

4. Examination Questions

1. Why does some of the suspended material in wastewater fail to be removed by settling for 1 hr? *Basic*

- a. Because it takes 1.5 hr to settle.
- b. Because it is lighter than water.
- c. Because it is attached to fine air bubbles.
- d. Because its specific gravity is very close to that of water and it is so small in size.
- e. All of the above.

2. The average particle to be removed in a sedimentation tank should *Advanced*

- a. Drop to the far end of the tank within the average detention time.
- b. Be carried halfway down the tank before settling.
- c. Fall directly into the sludge hopper.
- d. Be carried out in the effluent.

4. Scum collecting on the surface of a primary settling tank *Basic*

- a. Will not cause trouble and may be ignored.
- b. Must be removed by skimming or it will be troublesome.
- c. May be disposed of by stirring with a paddle.
- d. Is caused only by certain industries having inorganic wastes.

6. The test for settleable solids is useful in estimating *Basic*

- a. Gas production.
- b. Btu's.
- c. Removal efficiency of dissolved solids.
- d. Head loss in sludge pumping.
- e. Necessary sludge pumping rate.

7. The most positive way of knowing when sufficient sludge has been withdrawn from a primary settling tank is

Advanced

- a. To time the operation of the sludge pump.
- b. To measure the increased volume in the digester.
- c. To note the consistency of the sludge by sampling from the pump discharge or sludge well.
- d. To check for rising sludge in the settling tank.
- e. Take a reading the sludge pump time clock.

8. Raw sludge should be removed from a primary settling tank at any plant

Advanced

- a. At least hourly.
- b. Not more often than once a week.
- c. At least once a day.
- d. Whenever sludge rises to the surface.

9. The major purpose of an inlet baffle in a settling tank is to

- a. Reduce velocity and disperse the flow. *Basic*
- b. Increase velocity to prevent excessive settling near the inlet.
- c. Remove scum from the wastewater.
- d. Protect the scrapping mechanism from damage by excessive velocities.

10. If short-circuiting occurs in a clarifier, the operator should

Advanced

- a. Check the wiring.
- b. Identify the cause.
- c. Change fuses.
- d. Increase the sludge drawoff.
- e. Restart the pump.

11. The chief objection to the use of a long weir on a sedimentation tank is the

Advanced

- a. Prohibitive cost of construction.
- b. Increase in the necessary depth of the tank.
- c. Reduction in the velocity of the approach.
- d. Difficulty of securing uniform discharge over its entire length.
- e. Time required to change elevation as flow changes.

12. Saw-toothed weirs are used on uncovered circular sedimentation tanks to

Advanced

- a. Catch floating material.
- b. Save metal.
- c. Break up the overflow.
- d. Provide better flow distribution.
- e. Maintain a cleansing velocity.

13. The efficient operation of a primary sedimentation tank depends on the

Advanced

- a. Proper design of the tank.
- b. Condition of the wastewater.
- c. Characteristics of the wastewater.
- d. Operating care given by the operator.
- e. All of these.

14. You have an excessive DO drop across a primary clarifier. What is the most probable cause? *Advanced*
- Too heavy a wastewater flow.
 - Too infrequent sludge pumping.
 - Excessive BOD removal.
 - Poor adjustment on the weirs.
15. A good settling tank will always *Basic*
- Provide detention time to allow efficient settling.
 - Have long weirs to reduce the overflow velocities.
 - Provide good distribution of the influent waste.
 - Provide for all of the above.
16. Assume that the raw wastewater entering the primary clarifier contains 0.8 mg/l DO. As the wastewater passes through the primary clarifier, the dissolved oxygen will *Advanced*
- Stay the same.
 - Increase.
 - Decrease.
17. A colored dye solution was introduced into the wastewater entering a primary settling tank. The dye color was noticeable in the effluent in 15 min, and all of the color had passed through the tank in 30 min. You know that *Advanced*
- This tank is too large for the amount of flow being treated.
 - Settling in the tank must be exceptionally good.
 - Such a test has no meaning.
 - Wastewater is passing through the tank too quickly and settling is probably not very good.
18. Compacted and hardened sludge in a hopper may be caused by *Basic*
- Excessive quantities of grit in the sludge.
 - Too infrequent pumping.
 - Septic influent wastewater.
 - Sludge pH below 7.0.
19. Sludge from a settling tank should be drawn *Basic*
- Once a week.
 - Only in the morning.
 - On weekdays.
 - On a regular basis.
20. Septic action in a primary clarifier with mechanical removal equipment. *Basic*
- Is inherent in the design of this type of equipment and indicates normal performance.
 - Indicates that the sludge removal equipment is not operating in a satisfactory manner.
 - Improves the efficiency of the tank.

21. Which of the following would you first suspect if floating sludge were on a primary clarifier? Basic

- a. An increase in raw wastewater solids concentrations.
- b. A broken flight chain.
- c. That the withdrawal of sludge was not frequent enough.

22. The effluent weir of settling tanks should be level in order to prevent Basic

- a. Clogging of the "V" notch.
- b. Corrosion of the weir material.
- c. Filter fly from breeding.
- d. An uneven flow and short-circuiting.

23. The principal reason for frequent or continuous removal of sludge from a primary clarifier is Basic

- a. To keep the digester level up.
- b. To avoid anaerobic decomposition.
- c. To avoid clogging in sludge lines.
- d. To avoid sludge with a high moisture content.

24. In drawing sludge from a primary clarifier, the best practice is to Basic

- a. Draw small quantities of sludge two or more times each day.
- b. Draw a large quantity of sludge once each day.
- c. Draw only as often as is necessary, which is usually about once each week.

25. If the BOD reduction in a primary clarifier is about 15 percent, you may conclude that Advanced

- a. The plant is underloaded.
- b. The detention time is too short.
- c. This is normal.
- d. The grit chamber is too small.

26. The purpose of the baffle at the inlet of a primary settling tank is to Advanced

- a. Deflect the wind.
- b. Maintain the proper water level in the tank.
- c. Cause the flow into the tank to be distributed as evenly as possible, thus helping to eliminate fast-moving currents.
- d. Hold the side walls of a tank a fixed distance apart.

27. Sludge should be withdrawn from final settling tanks used after a trickling filter Basic

- a. When it has accumulated to a depth of 6 in. in the bottom of the tank.
- b. When it is as concentrated as possible.
- c. Every morning at 8 a.m.
- d. Often enough to prevent creation of septic conditions.

28. The sludge from the final tank of a trickling filter may best be disposed of by pumping *Basic*

- a. Directly to a sand bed.
- b. Or draining at intervals to the river.
- c. Directly to the digestion tank.
- d. Back to the influent sewer or to the primary settling tank.

29. If outlet weirs in clarifiers are not kept level, which conditions are likely to occur? *Basic*

- a. Solids removal will decrease and uneven flow distribution will occur.
- b. Solids removal will decrease and floating solids will be intercepted.
- c. Settled solids will become septic and uneven flow distribution will occur.
- d. Settled solids will become septic and floating solids will be intercepted.

30. Secondary or final clarifiers are needed to *Basic*

- a. Increase sludge digestion.
- b. Allow septic conditions to develop.
- c. Provide a home for organisms.
- d. Remove solids from effluent of activated sludge or trickling filter unit.
- e. None of these.

31. The principal difference between a sludge blanket-type clarifier and a conventional clarifier is that in the former

- a. Coagulants are added in the clarifier. *Advanced*
- b. Prechlorination is used.
- c. The flow is usually upward.
- d. Weirs are notched.

32. If insufficient withdrawal of secondary sludge is assumed, which of the following conditions would you expect to find existing? *Advanced*

- a. Presence of gas bubbles in the secondary clarifier.
- b. Sludge rising to the surface in the secondary clarifier.
- c. Sludge in the chlorine contact chamber.
- d. Odors near the secondary clarifier.
- e. All of the above.
- f. None of the above.

33. The detention time of wastewater in sedimentation basins is dependent on the size of the basin and the *Advanced*

- a. Rate of flow of the wastewater into it.
- b. Length of the discharge pipe.
- c. Amount of bacteria in the wastewater.
- d. BOD content.
- e. Amount of hydrogen sulfide in the wastewater.

34. If you have a choice, it is preferable to pump the sludge from the intermediate and final settling tanks to **Advanced**

- a. The primary settling tank.
- b. The digester.
- c. The sludge beds.
- d. The filter.

35. Sludge should be pumped from the final settling tanks of a conventional activated sludge plant. **Advanced**

- a. At least once a day.
- b. When sampling indicates the sludge is about 2 ft deep.
- c. Continuously.
- d. Often enough to prevent flotation of sludge solids resulting from septic action.

Answer Key

SECTION 4 - Sedimentation

- | | |
|-----------|-------|
| 1. e | 19. d |
| 2. b | 20. b |
| | 21. c |
| 4. b | 22. d |
| | 23. b |
| 6. e | 24. a |
| 7. c | 25. b |
| 8. a | 26. c |
| 9. a | 27. d |
| 10. b | 28. a |
| 11. d | 29. a |
| 12. d | 30. d |
| 13. e | 31. c |
| 14. b | 32. e |
| 15. d | 33. a |
| 16. c | 34. a |
| 17. d | 35. c |
| 18. a & b | |