

Surface Water Treatment Practice Quiz

1. Your license renews _____.
 - a) before January 1
 - b) after July 30 in even numbered years
 - c) after October 1 in odd numbered years
 - d) before June 30 in even numbered years

2. Your water treatment plant uses 39.6 lbs. of cationic polymer to treat a flow of 2.71 MGD. What is the polymer dosage?
 - a) 0.07 ppm
 - b) 1.75 ppm
 - c) 14.61 ppm
 - d) 3.23 ppm

3. A physical link between a potable water supply and one of unknown or questionable quality is _____.
 - a) a cross connection
 - b) a Tier 1 violation
 - c) a Boil Water Advisory
 - d) a backflow prevention assembly

4. The purpose of stabilization is _____.
 - a) to prevent floc from rising in the basin
 - b) to prevent sludge from entering the filters
 - c) to prevent corrosion or excessive scale from entering the distribution system
 - d) to prevent excessive turbidity at the top of the filters

5. BARF is an acronym for _____.
 - a) Boil Advisory Reference Form
 - b) Bacteriological Analysis Report Forms
 - c) Biological Activity Reactive Format
 - d) vomit

6. Core sampling is a viable way to check the condition of your _____.
 - a) raw water
 - b) coagulation process
 - c) finished water
 - d) filters

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7. The best cross connection device is _____.
a) air gap
b) double check
c) atmospheric vacuum breaker
d) barometric loop
8. A Class II water treatment operator needs _____ hours of continuing education to renew her/his license.
a) 6
b) 12
c) 18
d) 24
9. _____ are used to cause particles to become destabilized and begin to clump together.
a) coagulant aids
b) nonsettable solids
c) zeta particles
d) primary coagulants
10. The hydrologic cycle relates to _____.
a) the treatment processes
b) an old Harley
c) movement of water in the environment
d) the moons pull on tidewaters
11. Surface waters are more difficult to clean up or remediate than groundwater.
a) true
b) false
12. Figure the weir overflow rate if your flow is 3.1 cuft/sec and the diameter of the weir is 28 ft..
a) 1391.28 gpm/ft of weir
b) 15.8 gpm/ft of weir
c) .035 gpm/ft of weir
d) 296 gpm/ft of weir

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13. _____ has been implicated in more waterborne disease outbreaks than any other factor.
- a) improper treatment
 - b) main breaks
 - c) improper or inadequate flushing
 - d) backflow
14. Your treatment facility uses 97 lbs of chlorine a day to disinfect the 4 MGD you treat. Those 97 lbs results in a chlorine concentration of 2.9 ppm. When checking the furthest area of your system you discover that the residual is .6 ppm chlorine. What is your demand?
- a) 3.5 mg/l
 - b) 1.7 ppm
 - c) 2.3 ppm
 - d) 3.5 ppm
15. The basin in Wahootchie's water plant measure 60 feet long by 40 feet wide by 8 feet deep. The flow through this plant is 4.1 cuft/sec. What is the detention time?
- a) 1 hour 18 minutes
 - b) 144 minutes
 - c) 449 minutes
 - d) 2 hours 24 minutes
16. This device is approved to protect against backflow and backsiphonage in high hazard applications.
- a) double check valve assembly
 - b) vacuum pressure breaker
 - c) a hose bib
 - d) reduced pressure zone assembly
17. One method of determining if your finished water has the likelihood to be corrosive is _____.
- a) Van der Waals formula
 - b) Zeta potential
 - c) Langeliers Saturation Index
 - d) Hydrological Cycles

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18. The filters in the treatment plant are 40 feet by 20 feet by 7 feet deep. The flow is 1500 gpm. What is the filtration rate?

- a) .26 gpm/sq ft
- b) 1.9 gpm/sq ft
- c) 2.6 gpm/sq ft
- d) 3.7 gpm/sq ft

19. In water treatment, a Class I system is determined to be different than a Class III system by _____.

- a) population served
- b) number of service connections
- c) amount of water treated a day
- d) amount of water in storage facilities

20. A sanitary survey is used to determine _____.

- a) source water characteristics and effectiveness of treatment
- b) the hygienic and operational aspects of the plant
- c) compliance with the SDWA and other EPA mandates
- d) whether the CCR is complete and accurate

21. In solid contact units, the three main operational fundamentals are _____

- a) sedimentation, slurry, & suspended solids
- b) mixing, clarifying, & filtration
- c) chemical dosage, recirculation rate, & sludge control
- d) weighing agents, alkalinity & pac

22. Particle counters can be used in place of _____ in the treatment process to obtain better control.

- a) flash mixers
- b) variable drives
- c) filter coring
- d) turbidimeters

23. In their soluble or reduced state, iron and manganese are _____.

- a) alkalinity enhancers
- b) colorless
- c) negatively charged
- d) won't dissolve in water

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24. _____ corrosion is the corrosivity of dissimilar metals.
- a) saline
 - b) hydroxyl
 - c) excessive
 - d) galvanic
25. The two types of backflow are _____.
- a) backsiphonage and backpressure
 - b) backpressure and cavitation
 - c) air gap and rpz
 - d) dynamic and backsiphonage
26. 25 MGD is equivalent to _____.
- a) 1122 gpm and 1560 cu/ft of water
 - b) 36000 gpm and 187 cuft/sec
 - c) 17362 gpm and 38.75 cuft/sec
 - d) 15600 gpm and 466.7 cuft/sec
27. When chlorine is used as a disinfectant in water there reaches a point when the amount of chlorine added is reflected identically with the amount of free residual measured on your DPD _____.
- a) chloramination
 - b) breakpoint
 - c) ozone
 - d) liftoff
28. pH, by definition is _____.
- a) the ability of particles to stick together
 - b) the ability to cause color to turn insoluble
 - c) causes a water molecule to bring in a third hydrogen atom
 - d) the hydrogen ion concentration in water
29. Which of these does NOT have a primary MCL?
- a) nitrate
 - b) fluoride
 - c) manganese
 - d) copper

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30. During the coagulation/flocculation process, particulate impurities can be divided into two classifications.

- a) primary coagulants and coagulant aids
- b) settleable and nonsettleable solids
- c) hydraulic and mechanical
- d) paddlewheel and walking beam

31. You have noticed cracks appearing in your coagulation basin. If the basin is 20 feet wide and 60 feet long and the water is 12 feet deep how many gallons will need to be pumped out of this basin so work can begin?

- a) 107712 gallons
- b) 9600 gallons
- c) 14400 gallons
- d) 211384 gallons

32. MCLG is an acronym for

- a) Most Common Lucky Guess
- b) Minimum Colloidal Level Goals
- c) Maximum Chlorine Level Gallons
- d) Maximum Contaminant Level Goals

33. _____ polymers are positively charged.

- a) nonionic
- b) anionic
- c) cationic
- d) platonic

34. Water is flowing through a completely filled 10 inch line at 4 cuft/sec. What is the velocity?

- a) .4 fps
- b) 7.3 fps
- c) 2.5 fps
- d) 4.0 cuft/sec

35. Generally, the more uniform the media, the _____ the rate of headloss.

- a) slower
- b) same
- c) smaller
- d) larger

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36. The flow through a water plant is 5.25 MGD. Jar tests have indicated that the desired dosage of lime is 150 mg/l. What would the correct lime feeder setting per day and per minute?
- a) 3294.0 lbs a day/ 2.29 lbs a minute
 - b) 6567.8 lbs a day/ 4.56 lbs a minute
 - c) 4930.9 lbs a day/ 3.42 lbs a minute
 - d) 6587.8 lbs a day/ 274.5 lbs a minute
37. The maximum filtration rate allowable in Kentucky, without special permission, for dual and mixed media filters is _____.
- a) 2 gal/min/sq ft
 - b) 5 gal/min/sq ft
 - c) there is no maximum
 - d) 9 gal/min/sq ft
38. Water is moving through a 22 inch pipe at a velocity of 3.5 fps. What is the flow?
- a) 6.77 cuft/sec
 - b) .15 cuft/sec
 - c) 4.6 fps
 - d) 9.2 cuft/sec
39. In conventional rectangular sedimentation basins, 50 % of the sludge should settle out in the _____ of the basin.
- a) first third
 - b) last half
 - c) very beginning
 - d) tail end
40. The treatment facility treats 100,000 cuft of water a day and operates for 18 hours a day. How much water do they treat a day expressed in MGD?
- a) .75 MGD
 - b) 1.80 MGD
 - c) 2.92 MGD
 - d) 5.75 MGD
41. The Langeliers Saturation Index provides an indication of _____.
- a) the solubility of iron and manganese
 - b) the pH necessary to settle out color
 - c) the rate at which particles will settle
 - d) the likelihood that your source water is corrosive

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42. The most common operational complaint received by a water operator is _____.
a) water rates are too high
b) taste and odor
c) your uniforms aren't stylish enough
d) improper treatment techniques
43. The Van der Waals principle refers to _____.
a) oppositely charged particles attract
b) the settling rate of suspended solids
c) the benefits of early oxidation of raw water
d) the backwash rates of multi media filters
44. Coupon testing is a viable indicator of _____.
a) treatment optimization
b) the speed at which macrofloc is formed
c) the corrosive or scale forming tendencies of your water
d) the super saturation level of dissolved oxygen in your water
45. The time necessary to perform the coagulation, flocculation, and settling processes in treatment are correctly listed in what order, starting with coagulation?
a) days, weeks, months
b) hours, minutes, seconds
c) weeks, months, years
d) seconds, minutes, hours
46. Overdosing of potassium permanganate will likely cause _____.
a) an extremely high pH
b) pink water
c) taste and odor
d) inadequate settling
47. Which of the following is most likely to be used as a primary coagulant?
a) brine
b) ammonious hydroxide
c) ferric sulfate
d) sodium thiosulfate

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48. Desirable media characteristics include _____.
a) permeability
b) solubility in water
c) full of impurities
d) hard and durable
49. The two types of removal mechanisms for gravity filters are _____.
a) redundant and repetitive
b) mechanical and adsorption
c) coagulation and flocculation
d) regeneration and renewal
50. The LT2ESWTR has decreed that we test our source water for the presence of _____.
a) algae
b) pharmaceuticals
c) cryptosporidium
d) nitrate
51. Heterotrophic Plate Counts measure _____.
a) all pathogens in the sample
b) all bacteria in the sample
c) all giardia lamblia in the sample
d) percent of sludge in the sample
52. Combined filter effluent must be less than _____ NTU in 95% of all measurements (collected every four hours) for each month.
a) 1.0 NTU
b) 2.0 NTU
c) 3.0 NTU
d) 0.3 NTU
53. Total Coliform samples have a _____ hold time.
a) 12 hour
b) 24 hour
c) 30 hour
d) 36 hour

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54. Extremely soft water can cause problems with pipes and fittings because it is _____.
a) corrosive
b) scale forming
c) full of suspended solids
d) toxic
55. Fluoride is added to water to _____.
a) create a nuisance
b) aid in the development of teeth and bones
c) so there is something that has both a primary and secondary MCL
d) aid in the protective coating of pipes
56. An atmospheric vacuum breaker backflow prevention device protects against _____.
a) backflow
b) backsiphonage and backpressure
c) neither
d) backsiphonage
57. The best pH level for coagulation usually falls in the range of _____.
a) 4-6
b) 5-7
c) 7-9
d) 1-3
58. Which, surface water or groundwater, usually contain a higher level of pathogens?
a) surface water
b) groundwater
c) both are equal
d) neither
59. High nitrate levels in the water can cause _____.
a) rickets
b) cholera
c) blue baby syndrome
d) dysentery

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60. 35 degrees Celsius is equivalent to _____ degrees Fahrenheit.
- a) 0
 - b) 95
 - c) 1.6
 - d) 55
61. The mixing of coagulant chemicals and raw water is called _____.
- a) flocculation
 - b) aeration
 - c) reverse osmosis
 - d) flash mixing
62. Sedimentation basins have _____ zones.
- a) five
 - b) four
 - c) three
 - d) two
63. The flow of a 48 inch pipe is 8590 gpm. What is the velocity?
- a) 3.05 fps
 - b) 4.77 fps
 - c) 1.52 fps
 - d) 2.33 fps
64. Chlorine gas is _____ times _____ than air.
- a) 2.5, lighter
 - b) 4.5, heavier
 - c) 3.5, lighter
 - d) 2.5, heavier
65. An approved air gap separation must be _____.
- a) 12 inches or 3 times the diameter whichever is greater
 - b) $2\frac{1}{2}$ times the inside diameter or a minimum of 1 inch
 - c) $.785 \times D' \times D'$
 - d) a barometric loop
66. Cathodic protection refers to _____.
- a) personal protective equipment
 - b) thermal electric protection
 - c) corrosion
 - d) filtration

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67. The two main substances that cause water hardness are _____.
a) benzene and cadmium
b) manganese and calcium
c) calcium and copper
d) magnesium and calcium
68. If you get a positive coliform sample what must be done?
a) retake the original sample
b) retake the original sample plus one sample within five upstream service connections and one sample within five downstream service connections.
c) retake the original sample, one from the water plant, and one from any service connection close to the original sample site.
d) since no fecal coliform was detected, no more sampling needs to take place.
69. When backwashing filters, bed expansion should be between _____ percent.
a) 15 – 30 %
b) 10 – 20 %
c) 20 – 40 %
d) 30 – 50%
70. The electronic flow meter reads 137,892, 900 gallons at 8:00 AM on Monday and 146, 007, 227 gallons at 8:00 AM on Tuesday. According to the scales 122 lbs of chlorine was fed during that 24 hr period. Free chlorine readings entering the clearwell read 0.8 mg/l. What was the approximate chlorine demand of the raw water that day?
a) 2.6 mg/l
b) 1.0 mg/l
c) 3.2 mg/l
d) 4.1 mg/l
71. If the chlorine demand in the Podunk Water District was 1.2 ppm and the chlorine residual was 0.4 ppm what would the chlorine dosage be?
a) 0.8 ppm
b) 1.6 ppm
c) 2.0 ppm
d) 2.5 ppm

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72. How many lbs. of HTH (65%) are required to treat 7 MG of water and satisfy a 2.8 ppm demand as well as a 0.6 ppm residual?

- a) 198.5 lbs.
- b) 251.9 lbs
- c) 288.7 lbs.
- d) 305.4 lbs.

73. A jumbled mass or collection of floc, solids, and filter media that could grow into a larger mass and reduce filter efficiency is _____.

- a) turbidity mass
- b) tuberculation
- c) a mudball
- d) a media crack

74. Calculate the weir overflow rate if the flow is 2.3 cuft/sec and the radius of the weir is 29 feet.

- a) 5.67 gpm/ft of weir
- b) 8.50 gpm/ft of weir
- c) 11.34 gpm/ft of weir
- d) 17.01 gpm/ft of weir

75. The two main softening methods used by treatment facilities are _____.

- a) reverse osmosis and oxidation
- b) distillation and disinfection
- c) ultraviolet radiation and electrodialysis
- d) ion-exchange and lime-soda ash

76. The effective way to combat taste and odor problems is _____.

- a) aeration and tube settlers
- b) settling out by particle counting
- c) prevent them from occurring
- d) coagulation and flocculation

77. If a filter exceeds _____ NTU at any time the system must arrange for the State to conduct a Comprehensive Performance Evaluation within thirty days.

- a) 2.0 NTU
- b) 3.0 NTU
- c) 5.0 NTU
- d) 10.0 NTU

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78. Which disinfection method provides a residual safeguard?

- a) ozonation
- b) chlorination
- c) membrane filtration
- d) ultraviolet radiation

79. Turbidity is used as a process control measurement because _____.

- a) everyone has a turbidimeter around
- b) the results are foolproof
- c) the number of pathogens increase as turbidity increases
- d) turbidity removal is an extremely easy task

80. Patula's water plant treated their daily output of 4.5 MGD with 150 lbs of gaseous chlorine. What is their dosage at Patula's plant?

- a) 2.5 ppm
- b) 3.0 ppm
- c) 4.5 ppm
- d) 4.0 ppm

81. Solids contact units (clarifiers) generally demand a higher level of operator knowledge and skill than conventional treatment techniques and processes. .

- a) true
- b) false

82. Monkeys Eyebrow's treatment facility treats 9.5 MGD through the use of six (6) filters, each measuring 20 ft wide by 20 ft long. What is their filtration rate?

- a) 16.50 gpm/sqft
- b) 1.77 gpm/sqft
- c) 2.75 gpm/sqft
- d) 4.76 gpm/q/ft

83. Sources of taste and odor issues include _____.

- a) raw water
- b) distribution systems
- c) consumer plumbing
- d) all of the above

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84. Most water treatment facilities will run more effectively if _____.
a) the mayor lends a hand
b) it runs 24 hrs a day
c) it runs 12 hrs on and 12 hrs off
d) it runs 16 hours a day
85. Kentucky's filtration rate guidelines differ from the national guidelines, with the national guidelines being 3-8 gpm/sq ft. What does Kentucky's regs say in this regard?
a) 2-10 gpm/sqft
b) 3-15 gpm/sqft
c) 3-5 gpm/sqft
d) Kentucky has no guidelines
86. All systems in Kentucky must carry at least _____ ppm chlorine residual everywhere in their system.
a) 0.2
b) 2.0
c) 4.0
d) there is no minimum
87. Which is the most effective disinfectant when chlorine is added to water?
a) hydrogen ion
b) calcium dioxide
c) hypochlorous acid
d) haloacetic acid
88. Hard water can cause problems. Which of these is **NOT** a problem caused by hard water?
a) scale formation in pipes
b) toxic substances occurring because of corrosion
c) white scale on laundry fixtures, sinks, cooking utensil, etc.
d) buildup on water heater heating elements
89. Filtration actually _____ particulates.
a) destroys
b) stores
c) dissolves
d) suspends

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90. If a filter measures 20 feet by 30 feet by 7 foot deep and the flow is 3.5 cuft/sec, what is the backwash rate?

- a) 1.1 gpm/sqft
- b) 3.3 gpm/sqft
- c) 2.6 gpm/sqft
- d) 1.7 gpm/sqft

91. Double check valve backflow prevention assemblies are approved for high hazard applications.

- a) true
- b) false

92. Algae has a profound effect on our surface waters. During the day algae _____ and at night it _____.

- a) produces carbon dioxide, produces oxygen
- b) secretes sludge, produces toxins
- c) produces oxygen, produces carbon dioxide
- d) sleeps soundly, parties hardy

93. Water is moving through a 10 inch pipe at a rate of 4.2 feet per second. What is the flow?

- a) 3.51 cuft/sec
- b) 7.72 cuft/sec
- c) 5.61 cuft/sec
- d) 2.28 cuft/sec

94. Iron and manganese removal can be accomplished by _____.

- a) oxidation with chlorine followed by filtration
- b) oxidation by aeration followed by filtration
- c) oxidation by potassium permanganate followed by filtration
- d) all of the above

95. When chlorine reacts with organics in the water it has the tendency to produce _____.

- a) chloramines
- b) trihalomethanes and haloacetic acids
- c) macrofloc
- d) apparent color

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96. Short circuiting refers to _____.
a) pumps running backwards which stops treatment
b) a movie made in the 80's
c) inadequate voltage applied water treated by electrodialysis
d) uneven flows which result in decreased treatment efficiency
97. _____ is a concentrated accumulation of chemicals and contaminants and pollutants that we attempt to remove from raw water.
a) pathogens
b) sludge
c) coagulants
d) fluoride
98. The minimum number of bacteriological samples that any system can submit a month is _____.
a) 2
b) 5 % of residential services
c) 6
d) 1 for every 10,000 people served
99. In order to disinfect a sedimentation basin measuring 20 ft in width, 60 feet in length, and is 10 feet deep to obtain 50 ppm would require how many lbs. of 65% available HTH?
a) 5.0 lbs
b) 41.3 lbs
c) 37.4 lbs
d) 57.6 lbs
100. The primary duty of a water treatment operator is to _____.
a) protect the public health
b) perform assigned duties
c) obey the mayor or water board
d) get promoted as often as possible

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|-------|-------|--------|
| 1. d | 35. a | 68. b |
| 2. b | 36. b | 69. a |
| 3. a | 37. b | 70. b |
| 4. c | 38. d | 71. b |
| 5. b | 39. a | 72. d |
| 6. d | 40. a | 73. c |
| 7. a | 41. d | 74. a |
| 8. b | 42. b | 75. d |
| 9. d | 43. a | 76. c |
| 10. c | 44. c | 77. a |
| 11. b | 45. d | 78. b |
| 12. b | 46. b | 79. c |
| 13. d | 47. c | 80. d |
| 14. c | 48. d | 81. a |
| 15. a | 49. b | 82. c |
| 16. d | 50. c | 83. d |
| 17. c | 51. b | 84. b |
| 18. b | 52. d | 85. c |
| 19. c | 53. c | 86. a |
| 20. a | 54. a | 87. c |
| 21. c | 55. b | 88. b |
| 22. d | 56. d | 89. b |
| 23. b | 57. b | 90. c |
| 24. d | 58. a | 91. b |
| 25. a | 59. c | 92. c |
| 26. c | 60. b | 93. d |
| 27. b | 61. d | 94. d |
| 28. d | 62. b | 95. b |
| 29. c | 63. c | 96. d |
| 30. b | 64. d | 97. b |
| 31. a | 65. b | 98. a |
| 32. d | 66. c | 99. d |
| 33. c | 67. d | 100. a |
| 34. b | | |