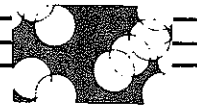


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# Water Treatment Class I



1. When collecting a distribution-system sample for bacteriological testing, the person collecting the sample should allow the water to run \_\_\_\_\_ before filling the sample bottle.
  - a. as long as necessary to permit clearing of the service line
  - b. 1 h
  - c. 30 min
  - d. only a few seconds
  
2. The volume of a cylinder with a radius of 5 ft and a height of 8 ft is \_\_\_\_\_  $\text{ft}^3$ .
  - a. 251
  - b. 328
  - c. 451
  - d. 628
  
3. The volume of a 100-ft-diameter tank that is 12-ft deep is \_\_\_\_\_  $\text{ft}^3$ .
  - a. 94,200
  - b. 98,600
  - c. 103,300
  - d. 285,200
  
4. A chemical commonly used to raise pH is
  - a. alum.
  - b. calgon.
  - c. chlorine.
  - d. lime.
  
5. Black stains on plumbing fixtures might be attributable to
  - a. calcium.
  - b. copper.
  - c. magnesium.
  - d. manganese.

6. One kilogram equals \_\_\_\_\_ grams.
  - a. 10
  - b. 100
  - c. 1000
  - d. 10,000
  
7. The indicator organisms used to determine contamination of drinking water are
  - a. coliform group.
  - b. *Giardia lamblia*.
  - c. iron bacteria.
  - d. salmonella.
  
8. The packing around the shaft of a centrifugal pump should be
  - a. in good condition indefinitely.
  - b. kept as tight as possible.
  - c. replaced once a month.
  - d. tightened just enough to allow an occasional drop of liquid to escape.
  
9. The chemical symbol for iron is
  - a. Al.
  - b. Ca.
  - c. Fe.
  - d. Ir.
  
10. One pound per square inch of pressure will raise water \_\_\_\_\_ ft.
  - a. 2.31
  - b. 10.5
  - c. 62.5
  - d. 1728
  
11. Static head is defined as the
  - a. energy of motion of the water.
  - b. pressure due to depth or elevation of the water.
  - c. pressure loss in the line due to friction.
  - d. all of the above.
  
12. What is the volume of a settling tank 100-ft long, 25-ft wide, and 8-ft deep?
  - a. 16,000 ft<sup>3</sup>
  - b. 20,000 ft<sup>3</sup>
  - c. 25,000 ft<sup>3</sup>
  - d. 36,200 ft<sup>3</sup>

13. What is used to detect chlorine leaks?
- 10 percent solution of aluminum sulfate
  - 10 percent solution of ammonia hydroxide
  - 10 percent solution of calcium hydroxide
  - 10 percent solution of sodium hydroxide
14. The pressure gauge reading at the base of a tank filled to a depth of 1 ft is \_\_\_\_\_ psi.
- 144
  - 62.4
  - 0.433
  - 0.231
15. The multiple-tube fermentation test consists of three distinct tests. These tests, in the order performed, are the
- preliminary, confirmed, and completed tests.
  - preliminary, presumptive, and confirmed tests.
  - presumptive, confirmed, and completed tests.
  - presumptive, preliminary, and completed tests.
16. Chlorine gas is
- the same weight by volume as air.
  - lighter than air.
  - lighter than air only when under pressure.
  - denser than air.
17. Polyphosphates may be used in water treatment to retard corrosion and
- adjust pH.
  - calcium scale.
  - reduce chlorine demand.
  - reduce taste and odors.
18. Calcium hypochlorite is formulated as a
- coagulant.
  - gas.
  - liquid.
  - powder.
19. Chlorine leaks in metal containers tend to
- become larger.
  - become smaller.
  - remain the same size.
  - seal themselves.

20. Determining the pH of water is one of the important tests of water quality. The results of the pH test indicate the
- chlorine residual.
  - hydrogen ion activity.
  - presence of coliform organisms.
  - presence of iron.
21. Leakage from a packing gland should be approximately
- none.
  - one drop per second.
  - one drop per minute.
  - 30 drops per hour.
22. A chlorine cylinder valve is thought to be leaking. If ammonia vapor is passed near the valve, the presence of a leak would be indicated by
- a loud noise.
  - red vapor.
  - a rotten egg odor.
  - white smoke.
23. If a fire hydrant requires a nozzle pressure of 100 psi, what head of water must be used to supply it?
- 231 ft
  - 63.3 ft
  - 32.1 ft
  - 21 ft
24. A water main should be disinfected
- when the pipe is in the storage yard.
  - after the pipe is delivered to the job site.
  - after the pipe is laid in place.
  - at the manufacturer's plant.
25. Carbon dioxide in water will
- decrease turbidity.
  - increase turbidity.
  - lower pH.
  - raise pH.
26. A pneumatic ejector lifts water from low points to higher levels. The device used to achieve this is a(n)
- air compressor.
  - axial-flow pump.
  - centrifugal pump.
  - plunger-type pump.

27. Pressure is commonly measured in
- British thermal units.
  - million gallons per day.
  - milligrams per litre.
  - pounds per square inch.
28. Mechanical seals are being installed in pumps because
- packing requires an undesirable leakage that seals eliminate.
  - seals prevent cross connections with potable water.
  - seals will take more shaft misalignment than packing.
  - there is a shortage of good packings available on the market.
29. Which one of the following items must be replaced when connecting a new chlorine cylinder?
- air and water regulator
  - fiber washer
  - needle valve and seat
  - pressure regulator
30. A major cause of pump and motor shaft coupling wear is a
- discharge pressure too high.
  - low suction pressure.
  - misalignment between pumps and motor flanges.
  - worn-out seal.
31. Filters in a water treatment process are primarily for removing or reducing
- calcium and magnesium sulfates.
  - color.
  - tastes and odors.
  - turbidity.
32. A water treatment plant receives an average flow of 261 gpm. What is the daily total flow to the plant?
- 0.32 mgd
  - 0.38 mgd
  - 0.48 mgd
  - 1.4 mgd
33. The free chlorine residual in water is the amount of
- chlorine applied as measured in milligrams per litre.
  - chlorine in raw water as it comes from the stream, reservoir, or well.
  - chlorides in the water.
  - uncombined chlorine that remains in the water after the chlorine has been applied and allowed to react.

34. The chemical name for muriatic acid is
- a. sulfuric acid.
  - b. phosphoric acid.
  - c. hydrochloric acid.
  - d. carbonic acid.
35. A chlorine residual in water can be determined by using the reagent
- a. diethyl-p-phenylenediamine (DPD).
  - b. ethylenediaminetetraacetic acid (EDTA).
  - c. polychlorinated biphenols (PCB).
  - d. sodium thiosulfate ( $\text{Na}_2\text{S}_2\text{O}_3$ ).
36. The most important use of chlorine in water treatment is as a(n)
- a. aid to coagulation.
  - b. algicide.
  - c. disinfectant.
  - d. oxidant for iron and manganese.
37. What is the approximate volume in gallons occupied by 15,000  $\text{ft}^3$  of water?
- a. 22,100 gal
  - b. 112,200 gal
  - c. 120,000 gal
  - d. 210,000 gal
38. The difference between the amount of chlorine added to water and the amount of residual chlorine remaining at the end of a specified contact period is
- a. the dosage.
  - b. free available chlorine.
  - c. chlorine residual.
  - d. chlorine demand.
39. Water that requires a large amount of soap to produce an acceptable lather is termed
- a. corrosive.
  - b. hard.
  - c. soft.
  - d. turbid.

40. A pump may be damaged if it is started with the discharge valve closed, if the pump is a(n)
- turbine pump.
  - positive-displacement pump.
  - centrifugal pump.
  - axial-flow pump.
41. Prepared water sample bottles used for collecting samples for bacteriological examination contain sodium thiosulfate crystals. It is important not to rinse out the sample bottle because the sodium thiosulfate
- eliminates the need for refrigerating the sample.
  - holds the pH at a constant value.
  - kills any pathogens that may be present in the sample.
  - neutralizes any chlorine present in the sample.
42. Velocity of flow in water mains is usually expressed in terms of
- feet per second.
  - gallons per minute.
  - litres per foot.
  - milligrams per litre.
43. A pH reading of 6.0 in raw water indicates the sample is
- acid.
  - alkaline.
  - basic.
  - neutral.
44. The temperature of water in a stream is  $10^{\circ}\text{C}$ . What is the equivalent temperature in degrees Fahrenheit?
- $82^{\circ}\text{F}$ .
  - $56^{\circ}\text{F}$ .
  - $50^{\circ}\text{F}$ .
  - $42^{\circ}\text{F}$ .
45. A grab sample represents
- the quality of the water at the time the sample was taken.
  - approximately 2 L of water.
  - a time-proportional sample.
  - a flow-proportional sample.

- 46. The pH scale runs from
  - a. 0-14.
  - b. 0-7.
  - c. 7-14.
  - d. 1-15.
- 47. Five gallons of water weigh \_\_\_\_\_ lb.
  - a. 8.34
  - b. 37.5
  - c. 41.7
  - d. 83.4
- 48. What is the approximate weight, in pounds, of 50,000 gal of water?
  - a. 41,000 lb.
  - b. 71,000 lb.
  - c. 170,000 lb.
  - d. 417,000 lb.
- 49. The flow is 35,000 gpd. This is \_\_\_\_\_ mgd.
  - a. 0.35
  - b. 0.035
  - c. 0.0035
  - d. 0.00035
- 50. The most important factor affecting the useful life of piping is
  - a. the ability of the materials used to resist internal and external corrosion.
  - b. the depth of the pipe.
  - c. the flexibility of the pipe.
  - d. the smoothness of the inside of the pipe.
- 51. A pH value of 7.0 is considered to be
  - a. acidic.
  - b. alkaline.
  - c. basic.
  - d. neutral.
- 52. The discharge-pressure gauge on a pump reads 15 psi. This is equivalent to \_\_\_\_\_ ft of head.
  - a. 5
  - b. 10
  - c. 25
  - d. 35



53. Chlorine is very corrosive when combined with
- alum.
  - carbon.
  - fluoride.
  - moisture.
54. What is the surface area of a clarifier 40 ft in diameter?
- 422 ft<sup>2</sup>
  - 630 ft<sup>2</sup>
  - 1120 ft<sup>2</sup>
  - 1256 ft<sup>2</sup>
55. Chloramines are formed by the addition of chlorine and
- ammonia.
  - liquid nitrogen.
  - soda ash.
  - sodium fluoride.
56. The purpose of a rotameter is to
- create a vacuum.
  - maintain a smooth fluid flow.
  - meter the flow of fluid.
  - reduce pressure.
57. A valve that joins a customer's service to the water main is called the
- bypass valve.
  - control flume.
  - corporation cock.
  - pressure-regulating valve.
58. When compared to a 1-mil gal reservoir at the same water elevation, how much pressure in the mains will a 100,000-gal reservoir develop?
- exactly one tenth as much pressure
  - less pressure
  - more pressure
  - the same pressure
59. What information must be on a warning tag attached to a switch that has been locked out?
- directions for removing tag
  - name of nearest physician to call in case of an emergency
  - signature of person who locked out switch and who is the only person authorized to remove tag
  - time to unlock switch

60. Which one of the following types of meters has no moving parts?
- a. propeller
  - b. proportional
  - c. rotameter
  - d. Venturi
61. The component of a centrifugal pump that is sometimes installed on the end of the suction pipe to hold the priming is known as a
- a. casing.
  - b. drain.
  - c. foot valve.
  - d. ventilator.
62. Coagulation and sedimentation alone cannot remove all of the turbidity and suspended matter in raw water. The final step in the removal of suspended matter in water is
- a. chlorination.
  - b. filtration.
  - c. flocculation.
  - d. sterilization.
63. Water weighs \_\_\_\_\_ lb/gal.
- a. 7.5
  - b. 8.34
  - c. 17.1
  - d. 62.4
64. The chemical symbol for sodium is
- a. Si.
  - b. S.
  - c. Na.
  - d. K.
65. The purpose for fluoridating municipal water supplies is to
- a. disinfect the water.
  - b. help improve the taste of the water.
  - c. help prevent dental decay.
  - d. remove iron.
66. Pressure is usually measured in
- a. cubic feet per second.
  - b. foot pounds.
  - c. gallons per minute.
  - d. pounds per square inch.

67. Chlorine valves are opened and closed with
- any suitable wrench or pliers.
  - a pipe wrench and wooden mallet.
  - valve wrenches provided with a cylinder or 1-ton container by the manufacturer.
  - wrenches made of a special, nonsparking alloy as a safety precaution.
68. What is the weight of a cubic foot of water?
- 1.55 lb
  - 8.34 lb
  - 7.48 lb
  - 62.4 lb
69. When opening and closing valves in high-pressure lines, the valves should be opened
- and closed as rapidly as possible.
  - and closed slowly.
  - rapidly and closed slowly.
  - slowly and closed rapidly.
70. A hypochlorinator is used to feed \_\_\_\_\_ into a water supply.
- hypochlorite solution
  - chlorine gas
  - chloramines
  - all of the above
71. One cubic foot of water contains \_\_\_\_\_ gal.
- 1.55
  - 7.5
  - 8.34
  - 62.4
72. One of the purposes of water storage tanks is to
- decrease the oxygen content.
  - improve the taste.
  - increase the carbon dioxide content.
  - supply water at peak demands.
73. Mud, silt, clay, and other suspended matter in water that cause it to appear murky are called
- cloudiness.
  - hardness.
  - turbidity.
  - turbulence.

74. If the pressure gauge at the bottom of a 200-ft standpipe reads 68 psi, what is the static head in feet?
- a. 86 ft
  - b. 143 ft
  - c. 157 ft
  - d. 200 ft
75. The volume of a sample should depend on
- a. what tests the sample will be used for.
  - b. the type of water being sampled.
  - c. the size of the container.
  - d. how many samples are needed.
76. A pump needs new packing
- a. if no more packing will fit into the stuffing box.
  - b. if there is any leakage from the packing gland.
  - c. when no more packing can be added.
  - d. when the gland follower is pulled all the way down.
77. Sodium hypochlorite is a
- a. compound that can be purchased in liquid solution and can be used for disinfection.
  - b. dry neutralizing powder for chlorine burns.
  - c. gas delivered in 100-lb, 150-lb, and 1-ton cylinders.
  - d. salt that is formed when hydrochloric acid is neutralized by sodium hydroxide.
78. Gas chlorinators, when operated at a high rate of withdrawal from the chlorine cylinder, can result in
- a. an explosion.
  - b. ice formation on the chlorine cylinder.
  - c. no effect.
  - d. overheating of the gas cylinder.
79. When a single water sample is reported as safe, this may be interpreted to mean
- a. that the water supply is adequately protected.
  - b. that the water supply may be regarded as safe until additional samples are requested by the city health officer.
  - c. that the water supply was safe at the sampling point at the time of the sampling.
  - d. none of the above.

80. In loading or unloading 150-lb chlorine cylinders, hand trucks should be used that are equipped with
- a retaining or safety chain.
  - a sling.
  - positive traction wheels.
  - safety features approved by OSHA regulations.
81. The letters or units "gpm" appearing on a flow-rate indicator in a pumping station means
- gallons per man.
  - gallons per man-hour.
  - gallons per mile of sewer line.
  - gallons per minute.
82. The amount of dissolved oxygen that can remain in water depends primarily on
- water temperature.
  - sunlight.
  - pH.
  - other constituents.
83. A flow of  $1.55 \text{ ft}^3/\text{s}$  is \_\_\_\_\_ gpm.
- 150
  - 384
  - 569
  - 696
84. What is the chlorine demand if the residual is 0.6 mg/L and 6.6 mg/L has been applied?
- 1.1 mg/L
  - 4.0 mg/L
  - 6.0 mg/L
  - 7.2 mg/L
85. The most effective pH range for iron and manganese removal is
- 6 or less.
  - 7.
  - 8 to 9.
  - not applicable to these constituents.
86. How many gallons per minute is a flow of 1.0 mgd?
- 521 gpm
  - 681 gpm
  - 695 gpm
  - 813 gpm

87. Disease-producing organisms are commonly called
- inorganics.
  - microbiota.
  - pathogens.
  - protozoa.
88. One pound per square inch pressure will support a column of water that is \_\_\_\_\_ ft high.
- 1.55
  - 2.31
  - 7.48
  - 8.34
89. Vent openings on reservoirs and clearwells should be
- chlorinated frequently.
  - provided with an overlapping cover.
  - sealed during winter.
  - screened.
90. You are chlorinating a well supply and the chlorine demand jumps from 0.9 mg/L to 3.0 mg/L. This is indicative of
- weak chlorine.
  - pollution.
  - more water being pumped.
  - all of the above.

# ANSWERS

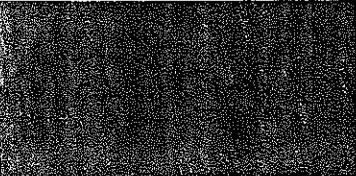


## Water Treatment Class I

- 1. a
- 2. d
- 3. a
- 4. d
- 5. d
- 6. c
- 7. a
- 8. d
- 9. c
- 10. a
- 11. b
- 12. b
- 13. b
- 14. c
- 15. c
- 16. d
- 17. b
- 18. d

- 19. a
- 20. b
- 21. b
- 22. d
- 23. a
- 24. c
- 25. c
- 26. a
- 27. d
- 28. a
- 29. b
- 30. c
- 31. d
- 32. b
- 33. d
- 34. c
- 35. a
- 36. c

- 37. b
- 38. d
- 39. b
- 40. b
- 41. d
- 42. a
- 43. a
- 44. c
- 45. a
- 46. a
- 47. c
- 48. d
- 49. b
- 50. a
- 51. d
- 52. d
- 53. d
- 54. d



- 55. a
- 56. c
- 57. c
- 58. d
- 59. c
- 60. d
- 61. c
- 62. b
- 63. b
- 64. c
- 65. c
- 66. d

- 67. c
- 68. d
- 69. b
- 70. a
- 71. b
- 72. d
- 73. c
- 74. c
- 75. a
- 76. d
- 77. a
- 78. b

- 79. c
- 80. a
- 81. d
- 82. a
- 83. d
- 84. c
- 85. c
- 86. c
- 87. c
- 88. b
- 89. d
- 90. b

