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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.

Please use Answer key, one answer per question, there are no intentional trick questions.

1. What is the most common measuring device found at the headworks of a wastewater treatment plant? SAC-WW-V1 sec. 3.4
A. MAG meter
B. Parshall flume
C. Venturi meter
D. Weir
E. None of the Above

2. Two good flow-measuring devices that are used in pipelines of treated or untreated wastewater is the _____ and _____? SAC-WW-V1 sec. 3.4
A. Parshall flume, weir
B. Venturi meter, Magnetic meter
C. Flow tube, rotameter
D. Velocity gauge, fluorescent dye
E. None of the Above

3. In most treatment plants using the activated sludge process, the sedimentation and flotation unit found immediately after the biological treatment basin is commonly called the: SAC-WW-V1 sec. 5.0
A. Grit chamber
B. Secondary clarifier
C. Dissolved Air Flotation (DAF) unit
D. Primary clarifier
E. None of the Above

4. Wearing shoes is the name usually given to a flat metal plate attached to the end of a wooden flight. Which structure would these shoes be found in? SAC-WW-V1 sec. 5.10 Topic PM
A. Grit chamber
B. Aeration tank
C. Mechanical bar screen
D. Circular clarifier
E. None of the Above

5. Which of the following **would not** be an abnormal condition for the performance of a clarifier? SAC-WW-V1 sec. 5.14
A. Sludge blankets
B. Toxic waste
C. Storm flows and hydraulic overloads
D. Septicity from collection system problems
E. None of the Above

6. Which sampling method is preferred to calculate the efficiency of a wastewater treatment process? SAC-WW-V1-sec. 5.22
A. Composite samples
B. Grab samples
C. DO samples
D. Temperature
E. None of the Above

7. When determining a clarifier's efficiency, you compare the wastewater rate of flow to the design flow, this would be called the _____ of the clarifier. SAC-WW-V1 sec. 5.23
A. Hydraulic loading
B. Shock loading
C. Total dynamic flow
D. Normal operating condition
E. None of the Above

8. Trickling filters provide a media with a large surface area which biological growth develops. This slime growth is sometimes called: SAC-WW-V1 sec. 6.01
A. Sludge mass
B. Cholera film
C. Zoogleal film
D. Activated film
E. None of the Above

9. Which statement best describes the purpose of the outlet orifice of a trickling filter? SAC-WW-V1 sec. 6.01
A. Controls flow to filter media
B. Provides a large surface area for slim growth
C. Drains distributor arm and controls filter flies along filter retaining wall
D. Regulates speed of distributor arm
F. None of the Above

10. What term best represents an aerobic process in which bacteria change the ammonia and organic nitrogen in wastewater into oxidized nitrogen. SAC-WW-V1 sec. 7.0
A. Biodegradable
B. Anaerobic digestion
C. Nitrification
D. None of the above

11. Why would solar heat be used for a RBC unit? SAC-WW-V1 sec. 7.121
A. Solar power is used to keep cost down
B. Solar power increases the DO levels
C. When temperatures are below 55°F, the sun warms the room without drying the bugs out
D. All of the above
E. None of the Above

12. Organisms that grow in a thread form commonly cause sludge bulking in the activated sludge process. These bugs are called: SAC-WW-V1 sec. 8.02
A. Facultative bacteria
B. Biological slough
C. Agglomeration
D. Filamentous bacteria

13. _____ is caused when storm sewers and ground water flow out of the sewer lines.
SAC-WW-V1 sec. 3.10
A. Infiltration
B. Allocation
C. Subsidence
D. Exfiltration
E. None of the Above

14. The principle purpose of wastewater pretreatment is:
SAC-WW-V1 sec. 3.3
A. The removal of coarse material from the wastewater
B. The reduction of organic material from the wastewater
C. The reduction of suspended solids from the wastewater
D. The reduction of energy usage in wastewater plants
E. None of the Above

15. A non-automated bar screen is typically cleaned by: SAC-WW-V1 sec. 3.31
A. High pressure hose
B. Fluctuations in the daily flow
C. Hand raking
D. Use of a hand grinder
E. None of the Above

16. Where are wastewater pretreatment components typically located?
SAC-WW-V1 sec. 3.4
A. In the collection system
B. Immediately before tertiary treatment
C. After primary treatment
D. At the plants headwork
E. None of the Above

17. Grit is removed from wastewater early in the treatment process to:
SAC-WW-V1 sec. 3.33
A. Protect pumps and other equipment
B. Prevent synergistic affects in the plant
C. Trap inorganic solvents before the biological treatment
D. Facilitate the suspension of organic materials
E. None of the Above

18. Which type of treatment removes the colloidal solids that appear in wastewater?
SAC-WW-V1 sec. 3.2
A. Biological treatment
B. Physical treatment
C. Sedimentation
D. Clarifier skimming devices
E. None of the Above

Some questions may repeat for QA/QC purposes.
19. Process control samples used to determine the efficiency of treatment in the primary clarifier should be: SAC-WW-V1 sec. 5.22
A. Grab samples of the effluent from the clarifier
B. Grab samples of the influent and effluent from the clarifier
C. Composite samples of the clarifier effluent
D. Composite samples of the clarifier influent and effluent
E. None of the Above

20. Which problem could be caused by pumping too long or too often from a primary clarifier:
SAC-WW-V1 sec. 5.3
A. Thin sludge will be going to digester which causes it to perform poorly
B. Short circuiting which results in excess solids loss over the weirs
C. Hydraulic overloading of the sludge pumps
D. Sludge blanket in the secondary clarifier will start bulking
E. None of the Above

21. When the primary clarifier is operating properly, which of the following will happen?
SAC-WW-V1 sec. 5.23
A. The pH will drop or lower through the clarifier
B. The pH will rise through the clarifier
C. The BOD and TSS will be raised through the clarifier
D. The BOD and TSS will be lowered through the clarifier
E. None of the Above

22. A rectangular clarifier has been empty for a period of time. Before starting the skimming mechanism, the operator should: SAC-WW-V1 sec. 5.10
A. Lift each flight off the rail to make sure not rusted and apply proper lubricate
B. Tighten the chain links as tight as possible
C. Start the motor and skimmer under a no load situation
D. Make sure the clarifier is full of water to prevent skimmer damage
E. None of the Above

23. What is the purpose of an effluent weir? SAC-WW-V1 sec. Table 5.2
A. To prevent algae accumulation
B. To ensure an equal flow, while accounting for small water surface elevations
C. To direct flow through the scum channel
D. Transports the wastewater to the clarifier
E. None of the Above

24. What is the purpose of the scum pipe? SAC-WW-V1 sec. Table 5.2
A. Allows the collected scum to flow from the skimmer box to the scum tank or a pump
B. Scrapes sludge before withdrawal
C. Removes the settled scum from the bottom of the clarifier
D. Receives the scum from the skimming arm
E. None of the Above

25. A good indication that the sludge is not being removed from the primary clarifier often enough is: SAC-WW-V1 sec. 5.3
A. The sludge blanket is low
B. Sludge rising to the top of the clarifier
C. Pump discharge has excess water
D. Scum collection box becomes full

26. The purpose of a scum baffle in a rectangular primary settling basin is to:
SAC-WW-V1 sec. Table 5.1
A. Deflect the wind across the basin
B. Prevent the floating materials from reaching the effluent trough
C. Hold the side walls of the tank at a fixed distance
D. Maintain proper water levels in the basin
E. None of the Above

27. A rectangular primary settling basin has many moving components. Which of the following is the name given to a piece of iron attached close to the outer ends of the scraper? SAC-WW-V1 sec. Table 5.1
A. Wearing shoes
B. Angle track
C. Scraper shoes
D. Low sludge blanket
E. None of the Above

28. Which step could be taken to improve clarifier effluent quality when excessive storm flow infiltration is a frequent problem? SAC-WW-V1 sec. 5.14
A. Seal sanitary sewers and/or use an equalization basin
B. Add aeration
C. Pre-chlorinate the influent
D. Slow re-circulation
E. None of the Above

29. Which of the following statements best explains the relationship between a primary and secondary clarifier? SAC-WW-V1 sec. 5.0
A. Primary clarifiers do not have surface skimmers
B. Sludge remains in the primary clarifier for months while secondary clarifiers only hours
C. The operations and components are basically the same
D. The shape of the clarifiers must be different
E. None of the Above

30. If the sludge depth in a clarifier is too old, what will happen?
SAC-WW-V1 sec. 5.23
A. Turbidity will decrease in the effluent
B. Sludge may become septic
C. SS from aeration tank will decrease
D. Return activated sludge will have high oxygen demand
E. None of the Above

31. The underdrain system of a trickling filter supports: SAC-WW-V1 sec. 6.01
A. Distributor arm
B. Media and ventilation
C. Center well
D. Underdrain channel
E. None of the Above

32. What is the main purpose of re-circulation in a trickling filter process?
SAC-WW-V1 sec. 6.02
A. To increase influent TSS concentration
B. To increase the contact time of the BOD and microorganisms
C. To prevent the leakage of water from the shaft seal
D. To increase the filtering period of the wastewater
E. None of the Above

33. Standard-rate trickling filter growth usually sloughs off at which intervals:
SAC-WW-V1 sec. 6.11
A. Summer and winter
B. Spring and fall
C. Morning and night
D. None of the above

34. The trickling filter process is experiencing a minor ponding problem on parts of the surface media. Which of the following corrective actions should be tried to ensure the quality of the effluent is not drastically changed? SAC-WW-V1 sec. 6.410
A. Chlorinate the surface with a 50 mg/L dosage
B. Force a high volume of air through the underdrain system
C. Spray a masking agent over the surface to help with odors
D. Spray the surface with a high pressure water stream
E. None of the Above

35. Chlorine may be used to control filter flies in trickling filters. What chlorine residual is recommended for filter fly control? SAC-WW-V1 sec. 6.412
A. 1 mg/L
B. 200 mg/L
C. 0.1 mg/L
D. 500 mg/L
E. None of the Above

36. Corrective measures should be taken immediately if foul odors develop in a trickling filter. Which of the following is **not** a guideline for preventing odors?
SAC-WW-V1 sec. 6.02
A. Decrease the recirculation rate to allow more oxygen to reach the bed
B. Examine ventilation facilities (such as the draft tube) in the filter
C. Maintain aerobic conditions in the collection system and primary treatment units
D. Discharge a commercially available odorant into the air by blowers
E. None of the Above

37. Biological Contactors use stages to maximize the effectiveness of a given amount of media surface. What is the benefit of this design? SAC-WW-V1 sec. 7.0
A. As BOD decreases, nitrification starts
B. Increases the TSS and increases nitrification
C. Handles lower BOD
D. None of the above

38. In a rotating biological contactor, what controls flow from one stage to the next stage or from one bay to the next bay? SAC-WW-V1 sec. Table 7.1
A. Rotating media
B. Drive assembly
C. Underdrains
D. Orifice or weir located in the baffle
E. None of the Above

39. What rotates the media in an air-driven rotating biological contactor (RBC) ?
SAC-WW-V1 figure 7.8
A. Air pressure
B. Air cups
C. Air velocity
D. Diffuser head setting
E. None of the Above

40. Which of the following samples are *not* suggested for monitoring rotating biological contactor treatment? SAC-WW-V1 sec. 7.121
A. NTU
B. BOD
C. DO
D. pH
E. None of the Above

41. Considering the layout and flow diagram for the complete treatment plant, most oxidation ditch plants would be most similar to which of the following: SAC-WW-V1 sec 8.300
A. Completely mixed activated sludge
B. Extended aeration
C. Conventional activated sludge
D. Contact stabilization
E. None of the Above

42. Settled activated sludge is generally_____ than raw sludge.
SAC-WW-V1 sec. 8.02
A. Thinner
B. Thicker
C. Denser
D. No different
E. None of the Above

43. Control of sludge wasting requires a certain concentration of food/microorganisms' ratio. Which of the following measurements are needed to determine F/M?
SAC-WW-V1 sec. 8.01
A. SS detention time
B. VSS in the return sludge
C. BOD
D. pH
E. None of the Above

44. The operator is taking a settling test on a package activated sludge plant and notices that the sludge settles in 15 minutes and rises to the surface in 30 minutes. This indicates:
SAC-WW-V1 sec. 8.26
A. Dissolved oxygen levels are too high
B. Solids levels in the aeration tank are to slow
C. Coliform levels are too high in the aeration tank
D. The plant is in good operation
E. None of the Above

45. An activated sludge package plant is designed without sludge wasting facilities. Which procedure could be used if it is necessary for the plant to waste excess sludge?
SAC-WW-V1 sec. 8.24
A. Pump from the settled sludge in the clarifier to a sand drying bed
B. Pump excess solids to the receiving stream
C. Allow the sludge to billow over the clarifier weirs during sampling
D. Chlorinate the effluent heavily during periods of bulking or billowing
E. None of the Above

46. What is the standard DO level needed during start-up of activated sludge in an oxidation ditch? SAC-WW-V1 sec. 8.321
A. At least 2.0 mg/L
B. >.1 to <.5 mg/L
C. >.5 to <1.0 mg/L
D. <.1 mg/L
E. None of the Above

47. Which of the following is true about extended aeration plants? WW-V1 sec. 8.201
A. They have high organic loading rates
B. They produce no sludge
C. They do not produce as much waste sludge as other processes
D. They have shortened aeration detention time
E. None of the Above

48. Controlled discharge ponds are facultative ponds with long detention times, typically, periods of discharge are: SAC-WW-V1 sec. 9.2
A. Spring and summer
B. Spring and fall
C. Fall and summer
D. Summer and winter
E. None of the Above

49. During which time would hydrogen sulfide odor cause problems in a stabilization pond? SAC-WW-V1 sec. 9.3
A. Winter
B. Summer
C. Daylight hours
D. At noon due to high flow rates entering the plant
E. None of the Above

50. What does algae need to convert oxygen to carbon dioxide in a facultative stabilization pond? SAC-WW-V1 sec. 9.3
A. Methane gas
B. Nitrates
C. Ammonia
D. Sunlight
E. None of the Above

51. The addition of chlorine, carbon dioxide, or sulfuric acid will_____ the pH of the wastewater. SAC-WW-V1 sec. 9.3
A. Neutralize
B. Increase
C. Stabilize
D. Lower
E. None of the Above

52. Which of the following is necessary before startup of a stabilization pond? SAC-WW-V1 sec. 9.5
A. Spray the floor with a herbicide to prevent weed growth
B. Allow only wastewater to fill the pond
C. Mix a clay dirt into the influent flow to seal the floor
D. Fill the pond with at least one foot of clean water
E. None of the Above

53. What is the minimum depth of water needed to control weed growth in a stabilization pond? SAC-WW-V1 sec. 9.62
A. 1 foot
B. 2 feet
C. 3 feet
D. 5 feet
E. 10 feet

54. All of the following methods are effective in removing algae in a stabilization pond except: SAC-WW-V1 sec. 9.65
A. Algae seeding
B. Air flotation
C. Micro screening
D. Slow sand filtration
E. None of the Above

55. Which of the following best describe pathogens? SAC-WW-V1 sec.10.00
A. Pathogens obtain their food supply without help
B. Bacteria that are not found in water
C. Bacteria, viruses and parasites that cause disease
D. Pathogens are not harmful to humans
E. None of the Above

56. Chlorine is added to the effluent before the contact chamber for complete mixing. What is the reason for not adding it directly to the chamber? SAC-WW-V1 sec. 10.232
A. Removes the excess chlorine immediately after the solution enters the chamber
B. It has very little mixing due to low velocities
C. Is designed to have a high flow velocity
D. Is covered and sunlight is needed to activate the chlorine
E. None of the Above

57. When exposed to a small amount of chlorine, what can an operator do to give relief to a minor sore throat? SAC-WW-V1 sec. 10.33
A. Swallow a solution of lime and water
B. Drink milk
C. Breath pure oxygen
D. Drink a little sodium hydroxide
E. None of the Above

58. Chloramines are? SAC-WW-V1 sec. 10.031
A. Enzymes
B. Combined chlorine and ammonia
C. Found in polluted air
D. Free chlorine
E. None of the Above

59. Which one of the following does not react with chlorine before disinfection takes place?
SAC-WW-V1 sec. 10.02
A. Phosphate
B. Phenols
C. Hydrogen sulfide
D. Organic matter
E. None of the Above

60. Which of the following is a recommended type of pipe used for chlorine solution lines?
SAC-WW-V1 sec. 10.230
A. Iron or galvanized
B. PVC schedule 40
C. PVC schedule 80
D. Copper
E. None of the Above

61. Which one of the following is *not* a normal procedure for gas chlorination start-up?
SAC-WW-VI sec. 10.250
A. Inspect vacuum lines
B. Open chlorine metering orifice slightly
C. Start injector water supply
D. Open the chlorine gas valve at the chlorinator
E. None of the Above

62. The part of the chlorine cylinder that is designed to melt, at 158°F to 165°F to prevent the cylinder from exploding, in the event of fire is the?
SAC-WW-V1 sec. 10.400
A. Fusible plug
B. Needle valve seat
C. Tank safety seal
D. Injector
E. None of the Above

63. A chlorine leak can be safely detected by:
SAC-WW-V1 sec. 10.42
A. Ammonia solution vapor
B. By smell
C. Chlorine test strip
D. Spraying water on suspected leak
E. None of the Above

64. Failure of the chlorine solution pumps would result in: SAC-WW-V1 sec. 10.06
A. Higher effluent fecal coliform count
B. A decrease in digester gas production
C. No change in effluent fecal coliform count
D. Lower effluent fecal coliform count
E. None of the Above

65. An amperometric titration is used to measure: SAC-WW-V1 sec. 10.205
A. Chlorine residual
B. Alkalinity
C. Conductivity
D. COD
E. None of the Above

66. When shutting down a gas chlorinator system, which valve should be closed first on the system? SAC-WW-V1 sec. 10.270
A. The chlorine container gas outlet valve
B. The pressure regulator valve
C. The pressure relief/vacuum valve
D. The rotameter or needle valve
E. None of the Above

67. Estimate the velocity of wastewater flowing through a grit channel if a stick travels 32 feet in 36 seconds. SAC-WW-V1 sec. A.131 Example 2
A. 1.125 ft/sec
B. 1152 ft/sec
C. .89 ft/sec
D. 15 ft/sec
E. None of the Above

68. A circular secondary clarifier handles a flow of o.9 MGD and suspended solids of 3600 mg/L. The clarifier is 50 feet in diameter and 8 feet deep. Find the surface-loading rate. SAC-WW-V1 sec. A. 132 Example 5
A. 500 gpd/sq ft
B. 400 gpd/sq ft
C. 459 gpd/sq ft
D. 363 gpd/sq ft
E. None of the Above

69. A flow of 1.1 MGD is applied to a trickling filter 50 feet in diameter and 4 feet deep. The BOD of the wastewater is 120 mg/L. Calculate the hydraulic loading on the filter. SAC-WW-V1 sec. A. 133 Example 8
A. 561 gpd/sq ft
B. 542 gpd/sq ft
C. 571 gpd/sq ft
D. 556 gpd/sq ft
E. None of the Above

70. Determine the chlorine demand of an effluent if the chlorine residual is 1.1 mg/L and the chlorine dose is 10.0 mg/L. SAC-WW-V1 sec. A. 137 Example 21
A. 8.9 mg/L
B. 9.1 mg/L
C. 9.4 mg/L
D. 9.6 mg/L
E. None of the Above

71. Operators perform jobs that require specialized safety equipment and procedures in case of an emergency. How can a facility insure proper use of the equipment?
SAC-WW-V2 sec. 14.84
A. Give each operator a training manual to study
B. Perform hands-on training courses with the safety equipment used during emergencies
C. Demonstrate an emergency through pictures and slides
D. Fire any operator who performs tasks in a dangerous manner
E. None of the Above

72. When working around anaerobic digesters the operators must be aware of hydrogen sulfide gas. Why must the air be tested for hydrogen sulfide gas rather than relying on the sense of smell? SAC-WW-V2 sec. 14.223
A. Hydrogen sulfide gas will dull the sense of smell at low concentrations
B. Hydrogen sulfide can be sensed only at high concentrations
C. Hydrogen sulfide cannot be detected by the sense of smell
D. Hydrogen sulfide is lighter than air and is near the ceiling
E. None of the above

73. What is the maximum noise level (decibels dBA) operators can be exposed to for an eight-hour period? SAC-WW-V2 sec. 14.191
A. 25 dBA
B. 85 dBA
C. 95 dBA
D. 105 dBA
E. None of the Above

74. The inside of a steel tank is being painted with a new bitumastic or asphaltic coating for corrosion, besides air monitoring, what would another safety concern be?
SAC-WW-V2 sec. 14.228
A. Vapors will react with skin to produce burns
B. Production of high oxygen atmosphere
C. Coating will react with steel and produce methane gas
D. Carbon monoxide is a by-product of the coating
E. None of the Above

75. Laboratory chemicals can be deadly and should have markings to show it. What other information should clearly be printed on the containers? SAC-WW-V2 sec. 14.31
A. Approved warning labels
B. Return address of the manufacture
C. Telephone number of the local poison control center
D. The date of purchase
E. None of the Above

76. Which of the following pumps are known as propeller pumps? WW-V2 sec. 15.111
A. Incline screw pump
B. Axial-flow
C. Centrifugal pump
D. Reciprocating
E. None of the Above

77. Why would it be more of an advantage to use pneumatic ejectors in place of centrifugal pumps when handling limited flows? SAC-WW-V2 sec. 15.111
A. Pneumatic ejectors are highly efficient for pumping large flows
B. Centrifugal pumps need more attention
C. Because of electrical overloading
D. At lower flows centrifugal pumps tend to plug easily do to small impellers
E. None of the Above

78. In a progressive cavity pump, which of the following parts spin?
SAC-WW-V2 sec. Figure 15.12
A. The stator
B. The rotor
C. The mounting
D. The inlet
E. None of the Above

79. Properly maintained bearings can last for years. What can cause bearings to fail?
SAC-WW-V2 sec. 15.122
A. Proper lubrication
B. Fatigue failure
C. Excessive rotation
D. To large of bearings
E. All of the above

80. What is the purpose of a suction gauge for a wet well? SAC-WW-V2 table 15.3
A. Indicates discharge head
B. Directs flow
C. Indicates trapped gases in the line
D. Indicates suction head or lift
E. None of the Above

81. When shutting down a pump for a long period of time, the operator should flush all sludge from the pump or piping because? SAC-WW-V2 sec. 15.14
A. It would take longer for the pump to get up to speed on startup
B. Gases can be produced that can rupture the pipe or pump
C. The bacteria in the sludge could corrode the pipe
D. Priming of a pump is always accomplished with fresh potable water
E. None of the Above

82. Why are shear pins used? SAC-WW-V2 Chapter 15 paragraph 12
A. To help operator record completed work
B. To prevent damage under sudden overload
C. To make sure equipment runs when overloaded
D. To hold flanges in place
E. None of the above

83. When scum lines become plugged, which of the following would NOT be used to remove scum? SAC-WW-V2 sec. 15.32
A. A pig
B. Rod or high pressure
C. Pumped grit
D. Warm digested sludge
E. None of the Above

84. Mechanical seals are used in place of packing for what reason?
SAC-WW-V2 sec. 15.121
A. Mechanical seals eliminate undesirable leakage
B. Mechanical seals handle shaft misalignments
C. Packing can be more expensive
D. Packing causes direct damage to shaft
E. None of the Above

85. A progressive cavity pump is typically used for: SAC-WW-V2 sec. 15.115
A. Moving large volumes of wastewater
B. Very small applications such as lab equipment
C. Pumping chemical feeds
D. Pumping liquids high in solids
E. None of the Above

86. What is the proper operating position of check valves on a reciprocating pump when in the discharge stroke? SAC-WW-V2 sec. 15.113
A. Intake closed; discharge open
B. Intake open; discharge closed
C. Intake open; discharge open
D. Intake closed; discharge closed
E. In through the outdoor

87. An imaginary line running along the center of the shaft is called:
SAC-WW-V2 sec. 15.111
A. Axial to Impeller
B. Axis to Impeller
C. Radial to Impeller
D. Stator
E. None of the Above

88. A vertical centrifugal pump with two impellers is known as a:
SAC-WW-V2 sec. 15.112
A. A multi-stage pump
B. A compound pump
C. An auxiliary pump
D. Double suction pump
E. None of the Above

89. Liquids that vaporize or evaporate at room temperature are known as:
SAC-WW-V2 sec. 16.220
A. Volatile liquids
B. Volatile odors
C. Volatile acids
D. Volatile solids
E. None of the Above

90. When reading a liquid measurement in a glass buret, the operator should:
SAC-WW-V2 sec. 16.43
A. Read the liquid at the top of the curve line in the buret
B. Read the liquid at the middle of the curve line in the buret
C. Read the liquid at the bottom level of the top curve line in the buret
D. Read the liquid at the bottom level of the curve line in the buret
E. None of the Above

91. Which of the following is a Composite Sample? SAC-WW-V2 sec. 16.33
A. Samples taken throughout the day at intervals of time
B. A single sample taken at a set time
C. A sample taken but stored refrigerated for 24 hours
D. A sample that the operator deposits
E. None of the above

92. What is the purpose of a Secchi Disc? SAC-WW-V2 sec. 16.4
A. For measuring the clarity of water
B. Marking sludge levels
C. A new disc to replace CD's
D. Analyze solids
E. None of the Above

93. Which chemical would NOT be used to control Hydrogen Sulfides?
SAC-WW-V2 sec. 16.411
A. Chlorine
B. Oxygen
C. Methane
D. Hydrogen peroxide
E. None of the Above

94. When preparing to filter TSS, which of the following is a pretreatment step?
SAC-WW-V2 sec. 16.43
A. Shake or mix the sample
B. Acidify the sample
C. Dechlorinate the sample
D. Adjust the pH of the sample
E. None of the Above

95. When performing a volatile solids test on the sludge, what is the test measuring? SAC-WW-V2 sec. 16.44
A. The amount of inorganic material
B. The amount of gasoline or oil in the sample
C. The amount of organic material
D. The amount of nitrogen in the sample
E. None of the Above

96. Grouping measurements and describing the result in a single number is known as: SAC-WW-V2 sec. 18.3
A. Average and means
B. Gage readings
C. Time intervals
D. None of the above
E. None of the Above

97. A device that continuously measures and calculates totals are called: SAC-WW-V2 sec. 18.4
A. Manometer
B. Gage
C. Totalizer
D. Range finder
E. None of the Above

98. What is MPN? SAC-WW-V2 sec. 18.6
A. Mixed Portion Number
B. Most Probable Number
C. My Personal Number
D. New TV channel
E. None of the Above

99. Which analysis requires a grab sample? SAC-WW-V2 sec. 16.33
A. pH, DO
B. Temperature
C. All of the above
D. None of the above

100. Which of the following is a good practice for operators to follow when working around moving equipment? SAC-WW-V2 sec. 14.21
A. Do not wear rubber shoes
B. Use only free tools when working on motor or pumps
C. Do not wear loose clothing
D. Use only one hand to work on any piece of equipment

101. The pH of wastewater is an important aspect. Hydrogen sulfide is extremely pH dependent. In which state is sulfide when in an ionic form? SAC-WW-V3 sec. 1.12
A. Gaseous
B. Solution
C. Solid
D. Pure form
E. None of the Above

102. Sulfide can exist in wastewater in three forms depending on the pH: S^{2-} ion, HS^- ion, or H2S gas. At the ideal temperature, what sulfide would form at a pH of 14?
SAC-WW-V3 sec. 1.12
A. S^{2-} ion, 90%
B. HS^- ion, 100%
C. H2S gas, 100%
D. H2S, 50% and HS^-, 50%
E. None of the Above

103. The presence or absence of oxygen establishes whether hydrogen sulfide will exist. If more than 1.0 mg/L of oxygen is present, what will happen to anaerobic bacteria?
SAC-WW-V3 sec. 1.12
A. It will become soluble BOD
B. It will oxidize to thiosulfate
C. It will produce higher levels of sulfide
D. Hydrogen sulfide will not exist
E. None of the Above

104. Which of the following represents the reaction of ammonia with chlorine?
SAC-WW-V3 sec. 1.40
A. $NH_3 + Cl_2 = NH_2Cl + CHl$
B. $NH_2Cl + Cl_2 = NHCl_2 + HCl$
C. $NHCl_2 + Cl_2 = NCl_3 + HCl$
D. Monochloramine, NH_2Cl
E. None of the Above

105. Hydrogen peroxide has been used as an oxidant to control odors. What are the disadvantages of using hydrogen peroxide? SAC-WW-V3 sec. 1.401
A. Inability to treat ammonia
B. It's an oxidant
C. Inhibits the regeneration of sulfate reducing microorganisms
D. Lack of toxic by-products
E. None of the Above

106. The pH of a production facility's wastewater may vary from 2.5 to 13.0 depending on the product being processed. It may be necessary to neutralize the wastewater to achieve a neutral pH. What chemical could be added to make a wastewater with a pH of 2.5 neutral?
SAC-WW-V3 sec. 2.52
A. Caustic
B. Sulfide
C. DO
D. Sodium bicarbonate
E. None of the Above

107. COD is an alternative to BOD for measuring the pollutional strength of wastewater. Bearing in mind that the BOD and COD tests involve separate and distinct reactions, what is the primary disadvantage of the COD test? SAC-WW-V3 sec. 2.52
A. Chloride may interfere with the chemical reaction
B. It measures the presence of carbon and hydrogen
C. It takes 5 days to get results
D. None of the above

108. This chemical has been used like chlorine to control odors. This chemical reacts with other substances very similar to chlorine. SAC-WW-V3 sec. 1.40
A. Phenol
B. Hydrogen Peroxide
C. Sodium hypochlorite
D. Chromate
E. Nitrate

109. In gravity thickening of wastewater sludge, gravity forces are used to separate solids from the sludge being treated. Secondary sludge's are not well suited for gravity thickening because it contains:
SAC-WW-V3 sec. 3.110
A. Bound water
B. High alkalinity
C. Low pH
D. Dissolved oxygen
E. None of the Above

110. If a primary sludge is allowed to go septic, which of the following gases are produced?
SAC-WW-V3 sec. 3.110
A. H_2S and CO_2
B. CH_4
C. A & B
D. Ozone
E. None of the Above

111. Which of the following is not a recommendation for preventing odors in a trickling filter?
SAC-WW-V1 sec. 6.411
A. Maintain aerobic conditions in the sewer system
B. Use of masking agents
C. Increase of BOD loading
D. Check and clear filter ventilation
E. None of the Above

112. Which of the following solutions helps prevent trickling filters from freezing?
SAC-WW-V1 sec. Table 6.2
A. Decrease the recirculation
B. Parallel operations
C. Reduce nozzles spray
D. All of the above
E. None of the Above

113. Excessive sloughing or biological growth on a trickling filter is an indication of:
SAC-WW-V1 sec. 6 troubleshooting guide
A. Ice buildup on filter media
B. Increase in secondary clarifier effluent suspended solids
C. Uneven distribution of flow
D. Filter ponding
E. None of the Above

114. The high-rate trickling filter is fed at 2,100 GPM and the filter diameter is 100 feet. What is the surface area flow rate in gallons per day? SAC-WW-V1 sec. 6.71
A. 385 GPD/sq ft
B. 385 GDP
C. 7850 GPD/Sq ft
D. 3 MGD
E. None of the Above

115. Development of white biomass over most of a Rotating Biological Contactor (RBC) disc area could be resolved by: SAC-WW-V1 table 7.2
A. Decreasing the treatment influent flow
B. Increasing the chlorination in the first stage
C. Adjusting baffles between first and second stages to increase total surface area in first stage
D. None of the above

116. If the motor bearings on a RBC are running above 200°F, which of the following corrective actions could be taken? SAC-WW-V1 table 7.232
A. Lubricate bearings per manufacturer's instruction
B. Check torque and alignment of bearings
C. Make sure the shaft is properly aligned.
D. All of the above
E. None of the Above

117. When making changes to correct a problem in an activated sludge package plant, how long might it take before the correction shows? SAC-WW-V1 sec. 8.252
A. At least 3 or more days
B. 24 hours
C. 3 hours
D. Depends on the basin detention time

118. Changing conditions or abnormal conditions can upset the microorganisms in the activated sludge process. If the sludge is bulking in the clarifier what could one possible factor be? SAC-WW-V1 sec. 8.252
A. Low DO concentration
B. High rate of aeration
C. Clarifier flow to high
D. Hydraulic overload is too high
E. None of the Above

119. Some aeration tubing systems require cleaning on a weekly basis. Which of the following can be used to remove deposits of carbonate on the tubing slits and biological slime from inside the tubing?
SAC-WW-V1 sec. 9.7
A. Chlorine
B. Sodium hydroxide
C. Anhydrous ammonia
D. Anhydrous hydrogen chloride
E. None of the Above

120. Which of the following lab sample is taken daily from the effluent of a pond? SAC-WW-V1 table 9.3
A. Chlorine residual
B. Coliform group
C. Dissolved oxygen
D. pH
E. None of the Above

121. Wastewater facilities may be required to provide chlorination services for which of the following activities? SAC-WW-V1 sec. 10.28
A. Disinfection of effluent
B. Process control of activated sludge
C. Season odor control
D. All of the above
E. None of the Above

122. According to the Sacramento Manual, in order to meet NPDES permit coliform requirements what is the required chlorine residual at the outlet of the chlorine contact basin? SAC-WW-V1 sec. 10.28
A. 4.5 mg/L
B. 3 mg/L
C. 2.5 mg/L
D. 1 mg/L
E. None of the Above

123. During the night shift, the operator notes that the chlorine residual analyzer recorder controller is not maintaining the chlorine residual properly. Which of the following could be a probable cause of the problem? SAC-WW-V1 Table 10.1
A. That flow fluctuations are the probable cause
B. That electrodes are fouled and should be cleaned
C. An increase in DO oxidized the residual
D. Ammonia is interfering and this is a common occurrence
E. None of the Above

124. A regular program of scheduled preventive maintenance is essential to keep a chlorinator functioning properly. If the operator notices that the chlorinator will not feed chlorine, the first thing an operator should check is: SAC-WW-V1 Table 10.1
A. The chlorine supply gages
B. The evaporation unit
C. The injector line
D. None of the above

125. During your inspection of the chlorine feed system, you find that there is no chlorine gas pressure at the chlorinator. You check and find the chlorine cylinder is full and the valve is open. What is the probable cause? SAC-WW-V1 Table 10.1
A. Inadequate injector vacuum
B. Plugged or damaged pressure-reducing valve
C. Chlorinator discharge valve is closed
D. Injector diaphragm ruptured
E. None of the Above

126. The operator determines that the Coliform count fails to meet required standards for disinfection. The operator checks the contact time and finds that short-circuiting has occurred in the contact chamber. What measures should be taken to correct this problem? SAC-WW-V1 table 10.1
A. Adjust the injector flow
B. Install baffling in the contact chamber
C. Reduce the chlorine feed rate
D. This is normal, it will correct with an increase in flow
E. None of the Above

127. Procedures and equipment for operating and maintaining chlorination and sulfonation systems are very similar but you should be aware of the differences. Which of the following is a true statement regarding sulfur dioxide and chlorine? SAC-WW-V1 sec. 10.875
A. Sulfur dioxide gas pressures are lower than chlorine gas pressure at the same temperature
B. Chlorinator control valve diaphragms can be used for sulfur dioxide
C. Sulfur dioxide has no health effects and is not dangerous
D. Sulfur dioxide vaporizes at the same rate as chlorine at the same temperature
E. None of the Above

128. Maintenance of the sulfur dioxide system should be part of a preventive maintenance program. It is recommended that the sulfonators be cleaned: SAC-WW-V1 sec. 10.883
A. Every year or more frequently if necessary
B. Never, they have self-cleaning units
C. Every six months
D. Monthly
E. None of the Above

129. A chlorinator is set to feed 50 pounds of chlorine per 24 hours; the wastewater flow is at a rate of 0.85 MGD; and the chlorine as measured by the chlorine residual test is 0.5 mg/L. What is the chlorine dose? SAC-WW-V1 sec. 10.06 Example
A. 3.5 mg/L
B. 2956 lbs
C. 7.1 mg/L
D. None of the above

130. A plant with a 2-MGD flow has an effluent chlorine residual of 4.5 mg/L. Sulfur dioxide dose is being applied at 1.0 mg/L more than the chlorine residual. Determine the sulfonator feed rate in pounds of sulfur dioxide per day. SAC-WW-V1 sec. 10.851 Example
A. 75.06 lbs/day
B. 92 lbs/day
C. 58.3 lbs/day
D. None of the above

131. Sludge floating to the surface of a secondary clarifier could be resolved by which of the following? SAC-WW-V2 sec. 11.67
A. Increase sludge wasting to decrease MCRT
B. Increase MCRT to greater than 6 days
C. Add NaOH to drop the pH
D. Sludge floating is no problem
E. None of the Above

132. Which of the following would be a cause of dead spots in aeration tanks?
SAC-WW-V2 sec. 11.67
A. Sludge return rate to high
B. Air supply valve improperly adjusted
C. Predominate actinomycetes
D. Inadequate flow distribution
E. None of the Above

133. Denitrification is an indication of good treatment, providing that the sludge in the settleability test stays on the bottom. If it floats up too early in the test this would indicate:
SAC-WW-V2 sec. 11.314
A. The operator should re-take the sample and test again
B. The sludge age should be reduced
C. The food-to-microorganism ratio is way too low and needs to be increased
D. None of the above

134. Which of the following are typical loading guidelines for activated sludge?
SAC-WW-V2 sec. 11.71
A. High-rate: COD >1, BOD >.5
B. Conventional: COD 0.5 to 1.0, BOD 0.25 to 0.5
C. Extended aeration: COD <0.2 lbs, BOD <.10 lbs
D. All of the above
E. None of the Above

135. In which of the following activated sludge processes is it recommended that the sample used for microscopic observations be taken at the end of the zone?
SAC-WW-V2 sec. 11.911 and Fig. 11.29
A. Contact stabilization
B. Extended aeration
C. Step feed
D. Conventional
E. None of the Above

136. All microorganisms are classified in kingdoms such as plant, animal, protista and monera.
Which of the following organisms belong to the protista kingdom? SAC-WW-V2 sec. 11.931
A. Fungi
B. Bacteria
C. Rotifers
D. Worms
E. None of the Above

137. Protozoa can be called "indicator organisms." Their presence or absence indicates the amount of bacteria in the activated sludge and the degree of treatment. Which of the following is **NOT** part of the protozoa family? SAC-WW-V2 sec. 11.931
A. Thiothrix
B. Mastigophora
C. Amoeba
D. Suctoria
E. None of the Above

138. Bacteria is produce by binary fission which is called the generation time. The ***E. coli*** bacteria are found in the intestinal tract of humans and warm-blooded animals. What is the generation time of this bacterium in a broth medium? SAC-WW-V2 sec. 11.931
A. 24 hours
B. 8 hours
C. 1 hour
D. 17 minutes
E. None of the Above

139. The Sacramento book gives an illustration of an operation and maintenance checklist for digesters. What is the suggested schedule for lubricating all valves stems, inspecting and greasing motor bearings? SAC-WW-V2 sec. 12.40
A. Never
B. Semi-annually
C. Weekly
D. Daily
E. None of the Above

140. Which of the following is not beneficial to the digestion process?
SAC-WW-V2 Table 12.3
A. Sodium Hydroxide
B. Ammonia Nitrogen
C. Magnesium
D. Sodium
E. None of the Above

141. Feeding of raw sludge to an anaerobic digester should be done:
SAC-WW-V2 sec. 12.22
A. At night, during the period of low flow
B. When the solids content of the sludge is <3.5%
C. Spread over a period of time
D. Only when the volatile acids/alkalinity ratio in below 0.2
E. None of the Above

142. The efficient cleaning of a digester demands that operators follow appropriate safety rules. Which of the following is the more important safety precaution to institute?
SAC-WW-V2 sec. 12.53
A. Isolate the gas collection and sludge system and provide adequate ventilation through the access holes with the use of explosion proof fans.
B. Make sure everyone working has had proper immunization in case they come in contact with airborne viruses
C. Train the back-up operator in proper use of rescue equipment
D. Make sure that processes will not be interrupted when digester is off line
E. None of the above

143. Which of the following describes aerobic sludge digestion?
SAC-WW-V2 sec. 12.60
A. Does not require air
B. Generates sludge that needs additional stabilization before ultimate disposal
C. Produces a sludge that has higher water content.
D. None of the above

144. Which of the following describes anaerobic sludge digestion?
SAC-WW-V2 sec. 12.60
A. Produces liquids that may be difficult to treat when returned to the plant
B. Produces liquids that usually are easier to treat when returned to the plant
C. Works by aerobic decay which produces fewer odors
D. Has low equipment cost
E. None of the Above

145. Laboratory results indicate that a total digested sludge solids sample was 9.6% solids and 42.8% volatile content. The raw sludge solids volatile content was 68%. What is the overall % reduction? SAC-WW-V2 sec. 12.3 Example 6 I
A. 64%
B. 36%
C. 50%
D. None of the above

146. How many two cubic yard dump trucks would it take to haul dry sludge to a bed 100 feet long and 25 feet wide if the dried sludge were spread six inches thick?
SAC-WW-V2 sec. 12.70 Question G
A. 24 truck loads
B. 46 truck loads
C. 83 truck loads
D. 36 truck loads
E. None of the Above

147. According to the Water Quality Criteria for effluent, what is the suggested limit of Nitrite and Nitrate as N for livestock and wildlife? SAC-WW-V2 Table 13.1
A. 1000 mg/L
B. 100 mg/L
C. 10 mg/L
D. 1 mg/L
E. None of the Above

148. What would cause excessive algae in the effluent of a pond?
SAC-WW-V2 Table 13.2
A. Outlet baffle not at proper location
B. Temperature or weather conditions promoting growth
C. The secondary clarifier is hydraulically overloaded
D. Skimmers not working properly
E. None of the Above

149. Your plant is designed with series ponds. The operator notifies you that there is excessive BOD in the effluent that has the potential to cause your plant to be out of compliance. You calculated the organic loading and it indicates an overload. How would you have the operator correct this? SAC-WW-V2 sec. 13.25
A. Use pumps to recirculate the pond contents
B. Wait 24 hours and see if the pond corrects itself
C. Notify EPA or local authority immediately of the problem
D. Tell the operator to add chlorine to kill the excess organisms
E. None of the Above

150. When an atmosphere for a confined space cannot be considered free of hazards which procedure should be followed: SAC-WW-V2 sec. 14.12
A. Wear approved safety belt and attached life line
B. Station at least one person to stand by on the outside and another within site to call for help
C. At least one stand by person with first aid and CPR skills
D. All of the above
E. None of the Above

151. What is the Upper Explosive Limit (UEL) for Methane? SAC-WW-V2 Table 14.1
A. 100%
B. 75%
C. 50%
D. 15%
E. None of the Above

152. Which type of fire extinguisher should be provided at a pumping station?
SAC-WW-V2 sec. 14.21
A. Water filled
B. Class A
C. Carbon Monoxide
D. Class ABC
E. None of the Above

153. Which of the following statements is **true** about covered Wet Pits?
SAC-WW-V2 sec. 14.220
A. Work is never done inside one
B. Because of the cover moisture does not enter
C. Only explosion-proof equipment should be used
D. It would not be considered confined space
E. None of the Above

154. Highly acidic or alkaline wastes can be very hazardous and dangerous to personnel, treatment processes, and equipment. By adding H_2SO_4, at the headworks, what effect would it have on the pH? SAC-WW-V2 sec. 14.235
A. It would lower the pH
B. It would raise the pH
C. It would make the influent pH neutral
D. None of the above

155. The National Fire Protection Association uses color-coded hazard warning labels for hazardous materials. What is the color designated for Reactive materials?
SAC-WW-V2 Fig. 14.7
A. Blue
B. White
C. Yellow
D. Red
E. None of the Above

156. Which statement describes "Brinelling"? SAC-WW-V2 sec. 15.122
A. When a pump and motor is in misalignment
B. Tiny indentations high on the shoulder of the bearing race
C. Lubrication failure
D. Motor bushing overheats
E. Medical term

157. Which of the following materials **is not** part of the motor brush composition?
SAC-WW-V2 sec. 15.170
A. Carbon graphite
B. Copper
C. Metal graphite
D. Graphite
E. None of the Above

158. To properly maintain a standard three-phase variable speed synchronous AC motor you must have some idea of what to look for when examining the slip rings and brushes. Which of the following components should be examined before startup? SAC-WW-V2 sec. 15.170
A. The coil inductor
B. The slip ring for a film
C. The disconnect switch
D. The piston rings
E. None of the above

159. What is the designed purpose of a suction bell on a pump?
SAC-WW-V2 sec. 15.3
A. Guide waste into pump suction pipe and reduces pipe entrance energy losses
B. Keeps pump primed for automatic operation by allowing entrapped gases to escape
C. Collects the waste discharged by pump impeller
D. Isolates pump from discharge system
E. None of the Above

160. What is the purpose of a shear pin in a reciprocating pump?
SAC-WW-V2 sec. 15.2 Paragraph 2
A. To insure alignment of piston
B. To indicate clogged suction line
C. To prevent damage by allowing eccentric to move to the neutral position
D. Shear pins are not used on reciprocating pumps
E. None of the Above

161. When installing new packing, what is the purpose of the lantern ring?
SAC-WW-V2 figure 15.21
A. To allow clearance for the gland
B. To keep the packing spaced in the stuffing box
C. To keep the shaft from detaching
D. To allow cooling liquid to enter along the shaft
E. None of the Above

162. Motor failure can be very costly and causes process shut downs if backup equipment is not available. Understanding insulation could help prevent problems to occur. How is the limitation of insulation defined? SAC-WW-V2 sec. 15.340
A. Ambient temperature
B. Motor winding
C. Phasing of motor
D. Induction of motor
E. None of the above

163. Work needs to be done on a motor. Recommended safety procedures includes lockout / tagout and suggest that the following component be discharged. SAC-WW-V2 sec. 15.45
A. The capacitor
B. The inductor
C. The diode
D. The thermal switch
E. None of the Above

164. Research has shown that there are several types of motor failures. Some can occur more frequently than others can. Which of the following causes the greatest number of motor malfunctions? SAC-WW-V2 sec. 15.42
A. Overloads
B. Single phasing
C. Bearing failures
D. Past its useful life
E. None of the Above

165. Horizontal motors should be mounted so that all four mounting feet are aligned. When connecting a pump and motor there are several types of misalignment. The following terms define types of misalignment **EXCEPT**: SAC-WW-V2 sec. 15.46
A. Linear misalignment
B. Angular misalignment
C. Parallel misalignment
D. Shaft end float
E. None of the Above

166. The electrical potential required to transfer electrons from one compound or element to another is called: SAC-WW-V2 Chapter 16 Definitions
A. Oxidation reduction potential
B. Reverse osmosis
C. Ion exchange
D. Oxidation
E. None of the Above

167. Solutions generally used in the laboratory are expressed in what concentration? SAC-WW-V2 sec. 16.15
A. Grams
B. Moles
C. Normality
D. Liters
E. None of the Above

168. The scale of a spectrophotometer is generally graduated two ways. If Units of Absorbance are used a logarithmic scale of non-equal divisions is graduated from? SAC-WW-V2 sec. 16.17
A. 10.0 - 20.0
B. 5.0 - 10.0
C. 0.0 - 2.0
D. None of the above

169. Which of the following chemicals are classified as explosive or flammable? SAC-WW-V2 sec. 16.203
A. Carbon disulfide
B. Sulfuric
C. Nitric
D. Chromic
E. None of the Above

170. What is the method for preserving a Sulfide sample? SAC-WW-V2 Table 16.4
A. Add 2 mL 1 M zinc acetate & 1 N NaOH to pH >9 and store at 4°C
B. Add sodium sulfide and store at room temperature
C. Add H_2SO_4 to pH <2 and store at 4°C
D. Store at 4°C
E. None of the Above

171. The Secchi disc is used to determine:
SAC-WW-V2 sec. 16.40
A. The weight of dry solids
B. The clarity of a clarifier
C. The depth of water
D. None of the above

172. Calculate the % removal of settleable solids of a clarifier when the influent set. sol. is 12.0 mL/L and the effluent set. sol. is 0.2 mL/L. SAC-WW-V2 sec. 16.42 Example E
A. 98%
B. 16%
C. 50%
D. 2.4%
E. None of the Above

173. $Ca(OH)_2$ has been used in wastewater treatment for many years. Usually it was used as a coagulant, especially treating industrial waste. What is the correct name for $Ca(OH)_2$? SAC-WW-V2 sec. 16.47
A. Lime
B. Hydrated lime
C. Quicklime
D. Soda ash
E. None of the Above

174. Coliform bacteria, originating from the intestines of warm-blooded animals, are tested for in wastewater because they can be indication of the presence of disease-producing organisms that can be associated with them. Which test method is approved by NPDES to determine Total Coliform analysis? SAC-WW-V2 sec. 16.51 #6
A. Membrane filter method
B. Nonstandard titration method
C. Acetate solution method
D. Gooch crucible method
E. None of the Above

175. Wastewater is relatively rich in phosphorus compounds. The forms of phosphorus found in wastewater are commonly classified into three categories. Which category term measures the amount of inorganic phosphorus in the sample of wastewater as measured by the direct colormetric analysis procedure? SAC-WW-V2 sec. 16.51 #12
A. Orthophosphate
B. Condensed phosphate
C. Organically bound phosphate
D. Total phosphate
E. None of the Above

176. The most important use of chlorine in the treatment of wastewater is for disinfection. When chlorine reacts quickly and completely with ammonia in wastewater which compound is produced? SAC-WW-V2 sec. 16.51 #5
A. Disinfection by-products
B. Monochloramines
C. Hypochlorite
D. Chlorine dioxide
E. None of the Above

177. What is the volatile solids test measuring when it is performed on solids?
SAC-WW-V2 sec. 16.44
A. The amount of inorganic material
B. The amount of grease in the sample
C. The amount of nitrogen in the sample
D. The amount of organic material
E. None of the Above

178. Hydrogen sulfide generation is greatest when which of the following conditions occur?
SAC-WW-V3 sec. 1.12
A. pH above 9.0
B. Temperatures above 30°C
C. High alkalinity concentrations
D. High oxygen concentrations
E. None of the Above

179. Aeration or high turbulence of wastewater will cause hydrogen sulfide to be:
SAC-WW-V3 sec. 1.40
A. Produced in higher concentrations
B. Stripped or carried out by the air
C. Bind with the nitrogen in the water
D. All the above
E. None of the Above

180. What will the result be if septic sludge is put into a gravity sludge thickener? SAC-WW-V3 sec. 3.110
A. The septic sludge will produce a more compact sludge blanket
B. The rate of settling will increase
C. The pH will decrease and the sludge will thicken more readily
D. Reduced efficiency and lower solids concentration
E. None of the Above

181. Which of the following is important in process control and would affect a dissolved air flotation **(DAF)** unit? SAC-WW-V3 sec. 3.120
A. Temperature
B. Air to solids (A/S)ratio
C. Alkalinity
D. pH
E. None of the Above

182. How would you determine the organic loading on a digester? SAC-WW-V3 sec. 3.2212
A. By determining the air flow in cfs per 1000 pounds of digester
B. By measuring the volatile solids loading per cubic foot per day
C. By measuring the rate of gas destruction in pounds per cubic foot per day
D. By determining the digestion time in days and hydraulic loading
E. None of the Above

183. What should an operator do to correct excessive foam in an aerobic digester when the DO is high, pH is 7, and the O_2 uptake is stable? SAC-WW-V3 sec. 3.2241
A. Increase the digester temperature
B. Raise the pH by adding Lime
C. Lower the air intake to reduce turbulence
D. All of the above
E. None of the Above

184. When lime is mixed with sludge to improve dewatering the pH should be: SAC-WW-V3 sec. 3.230
A. 11.5 to 12.0
B. 9.0 to 10.0
C. 5.0 to 8.0
D. None of the above
E. None of the Above

185. When the Elutriation process is used what type of sludge conditioning is occurring? SAC-WW-V3 sec. 3.340
A. Reduce the sludge alkalinity
B. Reduce the sludge acidity
C. Reduce quantity of anions in the sludge
D. Increase the sludge's affinity for water
E. None of the Above

186. The purpose of a Venturi-type restriction on a belt filter press would be to:
SAC-WW-V3 sec. 3.411
A. Provide turbulence to mix polymer with the flow
B. Reduce sludge acidity
C. Increase sludge application speed
D. Control belt tension and pressure
E. None of the Above

187. One factor that would allow for greater volumes of water to drain from the sludge in a belt filter press is to? SAC-WW-V3 sec. 3.4110
A. Mix more polymer with the sludge
B. Increase the belt speed
C. Increase the wash water being used
D. Decrease the belt tension
E. None of the Above

188. What information should be used by operators to determine the optimum depth to apply sludge on a sand drying bed?
SAC-WW-V3 sec. 3.431
A. The drying time and the time required to remove sludge
B. The depth of sand in the drying bed
C. The capacity of the underdrain
D. All of the above
E. None of the Above

189. The application of a free draining, non-cohesive material such as diatomaceous earth to a filtering media is known as: SAC-WW-V3 sec. 3.4101
A. Binding
B. Filter break through
C. Wash out
D. Plate overrun
E. None of the Above

190. A typical set point to start backwashing a rapid-sand filter is at_____ of head loss.
SAC-WW-V3 sec. 4.340
A. 4 feet
B. 5 feet
C. 6 feet
D. 7 feet
E. None of the Above

191. What lab test is used to simulate a tertiary plant operation?
SAC-WW-V3 sec. 4.282
A. Jar test
B. COD
C. TOC
D. NTU
E. None of the Above

192. Which of the following meters can be used to analyze and record the clarity of the filter influent and effluent flows?
SAC-WW-V3 sec. 4.411
A. NTU Meter
B. TSS meter
C. DO meter
D. Parshall flume
E. None of the Above

193. In sludge incineration a complete oxidation of the sludge depends on:
SAC-WW-V3 sec. 3.5315
A. The sludge feed rate
B. Detention time in the incinerator
C. The ratio of fuel/air supplied to the incinerator
D. Complete mixing
E. None of the Above

194. Ponding can occur at sites where wastewater effluent is being irrigated. Which of the following is NOT a reason that ponding occurs? SAC-WW-V3 sec. 8.11
A. Distribution line clogged with solids
B. A broken pipe in the irrigation line
C. Excessive application rate
D. Inadequate drainage
E. None of the Above

195. Land treatment systems, which have a point source effluent, are known as:
SAC-WW-V3 sec. 8.60
A. Irrigation systems
B. Water recycling systems
C. Overland flow systems
D. Infiltration / percolation
E. None of the Above

196. Advance or tertiary treatment may include which of the following processes:
SAC-WW-V3 sec. 4.9
A. Coagulation-sedimentation
B. Facultative decomposition and aeration
C. Aeration followed by sedimentation
D. Settling and centrifugation
E. None of the Above

197. To control the pressure during filter backwash, most systems have a:
SAC-WW-V3 sec. 4.21 Topic TT
A. By-pass valve
B. Pressure regulator on backwash pump
C. Rate control valve which slowly opens
D. VFD's on pumps
E. None of the Above

198. Solids breakthrough in a tertiary filter can happen when the:
SAC-WW-V3 sec. 4.23
A. Solids bind the sand bed of the filter
B. Solids pass through the media into the clearwell
C. Mud balls begin to float
D. Filter is backwashed excessively
E. None of the Above

199. Which of the following disadvantage is common to surface straining as contrasted to depth filtration? SAC-WW-V3 sec. 4.241
A. Media contamination
B. Breakthrough of TSS
C. Rapid head loss buildup
D. Fecal coliform buildup
E. None of the above

200. A depth filter media provides a slower buildup of head loss in the filter but this does allow for a quicker: SAC-WW-V3 sec. 4.242
A. Lowering of the pH in the effluent
B. Anaerobic condition to be produced
C. Breakthrough of the solids
D. Backwash cycle
E. None of the above

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