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 to 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 he 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 on 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 m/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. 15,625 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

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			