is no target value
B. 1.5 mg/L
C. 0.2 mg/L
D. 2.0 mg/L
E. None of the Above

100. Which of the following factors will influence the effectiveness of chlorination? SAC. WT-V1 Sec. 7.26
A. pH/Temperature
B. Chlorine dosage
C. All of the above
D. Logarithm
E. None of the above

101. What term is used to define very small, finely divided solid particles (they do not dissolve) that remain dispersed in a liquid for a long time due to their small size and electrical charge. When most of the particles have a negative electrical charge, they tend to repel each other. This repulsion prevents the particles from clumping together, becoming heavier, and settling out. SAC-V2-12.10
A. Insoluble Compounds
B. Colloidal Suspensions
C. Divalent
D. Dissolved Solids
E. None of the Above

102. The definition 'A compound that cannot be dissolved' describes which of the following terms? SAC-V2-12.10
A. Insoluble Compounds
B. Colloidal Suspensions
C. Divalent
D. Zeolite
E. None of the Above

103. Sand which looks like ordinary filter sand and is capable of softening water, removing iron and manganese and is a natural ion exchange material is called? SAC-V2-12.10
A. Zeolite sand
B. Greensand
C. Silica sand
D. White sand
E. None of the Above

104. Iron and manganese in water can be easily detected by observing the color of the inside walls of the filters and the filter media. If the raw water is pre-chlorinated, there will be a stain on the walls below the water level and the same color coating over the top portion of sand filter bed. The color of that stain and coating is? SAC-V2-12.10
A. White
B. Red
C. Brown
D. Yellow
E. Black

105. A "Consecutive public water system" means a public water system that obtains all of its water from?
A. Another public water system that is regulated by the Department.
B. Combined water systems
C. Grandfathered water system
D. Ground and surface water system
E. None of the Above

106. What term best represents a series of treatment processes, including coagulation and filtration but excluding sedimentation that results in substantial particulate removal?
A. Direct Filtration
B. Water Treatment Plant
C. Surface Water System
D. Conventional Filtration
E. None of the Above

107. What term best represents a technology, treatment technique, or other means which has been identified by the U.S. Environmental Protection Agency as being the best existing for removing or reducing the concentration of a contaminant in water. This process takes cost into consideration, and is examined for efficiency under field conditions and not solely under laboratory conditions?
A. Best Available Technology
B. Best Treatment Technique
C. Standard Methods
D. Water Treatment Plant
E. None of the above

108. Which of the following terms defines a 9-year calendar timeframe during which a public water system is required to monitor? Each cycle consists of 3 compliance periods.
A. 27-year Monitoring Cycle
B. Compliance Period
C. Compliance Cycle
D. Baseline Sampling
E. None of the above

109. What term is defined as the product of the absorbed quantity from ionizing radiation? This term takes into account such factors as the differences in biological effectiveness due to the type of radiation and its distribution in the body as specified by the International Commission on Radiological Units and Measurements?
A. Dose Equivalent
B. Gross beta particle activity
C. GC/MS
D. HPC
E. None of the Above

110. What term best represents a concentration of a corrosion inhibitor sufficient to form a protective film on the interior walls of a pipe?
A. Galvanic Protection
B. GAC
C. Effective Corrosion inhibitor residual
D. REM
E. None of the Above

111. When reviewing fluoride feeding system designs and specifications, which of the following should be evaluated? SAC-V2-13.41
A. The upstream sampling points.
B. Checks to ensure that all-piping material are not made of PVC or Stainless Steel.
C. Whether locations for monitoring readouts and dosage controls are convenient to the operation center and easy to read and correct.
D. All of the above
E. None of the Above

112. Which chemical from the following list can be used to raise the alkalinity of water? SAC-V2-14.22
A. Chlorine gas
B. Ferric Chloride
C. Carbon Dioxide
D. Soda Ash
E. Carbon Dioxide

113. Alkalinity is the capacity of water to neutralize acids. This capacity is caused by the water's content of carbonate, bicarbonate, hydroxide, and occasionally borate, silicate, and phosphate. Alkalinity is expressed in milligrams per liter of equivalent calcium carbonate. Alkalinity is not the same as pH because water does not have to be strongly basic to have a high alkalinity. Alkalinity is a measure of how much acid must be added to a liquid to lower the pH to? SAC-V2-14.22
A. 7
B. 10
C. 2
D. 4.5
E. None of the Above

114. If any routine or repeat sample for total coliform is positive, the water supplier shall have the total coliform-positive sample analyzed to determine whether fecal coliforms are present, except that the water supplier may test for E. coli instead of fecal coliforms. If fecal coliform or E. coli are present in a total coliform-positive sample, a water supplier shall report the positive results to the Department, by telephone or facsimile, as soon as possible but no later than ____ after receiving notice of the fecal coliform-positive or E. coli-positive test result.
A. 24 hours
B. 7 days
C. 10 days
D. 48 hours

115. What term describes a measurement in a laboratory at a concentration that is at or above the method detection limit?
A. NTU
B. Trigger Level
C. Detected
D. Action Level
E. None of the Above

116. The selection of a demineralization process for a particular application depends on several factors including? SAC-V2-16.1
A. Mineral concentrations in feedwater.
B. Product water quality desired.
C. Brine disposal facilities.
D. All of the above
E. None of the Above

Some questions may repeat for QA/QC purposes.

117. As our county's population continues to grow, so does our demand for more water resources. Traditionally, water supplies have been obtained from "fresh water" sources. This constantly increasing need for water has started to deplete the available fresh water supplies in some areas of the country. Faced with potential shortages, water planners must now consider new treatment technologies which until recently were not considered to be economically feasible. One type of water treatment process is freezing and distillation, this process is applied primarily to? SAC-V2-16.1
A. Seawater demineralization
B. TDS
C. Brackish waters
D. Groundwater
E. Surface water

118. Methods of removing minerals from water can be divided into two classes: 1) Those that use a phase change such as freezing or distillation, or 2) Non-phase change methods such as reverse osmosis, electrodialysis, and ion exchange. _____ has been used primarily to remove dissolved inorganic material (TDS) from industrial and wastewater, municipal water and wastewater, and seawater. However, some processes will also remove suspended material, organic material, bacteria, and viruses. SAC-V2-16.1
A. Demineralization
B. Ion Exchange
C. Softening
D. Acid treatment
E. None of the Above

119. This term is used to describe the rate of water flow through a semipermeable membrane. It is usually expressed in gallons per day, per square foot of membrane surface or in grams per second per square centimeter. SAC-V2-16.23
A. Flow
B. Volume
C. Decline
D. Flux
E. None of the above

120. Under ideal conditions, such as pure feedwater and no fouling of the membrane surface, there is still a(n) _____ in the water flux with time. SAC-V2-16.23
A. Decline
B. Increase
C. Constant level
D. Both B and C are correct
E. None of the Above

121. This term is used to describe a shallow, small-volume storage pond in which treatment process sludge is concentrated and stored for extended time periods. SAC-V2-17.60
A. Sand Drying beds
B. Supernatant
C. Centrifuges
D. Solar Drying beds or lagoons
E. None of the Above

122. Sludge has a unique characteristic about it, in that once it has even partially dried, it will not _____, therefore, layer after layer of wet sludge can be added over a period of time. SAC-V2-17.61
A. Expand
B. Emit an odor
C. Decrease
D. Bond
E. None of the Above

123. _____ power is generally found in lighting systems, small pump motors, various portable tools and throughout our homes. SAC-V2-18.113
A. Three phase
B. Single phase
C. Direct Current
D. Two phase
E. None of the Above

124. An alternating current circuit is one in which the voltage and current periodically change direction and _____. In other words, the current goes to zero to maximum strength, back to zero and to the same strength in the opposite direction. SAC-V2-18.113
A. Amplitude
B. Voltage
C. Hertz
D. Ohms
E. None of the Above

125. Calculate the Langelier Index for water with a calculated pH_s of 8.69 and an actual pH of 8.5? SAC-V1-A.137 EX. 40
A. +0.19
B. –0.19
C. 19
D. .19
E. None of the Above

126. A water treatment plant has five 150-pound cylinders in storage. The plant uses an average of 28 pounds of chlorine per day. How many days' supply of chlorine is in storage? SAC-V1-A.138 EX. 42
A. 24 days
B. 27 days
C. 21 days
D. None of the above
E. None of the Above

127. In determining a chlorine residual by the drop-dilution method, three drops of sample produced a chlorine residual of 0.2 mg/L in 10mL of distilled water. Assume 0.05 mL per drop. Calculate the actual chlorine residual in milligrams per liter. SAC-V1-A.139 EX. 45
A. 13 mg/L
B. 9 mg/L
C. 17 mg/L
D. None of the above

128. A sanitary survey requires detailed planning, a thorough system survey and reporting of the results. The planning portion involves a review of water quality records for compliance with applicable microbial, inorganic chemical, organic chemical and radiological contaminant MCLs as well as the records of compliance with the monitoring requirements for those contaminants. Sanitary surveys are conducted to identify possible health risks that may not be discovered by routine coliform sampling. The _____ requires community water systems serving fewer than 4,100 persons to complete an initial sanitary survey by June 1994 and to complete subsequent surveys every 5 years. SAC-V2-22.2200
A. Total Coliform Rule
B. CCR
C. BMP Rule
D. 41 CFR 1410.1200
E. None of the Above

129. Which of the following meters is most likely to include a totalizer? SAC-V2-19.313
A. pH Meter
B. Megger
C. Flow Meter
D. Randall or Secchi
E. None of the Above

130. Electrical probes may be used to sense water levels in tanks. One of the common problems associated with these probes is? SAC-V2-19.22
A. The probe may short out
B. The probe may become coated by calcium carbonate
C. A long detection response time
D. ORP factor
E. None of the Above

131. Which of the following methods of measuring flow is not subject to mechanical failure? SAC-V2-19.23
A. Displacement meter
B. Venturi meter
C. Magnetic meter
D. Rotameter
E. None of the Above

132. The period of time between the moment of change in a chlorinator control system and the moment when the change is sensed by the chlorine residual indicator is called? SAC-V2-19.03
A. The automatic lag time
B. The detection lag
C. The Detention Time
D. Probation period
E. None of the Above

133. If the concentration of iron and manganese is low (0.3 mg/L and 0.1 mg/L respectively) effective control may be achieved by? SAC-V2-12.21
A. Feeding copper sulfate
B. Feeding polyphosphate and chlorine
C. Feeding sulfuric acid and caustic soda
D. Adding hydrazine
E. None of the Above

134. Iron and manganese react with dissolved oxygen to form? SAC-V2-12.10
A. Divalent resins
B. Nonionic salts
C. Volatile esters
D. Insoluble compounds
E. None of the Above

135. Many of the instrumentation systems used in water treatment and in water treatment plants are combination systems referred to as Hybrid systems. Perhaps the most widely used method of automatic control for pumps, valves, chemical feeder, and other devices is known as _____. SAC-V1-10.32
A. Relay Logic
B. CRT
C. Pneumatic
D. Microwave
E. All of the above

136. Backwash recovery ponds or lagoons are used to separate the water from the solids after the filters have been backwashed. The water is usually returned or recycled to the plant headworks for treatment with the source water. These ponds may be used to concentrate or thicken sludge from sedimentation tanks. Sludge from the_____ process are usually stored in lagoons. The drainage water is removed and the sludge may be covered or hauled off to a disposal site or applied to agricultural lands to achieve the best soil pH for optimum crop yields. SAC-V2-17.3
A. Lime-soda softening
B. Reverse Osmosis
C. Distillation
D. Greensand Filtration
E. Ion Exchange

137. Iron bacteria in a water distribution system is undesirable because? SAC-V2-12.5
A. It will cause red water complaints and slime
B. It will cause yellow water complaints and slime
C. It will cause red water complements and slime
D. It will cause corrosion
E. None of the Above

138. Which of the following actions should be taken if media is being lost during the backwash cycle on a filter? SAC-V1-6.81
A. Discontinue surface cleaning during the backwash cycle
B. Backwash the filter more often
C. Cut back on filter backwash frequency by 25%
D. Adjust the backwash flow rate
E. None of the Above

139. A semi-permeable membrane may be used to demineralize water, however the flux going through the membrane will _____ over time due to compaction and fouling. SAC-V2-16.23
A. Increase
B. Decrease
C. Remain the same
D. None of the above

140. If your raw water has a TDS of 85mg/L, which of the following processes would be most economical and efficient for demineralization? SAC-V2-16.1
A. Ion Exchange
B. Freezing
C. Distillation
D. Electrodialysis
E. None of the Above

141. SCADA systems can be used to enhance energy conservation programs. For example, operators can develop energy management routines that allow for both maximum energy savings and maximum water storage prior to entering_____ periods. SAC-V2-23.940
A. Supply
B. On-Peak
C. Demand
D. Off-Peak
E. None of the above

Some questions may repeat for QA/QC purposes.

142. Which of the following processes can be used to remove minerals from the water? SAC-V2-16.1
A. Distillation, RO and freezing
B. Chelation, electrodialysis, and precipitation
C. Precipitation, distillation, and RO
D. Sterilization
E. None of the Above

143. A potable water line connected to a chemical feeder for feeding fluoride should be equipped with? SAC-V2-13.41
A. A bleed off valve
B. An overflow diverter
C. An air gap or pressure vacuum breaker
D. A fluoride SCADA binder
E. None of the Above

144. Which term best represents a backflow prevention assembly that contains an independently operated, internally loaded check valve; an internally operated air-inlet valve located on the discharge side of the check valve; tightly closing resilient seated shut-off valves on each end of the check valve assembly; and two properly located test cocks?
A. Pressure Vacuum Breaker
B. Double Check
C. Atmospheric Vacuum Breaker
D. Reduced pressure vacuum breaker
E. None of the Above

145. A SCADA system collects, stores, and analyzes information about all aspects of operation and maintenance. It can transmit an alarm signal when necessary, and allows fingertip control of alarms, equipment, and processes. SCADA provides the information that operators need to solve minor problems before they become major incidents. As the nerve center of a water utility, the system allows operators to enhance the efficiency of their water facility by keeping them fully informed and fully in control. What does the SCADA term RTU represent? SAC-V2-23.940
A. Remote Terminal Units
B. Radio Telemetry Units
C. Remote Telephone Units
D. Robotic Telemetry Units
E. None of the Above

146. A polyelectrolyte with a positive charge commonly used in water treatment as a primary coagulant or coagulant aid is called? SAC-V1-4.21
A. A cationic polymer
B. A Metallic salt
C. An anionic polymer
D. A nonionic polymer
E. None of the Above

147. What would happen if the temperature of a full chlorine cylinder were increased by 50^{o}F or 30^{o}C? SAC-V1-7.220
A. Corrosion will occur
B. This is an increased fire hazard
C. The cylinder will rupture
D. All of the above
E. None of the Above

148. The effectiveness of a disinfection process can best be determined by? SAC-V1-7.453
A. The lack of consumer complaints
B. The results of coliform testing
C. Turbidity of the finished water
D. The amount of free chlorine available
E. None of the Above

149. The chlorine gas line connected to the evaporator has been incorrectly connected to the liquid side of the chlorine container. What is the most likely result when this occurs? SAC-V1-7.451
A. The chlorine flow will be restricted and frost may appear on the valves
B. The chlorine flow will increase and the residual will double
C. Nothing
D. None of the above

150. What is the suggested target value for the free chlorine residual in the distribution system? SAC-V1-7.453
A. There is no target value
B. 1.5 mg/L
C. 2.0 mg/L
D. 0.2 mg/L
E. None of the Above

151. One of the hazards associated with the use of polymers in water treatment plants is that? SAC-V1-4.632
A. Polymers may cause disease and create low oxygen conditions
B. Polymers are explosive when mixed with water
C. Polymer gas is can be lethal when inhaled
D. Polymers are very slippery and hard to remove from floors
E. None of the Above

152. Which of the following are important factors in the design of a flocculator? SAC-V1-4.32
A. pH and water clarity
B. Filter capacity and type of coagulant
C. Raw water turbidity and basin shape
D. Detention time and proper stirring intensity
E. None of the above

153. A water treatment plant is feeding both alum and a cationic polymer. The lab has set up a jar test to test both coagulants. Which is the best testing sequence for the jar tests? SAC-V1-4.623
A. In the first test, keep both the polymer and the alum the same; in the next test sequence, vary the alum dose but keep the polymer dose the same.
B. In the first test, vary the polymer dose but keep the alum the same; in the next test sequence, keep the alum dose and the polymer dose the same.
C. In the first test, vary the polymer dose but keep the alum the same; in the next test sequence, vary the alum dose but keep the polymer dose the same.
D. None of the above

154. In the Galvanic Series, the base metals listed at the top are more reactive. Which of the following would be near the top of the Galvanic Series? SAC-V1-8.11
A. Magnesium
B. Silver
C. Sodium
D. Lithium
E. None of the Above

155. The use of cathodic protection systems stops natural corrosion by? SAC-V1-8.341
A. Coating the system
B. Removing the Tubers
C. Supplying an electrical current to overcome the corrosion-producing action
D. Plating the binding compounds
E. None of the Above

156. Which of the following should be done as a precaution to protect against corrosion? SAC-V1-8.450
A. Paint the steel anode
B. Paint the copper cathode
C. Paint the anode and cathode
D. Paint the Di-electric union
E. None of the Above

157. The Langelier Index is used as a measure of? SAC-V1-8.322
A. Alkalinity
B. Corrosivity
C. Turbidity
D. Marble
E. None of the Above

158. Corrosion damage may be measured by using coupons. These coupons are usually placed where? SAC-V1-8.30
A. In the raw water intakes
B. Inside the water mains
C. In the flash mixer
D. On the exterior of Pressure Reducing Valves
E. None of the Above

159. Corrosion occurs only when which of the following reactions take place? SAC-V1-8.10
A. An electrical and chemical reaction
B. A phase change and ionic reaction
C. Within positive and negative magnetic fields
D. All of the above
E. None of the Above

160. Plant tours for school children should be conducted by? SAC-V2-23.27
A. The teacher or student aide
B. The plant manager or supervisor
C. An employee who understands the plant operation and can answer questions
D. The designing engineer
E. None of the Above

161. Water rates should recover the cost of service that includes? SAC-V2-23.01
A. Treatment and distribution costs
B. Annual treatment costs
C. Compliance and regulatory costs
D. Installation, treatment, and distribution costs
E. None of the Above

162. Multistage centrifugal pumps can discharge high-pressure water. The pressure increases with the number of stages but what happens to the capacity/ flow of the pump? AWWA Chap. 12 P. 360
A. The flow will remain the same through each stage
B. The flow is decreased by 25% for each stage
C. The flow will double with each stage
D. The flow is cut in half

163. Your supervisor has requested that you develop a public relations campaign. What should you do first? SAC-V2-23.20
A. Design a map of the plant and brochure describing the treatment system
B. Call the press and set up an interview
C. Run a series of newspaper articles about non-compliance issues
D. Hand out bottled water to each customer
E. None of the Above

164. Which of the following would be an effective use of a bulletin board located in the plant? SAC-V2-23.21
A. To post plant communications and recognize jobs well done
B. To post absentee reports
C. To post items for sale and recent gossip
D. To post missing tools and uncover budget deficits
E. None of the Above

165. Which of the following is not a procedure used to dewater sludge? SAC-V2-Table 17.1
A. Floating Headers
B. Solar drying beds
C. Centrifuges
D. Filter Presses
E. Belt Presses

166. One of the hardest tasks for a new supervisor is? SAC-V2-23.10
A. Learning to delegate duties to co-workers
B. Gaining acceptance from management
C. Gaining confidence of co-workers
D. None of the Above

167. When you take a customer call and find that you must transfer the call to someone else, what should you do? SAC-V2-23.25
A. Ask the customer to repeat the problem
B. Ask them to remember your name and telephone number
C. Explain why you must transfer the call
D. Tell the customer you need to put them on hold
E. None of the Above

168. Chlorine gas is? SAC-V1-7.80
A. Undetectable
B. Able to cause shingles and toothaches
C. 2.5 times heavier than air
D. 2.5 times lighter than air
E. None of the Above

169. Why would a pump engineer design a system that would use multiple pumps for a parallel operation? AWWA Appendix D Page 552
A. To provide for a fluctuating demand
B. To provide an increased discharge head
C. To reduce the friction coefficient on a larger pump for greater efficiency
D. All of the above
E. None of the Above

Some questions may repeat for QA/QC purposes.

170. When the superintendent is inspecting the plans for a new ground water storage tank, the superintendent should pay attention to the inlet and outlet of this tank. What design factor should be noted? SAC.-V1 Sec. 3.43
A. The inlet and outlet should be on opposite sides of the tank
B. The inlet must be twice the size of the outlet
C. The outlet must be twice the size of the inlet
D. The outlet and inlet should be on the top
E. None of the Above

171. The location of the water treatment plant and the methods used to ultimately dispose of the process wastes will dictate the monitoring and reporting requirements. State or local health or pollution control agencies may establish these reporting requirements. The goal of monitoring and reporting volumes for sludge's or brines, percent solids, and other measurements are to ensure that? SAC-V2-Sec. 17.11
A. There are negative results from coliform testing
B. The plant is not creating an adverse environmental impact
C. There has been no serious recycling problems
D. The sludge dilution problem has been remedied
E. None of the Above

172. Monitoring of filter effluent turbidity on a continuous basis with an on-line_____ is highly recommended. This will provide you with continuous feedback on the performance of the filtration process. In most instances, it is desirable to cut off filter operation at a predetermined effluent turbidity level. SAC-V1-6.71
A. Turbidimeter
B. Chlorine residual analyzer
C. Spectrophotometer
D. ORP
E. None of the Above

173. Coliform bacteria can sometimes grow in distribution systems although the water delivered is acceptable and there is no obvious contamination. What term is used in the industry to describe this occurrence? SAC-V2 Sec. 4.502
A. Incubation
B. Biofouling or after growth
C. Spontaneous biogeneration
D. Spontaneous combustion
E. None of the above

174. Some aquatic microorganisms produce odor causing substances that are only released when the microorganism dies, this may cause? SAC-V1-9.110
A. Greater odor problems in the finished water than compared to the raw water
B. An increase in sludge
C. The pH to lower
D. The pH to raise
E. None of the Above

175. Liquid chemical storage tanks require special construction considerations which include? SAC-V2-18.40
A. A berm or earth bank to contain spills
B. A single drainage pit
C. The weight of displacement
D. A connection to the headworks
E. None of the Above

176. The liquid layer that forms above the sludge in a settling lagoon is called? SAC-V2-17.60
A. The permeate
B. The supernatant
C. Product water
D. None of the above

177. Which of the following chemicals can be used as an alternate disinfectant? SAC-V2-15.53
A. Ozone
B. Chlorine Dioxide
C. Chloramine
D. All of the above
E. None of the Above

178. Lines in the distribution system should be flushed on a regular basis. When is the best time and recommended system pressure to perform regular flushing? SAC-V2-12.5
A. Done at night and the water pressure in the system must be at least 50 psi
B. Done at night and the water pressure in the system must be at least 20 psi
C. Done in the afternoon and the water pressure in the system must be at least 20 psi
D. Done at mid-morning and the water pressure in the system must be at least 50 psi
E. None of the Above

179. A fine silica material composed of the skeletal remains of sea creatures is called? SAC-V1-6.2
A. Spirogyra
B. Diatomaceous earth or DE
C. Algae
D. Bone meal
E. None of the above

180. At a pH of greater than 8.3, most of the alkalinity will exist in the form of what ion? SAC-V2-14.22
A. CO_2
B. OH
C. CO_3
D. HCO_3
E. None of the Above

181. Identify the following type of water treatment filtration method: This is the same as conventional, except that sedimentation is not included. This category includes inline filtration. Generally, higher quality water is needed for this filtration technology than for traditional treatment. SAC-V1-6.111
A. Slow sand
B. Direct
C. Conventional
D. None of the above

182. When testing for coliform bacteria, the glassware should be? SAC-V1-11.3 Lesson 4
A. Boric
B. Sterilized
C. Made from special laboratory glass
D. Recyclable
E. None of the Above

183. When working with acids or solvents that produce dangerous fumes, the most suitable protection is? SAC-V1-11.1623
A. An impervious hood
B. A port ventilated shield
C. An air feed hood
D. A vented mask SCATA

184. How should the sample be collected when an analysis for coliform bacteria is performed? SAC-V1-11.220
A. A grab sample
B. A composite sample
C. Collected automatically
D. Either a grab or a composite sample
E. None of the Above

185. Water samples collected at intervals during the day and then are combined are called? SAC-V1-11.221
A. Composite samples
B. Grab samples
C. Deep samples
D. HPC samples
E. None of the Above

186. Which of the following steps must be performed when preparing M-Endo broth to be used in the membrane filter test for total coliform? SAC-V1-11.3 Lesson 4
A. The media must be heated to a boiling point
B. The media shall be autoclaved
C. The media should be frozen if not used in 24 hours
D. The media should be stored at room temperature
E. None of the Above

187. How is the standardization of a solution determined in the lab? SAC-V1-11.12 Lesson 2
A. Using a standard curve
B. Titration
C. Litmus test strips
D. All of the above
E. None of the Above

188. The method that is the standard of comparison in determining chlorine residual is? SAC-V1-11.3 Lesson 2
A. Amperometric titration
B. DPD colormetric
C. DPD titration
D. Taste test
E. None of the Above

189. In _____ control systems, each filter effluent control valve is connected to a flowmeter. As the filter run continues and the media begins to clog, the control valve slowly opens to maintain a constant flow of water through the filter. A master controller is required to monitor the overall plant flow and adjust the flow rate of each filter accordingly. SAC-V1-6.3
A. Rate-of-flow
B. Self-backwashing
C. Declining Rate
D. Split Flow
E. Reverse

190. The application rate for Powdered Activated Carbon (PAC) is determined by? SAC-V1-9.4412
A. The alkalinity of the raw water
B. The pH and alkalinity in the raw water
C. The dissolved oxygen level and contact time
D. Jar tests and threshold odor number testing
E. None of the above

191. Where is the best location for the addition of PAC? SAC-V1-9.441
A. Flash Mixer
B. Final Filter
C. Raw water intake
D. Sedimentation basin
E. None of the Above

192. The reducer which connects the pipe to the pump intake should be? SAC-V2-18.211
A. Eccentric
B. Concentric
C. Brass
D. Stainless Steel
E. None of the Above

193. A voltage meter is a very useful tool in electrical maintenance and may be used to test for? SAC-V2-18.120
A. Insulation on a meter or motor
B. Amperage
C. Blown fuses
D. All of the above
E. None of the Above

194. Testing records indicate that a motor has been tested for several years with a Megger. The tests indicate lower values than expected, but they have remained stable and consistent. What should be done with the motor? SAC-V2-18.122
A. Nothing, but the testing should be continued
B. The motor should be rewound
C. The motor should be reinsulated
D. The motor should be removed from service
E. None of the Above

195. If you have a single phase 240 VAC system, how many power leads should be coming into the panel? SAC-V2-18.113
A. 1 at 240 volts, and 1 neutral
B. 3 at 60 volts each
C. 2 at 120 volts each, and 1 neutral
D. None of the above

196. How can you reduce the starting load from a pump? SAC-V2-18.211
A. Throttle down the discharge valve on the pump
B. Throttle down the suction valve on the pump
C. Increase the total suction lift
D. Increase the dynamic head and throttle the foot valve
E. None of the Above

197. When two pumps of the same size are installed, why should they be operated alternately? SAC-V2-18.231 Par. 1
A. To provide an equal service record for pump replacement
B. To minimize power costs on start-up
C. To equalize wear and distribute lubricant in bearings
D. To prevent backflow into the system
E. None of the Above

198. Air compressors generate heat during compression which causes? SAC-V2-18.25
A. A reduction in efficiency
B. Oil lubricants to break down quickly and require frequent replacement
C. An increase in power consumption
D. A decrease in the effective volume of the compressor
E. None of the Above

199. The Maximum Contaminant Level established for the use of fluoride in drinking water is? SAC-V2-22.219
A. 2.0 mg/L
B. 0.4 mg/L
C. 4.0 mg/L
D. 1.0 mg/L
E. None of the Above

200. Why has the Environmental Protection Agency established a Maximum Contaminant Level for turbidity? SAC-V2-22.2313
A. Turbidity causes cloudiness
B. IOCs reduction
C. Turbidity interferes with disinfection
D. Turbidity causes color
E. Turbidity will settle in the distribution system

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