

Wastewater Questions*

**Answers can be found on the last page.*

1. The common detention time in a primary clarifier is:
 - A. 30 minutes
 - B. 1 hour
 - C. 2 hours
 - D. 4 hours

2. If an operator notices sludge floating on the primary clarifier, it probably means:
 - A. There is too much oxygen in the wastewater
 - B. Too much sludge being removed
 - C. There is not enough detention time
 - D. Not enough sludge is being removed

3. If a treatment plant receives a flow of 2 MGD and a BOD concentration of 157 mg/L, how many pounds of BOD enters the treatment plant?
 - A. 2619 Pounds
 - B. 2713 Pounds
 - C. 2819 Pounds
 - D. 2918 Pounds

4. Disease producing bacteria are called:
 - A. Parasites
 - B. Coliforms
 - C. Saprophytes
 - D. Pathogens

5. Which of the pH readings indicate an acidic wastewater?
 - A. 3
 - B. 7
 - C. 9
 - D. 11

6. One mg/L is equivalent to:
 - A. One ml/L
 - B. One oz per gallon
 - C. One cc per liter
 - D. One part per million

7. Your pump pumped for 24 hours and pumped 302,400 gallons. The capacity of the pump is:
- A. 110 gpm
 - B. 200 gpm
 - C. 210 gpm
 - D. 310 gpm
8. If it is determined that a chlorine dose of 1.2 mg/L would be proper disinfection on an effluent, then how many pounds of chlorine would be needed to treat a flow of 3,600,000 gpd?
- A. 3.6 lbs
 - B. 10 lbs
 - C. 20 lbs
 - D. 36 lbs
9. In an activated sludge tank, what would contribute to a higher oxygen demand?
- A. Decrease in pH
 - B. An increase in BOD to the aeration tank
 - C. A decrease in BOD to the aeration tank
 - D. A decrease in microorganisms
10. If the sludge in the secondary clarifier is septic, this could be caused by:
- A. Too high of a return sludge rate
 - B. Too low of a return sludge rate
 - C. Too high of a hydraulic load
 - D. Too much septic tank waste
11. Return activated sludge is “returned” to the aeration basin
- A. To make sure there is enough water to keep the microorganisms alive
 - B. So the water can be recycled
 - C. So there is a good healthy population of microorganisms to treat the waste
 - D. So the operator can get a better example

12. How many pounds of solids are in an aeration tank that is 50 ft square, and 15 ft deep and a water level of 12 ft, the MLSS is 2200 mg/l, MLVss is 1760 mg/l?
- A. 4110
 - B. 5137
 - C. 3288
 - D. 4125
13. If an activated sludge plant receives an average flow of 900 gpm, how many pounds of BOD would enter the plant in a day if the influent strength were 234 mg/l?
- A. 2236 lbs
 - B. 2379 lbs
 - C. 2529 lbs
 - D. 2740 lbs
14. What is the SVI if the volume of settled sludge is 400 ml/l and MLSS is 5000 mg/l?
- A. 40
 - B. 80
 - C. 160
 - D. 320
15. How should an operator position gate valves?
- A. 25% open
 - B. 50% open
 - C. 75% open
 - D. 100% open
16. As water temperature increases, disinfection power of chlorine will:
- A. Increase
 - B. Decrease
 - C. Remain the same
 - D. Continue to work slower
17. The average flow per person per day is:
- A. 30 gpd
 - B. 60 gpd
 - C. 100 gpd
 - D. 150 gpd

18. The optimum flow velocity in grit channel is:
- A. 1 foot per second
 - B. 2 feet per second
 - C. 3 feet per second
 - D. 5 feet per second
19. The reason plant influent is passed through a bar screen is to
- A. Thin the wastewater
 - B. Remove grit
 - C. Screen out the sludge
 - D. Remove large objects
20. A comminutor is a device that
- A. Allows operator to communicate with one another
 - B. Shreds rags and other debris before entering the treatment plant
 - C. Settles out colloidal solids
 - D. Removes boards from the plant influent
21. The following device is used to measure the flow into a treatment plant
- A. Parshall flume
 - B. Comparator
 - C. Sluice gate
 - D. Proportional weir
22. Sludge pumped to the anaerobic digester should be as thick as possible
- A. To reduce the heat requirement in the digester
 - B. To clean the grease out of the raw sludge line
 - C. To keep the sludge blanket as high as possible in the digester
 - D. So the sludge will settle to the bottom of the digester
23. Aerobic digestion is most like which of the following
- A. Aerated lagoon
 - B. Trickling filters
 - C. Anaerobic digestion
 - D. Activated sludge

24. An NPDES permit
- A. Is required to become a licensed operator
 - B. Regulated the amount of pollutants that can be discharged
 - C. Is only required for municipal dischargers
 - D. Is good for two years
25. Which of the following is not a typical process control test
- A. BOD
 - B. SS
 - C. pH and temp
 - D. Fecal coliform
26. Acid forming bacteria would be found predominately in
- A. Aerated grit chambers
 - B. Aerobic digesters
 - C. Anaerobic digesters
 - D. Low pH water
27. Sludge pumped to the anaerobic digester
- A. Must be added at a continuous rate, not all at once
 - B. Must be chlorinated to kill aerobic bacteria
 - C. Must be pumped in batches so that the bacteria will grow more rapidly
 - D. Should be thin to ease in pumping
28. The minimum dissolved oxygen content in an aeration tank should not fall below
- A. 1 mg/l
 - B. 2 mg/l
 - C. 4 mg/l
 - D. 8 mg/l
29. If the influent BOD is 185 mg/l, the influent flow is 500,000 gpd, the MLVSS is 2,800 mg/l, the volume of the aeration tank is 145,000 gal, and 1,200 gallons of sludge are wasted daily. What is the F/M ratio?
- A. .15
 - B. .23
 - C. .32
 - D. .38

30. Which of the following would most likely cause rising sludge in secondary clarifiers?
- A. Low MLSS
 - B. Long aeration tank detention time
 - C. Hydraulic loading on the clarifier
 - D. Long detention time in the clarifier
31. The type of bacteria that releases hydrogen sulfide gas are
- A. Pathogens
 - B. Aerobic
 - C. Anaerobic
 - D. Coliforms
32. Which of the following affects air requirements in an activated sludge aeration tank:
- A. The BOD loading
 - B. The solids concentration
 - C. The desired BOD removal efficiency
 - D. All of the above
33. Chlorine leaks in metal containers tend to
- A. Become smaller
 - B. Become larger
 - C. Remain the same
 - D. Become encrusted
34. Which indicated a good quality activated sludge?
- A. Black color and septic odor
 - B. Brown color and musty odor
 - C. Brown color and thick dark brown foam
 - D. Light tan and fluffy foam
35. Which one of the following considerations would be least likely to contribute to rising sludge in secondary clarifiers?
- A. Low MLSS
 - B. Long aeration tank detention time
 - C. Hydraulic loading on the clarifier
 - D. Nitrification in the aeration tank

36. What organisms are found in a balanced, good settling mixed liquor?
- A. Flagellates and amoeboid organisms
 - B. Flagellates and free swimming ciliated, but no stalked ciliates or rotifers
 - C. Free swimming and stalked ciliates, some flagellates, and amoeboid
37. How long would you allow an activated sludge plant to react and stabilize after a change?
- A. 12 hours
 - B. 1 day
 - C. 2 days
 - D. 1 week
38. A circular clarifier is 127 feet in diameter. It is 12 feet deep and receives a flow of 8700 gpm. What is detention time in hours for the clarifier?
- A. 1.7 hrs
 - B. 2.2 hrs
 - C. 3.4 hrs
 - D. 4.3 hrs
39. What should the chlorine feed rate be in lbs/day for a flow of 2.5 MGD and a dose of 12 mg/l?
- A. 25 lbs
 - B. 75 lbs
 - C. 157 lbs
 - D. 250 lbs
40. How many pounds of solids are pumped to a digester each day if the digester receives 10,000 gpd of sludge at 5% solids concentration?
- A. 417 lbs
 - B. 2243 lbs
 - C. 4170 lbs
 - D. 7523 lbs
41. A treatment plant receives a flow of 3.5 MGD. If the clarifier is 100 feet long, 30 feet wide, and 12 feet deep, what is the surface loading rate?
- A. 78 gal/ft²/day
 - B. 700 gal/ft²/day
 - C. 1170 gal/ft²/day
 - D. 1500 gal/ft²/day

42. A 3.9 MGD wastewater treatment plant, the influent suspended solids concentration to the primary clarifier is 240 mg/l. The primary sludge contains 3.2% TS and the primary effluent has a suspended solids concentration on 125 mg/l. How many gallons of primary sludge should be pumped in a day?
- A. 2025 gal/day
 - B. 7547 gal/day
 - C. 14,016 gal/day
 - D. 32,365 gal/day
43. In an electrical circuit, which wire is always the ground wire?
- A. White
 - B. Green
 - C. Red
 - D. Black
44. Increases or decreases in the wasting rate in the activated sludge process do not immediately affect the:
- A. Return rate
 - B. Solids inventory
 - C. MLSS concentration
 - D. F/M ratio
45. Review of laboratory analysis reveals a primary effluent ammonia concentration of 30 mg/l and a secondary effluent ammonia concentration of 0.6 mg/l. The reduction is most likely due to:
- A. Denitrification
 - B. High oxygen demand in the aeration tank
 - C. Nitrification
 - D. Nitrogen deficit
46. Small pin floc observed suspended throughout a moderately turbid secondary clarifier is a strong indication of which of the following:
- A. Sludge age is too high
 - B. Sludge may be under oxidized
 - C. Insufficient turbulence
 - D. None of the above

47. The primary disadvantage of the COD test is its susceptibility to interference by
- A. Ammonia nitrogen
 - B. Iron
 - C. Sulfide
 - D. Chloride
48. Which is most important water quality analysis of aerobic digester contents?
- A. Volatile acid/alkalinity ratio
 - B. Food to microorganisms ratio
 - C. Oxygen uptake rates
 - D. Alkalinity
49. Which of the following activated sludge processes are best suited for nitrification to occur?
- A. Extended Aeration
 - B. Conventional or plug flow
 - C. Step feed
 - D. Contact stabilization
50. The ratio of chlorine to ammonia nitrogen needed for a complete breakpoint chlorination reaction to occur is approximately:
- A. 1 part chlorine to 1 part ammonia nitrogen
 - B. 5 parts chlorine to 1 part ammonia nitrogen
 - C. 10 parts chlorine to 5 parts ammonia nitrogen
 - D. 1 part chlorine to 5 parts ammonia nitrogen
51. A thin billowing foam on the aeration basin of an activated sludge plant indicates:
- A. Normal operation
 - B. High F/M ratio
 - C. Low F/M ratio
 - D. Old sludge

52. A wastewater treatment plant has an average flow of 3.75 MGD. If the influent TSS concentration is 175 mg/l, how many pounds of suspended solids enter the plant in a day?
- A. 3,823 lbs
 - B. 4,908 lbs
 - C. 5,473 lbs
 - D. 7,564 lbs
53. A primary clarifier has an influent SS concentration of 185 mg/l. If the primary effluent is 100 mg/l, how many pounds of SS are removed by this unit per day if the flow is 1,500,000 gpd?
- A. 825 lbs
 - B. 1,063 lbs
 - C. 1,233 lbs
 - D. 1,576 lbs
54. If the influent BOD is 93 mg/l, the influent flow is 1,300,000 gpd, the MLVSS is 1,700 mg/l, and the aeration basin is 100 ft in diameter and 12 ft deep. What is the F/M ratio?
- A. .50 lbs
 - B. .10 lbs
 - C. .05 lbs
 - D. .02 lbs
55. What is the sludge age given the following information:
- Raw TSS = 212 mg/l
 - Flow = .47 MGD
 - 2 aeration basins = 40 ft diameter x 15ft deep
 - MLSS = 5651 mg/l
- A. 7.4 days
 - B. 13.6 days
 - C. 15.9 days
 - D. 20.5 days

Wastewater Questions – Answer Key

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|-----|---|-----|---|
| 1. | C | 29. | B |
| 2. | D | 30. | D |
| 3. | A | 31. | C |
| 4. | D | 32. | D |
| 5. | A | 33. | B |
| 6. | D | 34. | B |
| 7. | C | 35. | B |
| 8. | D | 36. | C |
| 9. | B | 37. | D |
| 10. | B | 38. | B |
| 11. | C | 39. | D |
| 12. | A | 40. | C |
| 13. | C | 41. | C |
| 14. | B | 42. | C |
| 15. | D | 43. | B |
| 16. | A | 44. | A |
| 17. | C | 45. | C |
| 18. | A | 46. | A |
| 19. | D | 47. | D |
| 20. | B | 48. | C |
| 21. | A | 49. | A |
| 22. | A | 50. | B |
| 23. | D | 51. | B |
| 24. | B | 52. | C |
| 25. | D | 53. | B |
| 26. | C | 54. | B |
| 27. | A | 55. | C |
| 28. | B | | |