Registration form

Wastewater Treatment System Operator Training Course $150.00
48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL $50.00

Start and Finish Dates: _____
You will have 90 days from this date in order to complete this course

Name_____**Signature**_____
I have read and understood the disclaimer notice on page 2. Digitally sign XXX

Address: _____

City_____**State**_____**Zip**_____

Email_____ **Fax (_____)**_____

Phone:
Home (_____)_____ **Work (_____)**_____

Operator ID #_____**Exp Date**_____

Please circle/check which certification you are applying the course CEU's.

Collection___ Wastewater Treatment ___ Other _____

Your certificate will be mailed to you in about two weeks unless you pay for the rush service.

Technical Learning College
PO Box 420, Payson AZ 85547-0420
Fax (928) 272-0747 Back-up Fax (928) 468-0675
(928) 468-0665 Toll Free (866) 557-1746 info@tlch2o.com

CCV Security Code _____

Discover card
American Express
Visa or MasterCard #_____**Exp. Date**_____

If you've paid on the Internet, Please write your customer#_____

Referral's Name_____

We will stop mailing the certificate of completion so we need either your fax number or e-mail address. We will e-mail the certificate to you, if no e-mail address; we will fax it to you.

DISCLAIMER NOTICE
I understand that it is my responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. I understand State laws and rules change on a frequent basis and I believe this course is currently accepted in my State for CEU or contact hour credit, if it is not, I will not hold Technical Learning College responsible. I also understand that this type of study program deals with dangerous conditions and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable for any errors or omissions or advice contained in this CEU education training course or for any violation or injury caused by this CEU education training course material. I will call or contact TLC if I need help or assistance and double-check to ensure my registration page and assignment has been received and graded.

State Approval Listing Link, check to see if your State accepts or has pre-approved this course. Not all States are listed. Not all courses are listed. If the course is not accepted for CEU credit, we will give you the course free if you ask your State to accept it for credit.

Professional Engineers; Most states will accept our courses for credit but we do not officially list the States or Agencies. Please check your State for approval.

State Approval Listing URL…
http://www.tlch2o.com/PDF/CEU%20State%20Approvals.pdf

You can obtain a printed version of the course manual from TLC for an additional $79.95 plus shipping charges.

AFFIDAVIT OF EXAM COMPLETION
I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

Grading Information
In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

For security purposes, please fax or e-mail a copy of your driver's license and always call us to confirm we've received your assignment and to confirm your identity.

Thank you…

WWT System Operator Answer Key

Name_____

Phone # _____

Please Circle, Bold, Underline or X, one answer per question.

1.	A B C D E	42.	A B C D E	83.	A B C D E
2.	A B C D E	43.	A B C D E	84.	A B C D E
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275.	A	B	C	D	E	284.	A	B	C	D	E	293.	A	B	C	D	E
276.	A	B	C	D	E	285.	A	B	C	D	E	294.	A	B	C	D	E
277.	A	B	C	D	E	286.	A	B	C	D	E	295.	A	B	C	D	E
278.	A	B	C	D	E	287.	A	B	C	D	E	296.	A	B	C	D	E
279.	A	B	C	D	E	288.	A	B	C	D	E	297.	A	B	C	D	E
280.	A	B	C	D	E	289.	A	B	C	D	E	298.	A	B	C	D	E
281.	A	B	C	D	E	290.	A	B	C	D	E	299.	A	B	C	D	E
282.	A	B	C	D	E	291.	A	B	C	D	E	300.	A	B	C	D	E

Please fax the answer key to TLC Western Campus Fax (928) 272-0747

Always call us after faxing the paperwork to ensure that we've received it.

Rush Grading Service
If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush service handling fee of $50.00. This fee may not cover postage costs. If you need this service, simply write RUSH on the top of your Registration Form. We will place you in the front of the grading and processing line. Thank you…

We will stop mailing the certificate of completion so we need either your fax number or e-mail address. We will e-mail the certificate to you, if no e-mail address; we will fax it to you.

Please e-mail or fax this survey along with your final exam

WASTEWATER SYSTEM OPERATOR CEU COURSE
CUSTOMER SERVICE RESPONSE CARD

NAME: _____

E-
MAIL_____PHONE_____

PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE ANSWER IN THE AREA BELOW.

1. Please rate the difficulty of your course.
   Very Easy 0 1 2 3 4 5 Very Difficult

2. Please rate the difficulty of the testing process.
   Very Easy 0 1 2 3 4 5 Very Difficult

3. Please rate the subject matter on the exam to your actual field or work.
   Very Similar 0 1 2 3 4 5 Very Different

4. How did you hear about this Course? _____

5. What would you do to improve the Course?

How about the price of the course?

Poor_____ Fair ____ Average ____ Good____ Great_____

How was your customer service?

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Any other concerns or comments.

Wastewater Treatment System Operator Training Assignment

The Wastewater Treatment System Operator Assignment is available in Word on the Internet for your convenience, please visit www.ABCTLC.com and download the assignment and e-mail it back to TLC.

You will have 90 days from receipt of this manual to complete it in order to receive your Professional Development Hours (PDHs) or Continuing Education Unit (CEU). A score of 70 % or better is necessary to pass this course. If you should need any assistance, please email or fax all concerns and the completed ANSWER KEY to info@tlch2o.com.

Please select one answer per question and mark the best answer on the answer key.

Key Wastewater Words

1. Amino acid: A functional group consisting of a carbon with a carboxylic acid, "-COOH" and an amine, "-NH2." These compounds are the _____.
A. Use molecular oxygen
B. Oxygen from inorganic ions
C. Very low levels of molecular oxygen
D. Building blocks for proteins
E. None of the Above

2. Anabolism Biosynthesis: The production of new cellular materials from other _____.
A. Organic or inorganic chemicals
B. Oxygen from inorganic ions
C. Very low levels of molecular oxygen
D. Oxidation of ammonia and ammonium
E. None of the Above

3. Anaerobes: A group of organisms that do not require molecular oxygen. These organisms, as well as all known life forms, require oxygen. These organisms obtain their _____such as nitrate or sulfate or from protein.
A. Use molecular oxygen
B. Oxygen from inorganic ions
C. Very low levels of molecular oxygen
D. Oxidation of ammonia and ammonium
E. None of the Above

4. Anaerobic process: A process that only occurs in the _____.
A. Use molecular oxygen
B. Oxygen from inorganic ions
C. Absence of molecular oxygen
D. Oxidation of ammonia and ammonium
E. None of the Above

5. Anoxic process: A process that occurs only at _____or in the absence of molecular oxygen.
A. Use molecular oxygen
B. Oxygen from inorganic ions
C. Absence of molecular oxygen
D. Very low levels of molecular oxygen
E. None of the Above

6. Biochemical oxygen demand (BOD): The amount of oxygen required to oxidize any organic matter present in a water during a specified period of time, usually 5 days. It is an _____of the amount of organic matter present in a water.
A. Returning nutrients
B. Organic matter present in a water
C. Oxygen required to oxidize any organic matter
D. Consumption of oxygen
E. None of the Above

7. Carbonaceous biochemical oxygen demand (CBOD): The amount of _____ containing matter present in a water.
A. Returning nutrients
B. Organic matter present in a water
C. Oxygen required to oxidize any carbon
D. Consumption of oxygen
E. None of the Above

8. Chemical oxygen demand (COD) : The amount of _____in the water using harsh chemical conditions.
A. Returning nutrients
B. Organic matter present in a water
C. Oxygen required to oxidize any organic matter
D. Consumption of oxygen
E. None of the Above

9. Decomposers: Organisms that utilize energy from wastes or dead organisms. Decomposers complete the cycle by _____to the soil or water and carbon dioxide to the air or water.
A. Returning nutrients
B. Organic matter present in a water
C. Oxygen required to oxidize any organic matter
D. Consumption of oxygen
E. None of the Above

10. Denitrification: The _____ of nitrate to nitrogen gas. It occurs naturally in surface waters low in oxygen, and it can be engineered in wastewater treatment systems.
A. Returning nutrients
B. Organic matter present in a water
C. Anoxic biological conversion
D. Consumption of oxygen
E. None of the Above

11. Deoxygenation: The consumption of oxygen by the different aquatic organisms as they _____ in the aquatic environment.
A. Returning nutrients
B. Organic matter present in a water
C. Oxidize materials
D. Consumption of oxygen
E. None of the Above

12. Facultative: A group of microorganisms which prefer or preferentially use molecular oxygen when available, but are capable of using other pathways for energy and synthesis _____is not available.
A. Specific F/M ratio
B. If molecular oxygen
C. Oxidize any ammonia
D. None of the Above

13. F/M Ratio: Another method for control wasting is to maintain a constant food-to-microorganism (F:M or F/M) ratio. With this method, the operator will try to increase or decrease the _____ to match an increase or decrease in the BOD entering the plant. Most plants will operate best at a specific F/M ratio between 0.05 - 0.1.
A. Specific F/M ratio
B. Nitrification
C. Oxidize any ammonia
D. Optimum F/M
E. None of the Above

14. If the _____has been determined from experience and can be maintained, a good effluent may be produced with consistent plant operation.
A. Specific F/M ratio
B. Nitrification
C. Oxidize any ammonia
D. Optimum F/M
E. None of the Above

15. The _____is to be calculated at least weekly and related to the efficiency of treatment plant operation.
A. F/M ratio
B. Nitrification
C. Oxidize any ammonia
D. Optimum F/M
E. None of the Above

16. An _____between 0.05 - 0.15 BOD/lb MLSS is usually considered acceptable for an extended aeration process.
A. F/M ratio
B. Nitrification
C. Oxidize any ammonia
D. Optimum F/M
E. None of the Above

17. Nitrification: The biological _____ sequentially to nitrite and then nitrate. It occurs naturally in surface waters, and can be engineered in wastewater treatment systems.
A. Use molecular oxygen
B. Oxygen from inorganic ions
C. Very low levels of molecular oxygen
D. Oxidation of ammonia and ammonium
E. None of the Above

18. The purpose of _____ in wastewater treatment systems is a reduction in the oxygen demand resulting from the ammonia.
A. Specific F/M ratio
B. Nitrification
C. Oxidize any ammonia
D. Optimum F/M
E. None of the Above

19. Nitrogen fixation: The conversion of atmospheric (or dissolved) nitrogen gas into_____.
A. Specific F/M ratio
B. Nitrate by microorganisms
C. Oxidize any ammonia
D. Optimum F/M
E. None of the Above

20. Nitrogenous oxygen demand (NOD) : The amount of oxygen required to _____ present in a water.
A. Specific F/M ratio
B. Nitrification
C. Oxidize any ammonia
D. Optimum F/M
E. None of the Above

21. NPDES: The National Pollutant Discharge Elimination System. The discharge criteria and permitting system established by the U.S. EPA as a result of the Clean Water Act and its subsequent amendments or the permit required by _____ as a result of the Clean Water Act.
A. Each discharger
B. Concentration of contaminants
C. Typically calculated
D. Primary treatment
E. None of the Above

22. MCRT Mean Cell Residence Time: The average time a given unit of cell mass stays in the activated sludge biological reactor. It is typically calculated as the total mixed liquor suspended solids in the biological reactor divided by the _____ in the effluent and solids wasted.
A. Permit required
B. Combination of solids
C. Typically calculated
D. Primary treatment
E. None of the Above

23. Mixed liquor suspended solids (MLSS): The total suspended solids _____ in the activated sludge tank.
A. Permit required
B. Concentration
C. Typically calculated
D. Primary treatment
E. None of the Above

24. Mixed liquor volatile suspended solids (MLVSS): The _____ in the activated sludge tank.
A. Volatile suspended solids concentration
B. Concentration of contaminants
C. Typically calculated
D. Primary treatment
E. None of the Above

25. Organic compound: Any compound _____ except for the carbonates (carbon dioxide, the carbonates and bicarbonates), the cyanides, and cyanates.
A. Permit required
B. Concentration of contaminants
C. Typically calculated
D. Containing carbon
E. None of the Above

26. Organic nitrogen: Nitrogen _____in organic compounds such as amino acids and proteins.
A. Contained as amines
B. Concentration of contaminants
C. Typically calculated
D. Primary treatment
E. None of the Above

27. Oxidative phosphorylation: The synthesis of the _____ compound adenosine triphosphate (ATP) from adenosine diphosphate (ADP) using a chemical substrate and molecular oxygen.
A. Energy storage
B. Concentration of contaminants
C. Typically calculated
D. Primary treatment
E. None of the Above

28. Secondary treatment: In wastewater treatment, the conversion of the suspended, colloidal and dissolved organics remaining after _____ into a microbial mass which is then removed in a second sedimentation process.
A. Permit required
B. Concentration of contaminants
C. Typically calculated
D. Primary treatment
E. None of the Above

29. Secondary treatment includes both the biological process and the _____.
A. Associated sedimentation process
B. Concentration of contaminants
C. Typically calculated
D. Primary treatment
E. None of the Above

30. Sludge: A _____waste material and water.
A. Permit required
B. Mixture of solid
C. Typically calculated
D. Primary treatment
E. None of the Above

31. Sludges result from the _____ in water and wastewater treatment processes.
A. Permit required
B. Concentration of contaminants
C. Typically calculated
D. Primary treatment
E. None of the Above

32. Typical wastewater sludges contain from 0.5 to 10 percent solid matter. Typical water treatment sludges _____ solids.
A. Vaporize easily
B. Organic and inorganic matter
C. Amount of oxygen
D. Contain 8 to 10 percent
E. None of the Above

33. Thiols: Organic compounds which contain the _____ functional group. Also called mercaptans.
A. Vaporize easily
B. Organic and inorganic matter
C. Amount of oxygen
D. Contain 8 to 10 percent
E. None of the Above

34. Total dissolved solids (TDS) : Is the amount of _____ in a water.
A. Vaporize easily
B. Organic and inorganic matter
C. Amount of oxygen
D. Dissolved matter
E. None of the Above

35. Total solids (TS): Is the amount of _____ and inorganic matter that is contained in a water.
A. Vaporize easily
B. Organic
C. Amount of oxygen
D. Contain 8 to 10 percent
E. None of the Above

36. Total suspended solids (TSS): is the amount of _____ matter in a water.
A. Suspended (filterable)
B. Organic and inorganic matter
C. Amount of oxygen
D. Contain 8 to 10 percent
E. None of the Above

37. Ultimate biochemical oxygen demand (BODu) : The total amount of oxygen required to oxidize any _____ present in a water, i.e. after an extended period, such as 20 or 30 days.
A. Vaporize easily
B. Organic matter
C. Amount of oxygen
D. Contain 8 to 10 percent
E. None of the Above

38. Virus: A submicroscopic genetic constituent that can alternate between_____. As a virus particle, or virion, it is DNA or RNA enveloped in an organic capsule. As an intracellular virus, it is viral DNA or RNA inserted into the host organisms DNA or RNA.
A. Vaporize easily
B. Organic and inorganic matter
C. Two distinct phases
D. Contain 8 to 10 percent
E. None of the Above

39. Volatile: A material that will _____.
A. Vaporize easily
B. Organic and inorganic matter
C. Amount of oxygen
D. Contain 8 to 10 percent
E. None of the Above

40. Volatile solids (VS): Is the amount of matter which _____ when a water sample is heated to 550^0C.
A. Volatilizes (or burns)
B. Organic and inorganic matter
C. Amount of oxygen
D. Contain 8 to 10 percent
E. None of the Above

What is Wastewater Treatment?
41. _____is the process of cleaning used water and sewage so it can be returned safely to our environment.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

42. _____is the last line of defense against water pollution. If you envision the water cycle as a whole, you can see clean water produced by wastewater treatment is the same water that eventually ends up back in our lakes and rivers where we get our drinking water.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

Why Are Wastewater Treatment Plants Important?
43. Wastewater treatment plants are vital to _____. They protect public health by eliminating disease-causing bacteria from water.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. Our communities
E. None of the Above

44. By protecting water quality, _____plants make it possible for us to safely enjoy the recreational use of clean oceans, lakes, streams and rivers.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

33 U.S.C. s/s 1251 et seq. (1977)
45. The _____is a 1977 amendment to the Federal Water Pollution Control Act (PCA) of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

46. The law gave the _____ the authority to set effluent standards on an industry basis (technology-based) and continued the requirements to set water quality standards for all contaminants in surface waters.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

47. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit (_____) is obtained under the act.
A. Wastewater Treatment
B. Clean Water Act
C. NPDES
D. EPA
E. None of the Above

48. The 1977 amendments focused on toxic pollutants. In 1987, the PCA was reauthorized and again focused on toxic substances, authorized citizen suit provisions, and funded sewage treatment plants (_____) under the Construction Grants Program.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

49. The CWA provides for the delegation by the _____ of many permitting, administrative, and enforcement aspects of the law to state governments.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

50. In states with the authority to implement_____programs, the EPA still retains oversight responsibilities.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

51. In 1972, Congress enacted the first comprehensive national clean water legislation in response to growing public concern for serious and widespread water pollution. The _____is the primary federal law that protects our nation’s waters, including lakes, rivers, aquifers and coastal areas.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

52. The Potomac River was clogged with blue-green algae blooms that were a nuisance and a threat to public health. Many of the _____were little more than open sewers and sewage frequently washed up on shore. Fish kills were a common sight. Wetlands were disappearing at a rapid rate.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

53. Today, the _____has improved dramatically as a result of a cooperative effort by federal, state, tribal and local governments to implement the pollution control programs established in 1972 by the Clean Water Act.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

54. The _____primary objective is to restore and maintain the integrity of the nation's waters. This objective translates into two fundamental national goals: eliminate the discharge of pollutants into the nation's waters, and achieve water quality levels that are fishable and swimmable.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

55. The _____focuses on improving the quality of the nation’s waters. It provides a comprehensive framework of standards, technical tools, and financial assistance to address the many causes of pollution and poor water quality.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

56. This includes municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and _____.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

57. The _____requires major industries to meet performance standards to ensure pollution control, charges states and tribes with setting specific water quality criteria appropriate for their waters.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

58. After 25 years, the _____ continues to provide a clear path for clean water and a solid foundation for an effective national water program.
A. Wastewater Treatment
B. Clean Water Act
C. POTW's
D. EPA
E. None of the Above

In 1972
59. Only a third of the nation's waters were safe for _____. Wetlands losses were estimated at about 460,000 acres annually.
A. Dissolved and suspended solid
B. Phosphorus and nitrogen
C. Fishing and swimming
D. Economy and aquatic
E. None of the Above

60. Agricultural runoff resulted in the erosion of 2.25 billion tons of soil and the deposit of large amounts of _____into many waters. Sewage treatment plants served only 85 million people.
A. Dissolved and suspended solid
B. Phosphorus and nitrogen
C. Fishing and swimming
D. Economy and aquatic
E. None of the Above

The Future
61. All Americans will enjoy clean water that is safe for fishing and swimming. We will achieve a net gain of wetlands by preventing additional _____ hundreds of thousands of acres of wetlands.
A. Dissolved and suspended solid
B. Phosphorus and nitrogen
C. Losses and restoring
D. Economy and aquatic
E. None of the Above

62. Soil erosion and runoff of phosphorus and nitrogen into watersheds will be minimized, helping to sustain the nation's farming economy and aquatic systems. The nation's waters will be free of effects of _____.
A. Dissolved and suspended solid
B. Sewage discharges
C. Fishing and swimming
D. Economy and aquatic
E. None of the Above

Regulation Highlights
63. Sewage is the wastewater released by residences, businesses and industries in a community. It is 99.94 percent water, with only 0.06 percent of the wastewater _____material.
A. Dissolved and suspended solid
B. Phosphorus and nitrogen
C. Fishing and swimming
D. Economy and aquatic
E. None of the Above

64. The _____ is caused by suspended particles that in untreated sewage range from 100 to 350 mg/l.
A. Disease-causing organisms
B. Cloudiness of sewage
C. Biochemical oxygen demand
D. Coliform bacteria and other pollutants
E. None of the Above

65. A measure of the strength of the wastewater is _____, or BOD5.
A. Disease-causing organisms
B. Cloudiness of sewage
C. Biochemical oxygen demand
D. Coliform bacteria and other pollutants
E. None of the Above

66. The BOD5 measures the amount of oxygen microorganisms required to break down sewage in five days. Untreated sewage has a BOD5 ranging from 100 mg/l to 300 mg/l. Pathogens or _____ are present in sewage.
A. Disease-causing organisms
B. Cloudiness of sewage
C. Biochemical oxygen demand
D. Coliform bacteria and other pollutants
E. None of the Above

67. Coliform bacteria are used as an indicator of _____.
A. Disease-causing organisms
B. Cloudiness of sewage
C. Biochemical oxygen demand
D. Coliform bacteria and other pollutants
E. None of the Above

68. Sewage also contains nutrients (such as ammonia and phosphorus), minerals, and metals. Ammonia can range from 12 to 50 mg/l and _____ can range from 6 to 20 mg/l in untreated sewage.
A. Disease-causing organisms
B. Cloudiness of sewage
C. Biochemical oxygen demand
D. Phosphorus
E. None of the Above

69. Sewage treatment is a multi-stage process to renovate wastewater before it reenters a body of water, is applied to the land or is reused. The goal is to reduce or remove organic matter, solids, nutrients, _____and other pollutants from wastewater.
A. Disease-causing organisms
B. Cloudiness of sewage
C. Coliform bacteria and other pollutants
D. None of the Above

70. Each receiving body of water has limits to the amount of pollutants it can receive without degradation. Therefore, each sewage treatment plant must hold a permit listing the allowable levels of BOD5, suspended solids, _____.
A. Disease-causing organisms
B. Cloudiness of sewage
C. Biochemical oxygen demand
D. Coliform bacteria and other pollutants
E. None of the Above

71. The _____are called NPDES permits which stands for the National Pollutant Discharge Elimination System.
A. Disease-causing organisms
B. Cloudiness of sewage
C. Biochemical oxygen demand
D. Coliform bacteria and other pollutants
E. None of the Above

72. A person shall not install or _____ between any part of a sewage treatment facility and a potable water supply, so sewage or wastewater contaminates a potable or public water supply.
A. Disease-causing organisms
B. Maintain a connection
C. Biochemical oxygen demand
D. Coliform bacteria and other pollutants
E. None of the Above

Preliminary and Secondary Treatment Overview
73. The Preliminary Treatment is a purely physical stage consisting of Coarse Screening, Raw Influent Pumping, Static Fine Screening, _____, and Selector Tanks.
A. Raw Influent Pumping
B. Raw wastewater
C. Static Fine Screening
D. Grit Removal
E. None of the Above

74. The _____ enters from the collection system into the Coarse Screening process.
A. Raw Influent Pumping
B. Raw wastewater
C. Static Fine Screening
D. Grit Removal
E. None of the Above

75. The Coarse Screening consists of a basket-shaped bar screen which collects larger debris (several inches in diameter) prior to the _____. This debris is removed and placed into a dumpster for disposal into the landfill.
A. Raw Influent Pumping
B. Raw wastewater
C. Static Fine Screening
D. Grit Removal
E. None of the Above

76. The wastewater then passes into the _____ process that consists of three submersible centrifugal pumps.
A. Raw Influent Pumping
B. Raw wastewater
C. Static Fine Screening
D. Grit Removal
E. None of the Above

77. These _____ operate under a principal termed prerotation, which allows them to vary their pump rate hydraulically without the use of complex and expensive electronics.
A. Influent Pumps
B. Raw wastewater
C. Static Fine Screening
D. None of the Above

78. The flow then passes into the _____ process, which consists of two stationary (or static) screens which remove finer debris not captured by the coarse screens.
A. Raw Influent Pumping
B. Raw wastewater
C. Static Fine Screening
D. Grit Removal
E. None of the Above

79. This screened debris is then dewatered and collected in _____ for disposal into a landfill.
A. Hoppers
B. Secondary Clarification
C. Oxidation Ditches
D. Biological process
E. None of the Above

80. The wastewater then passes into the _____ process which consists of two vortex grit separators which produce a whirlpool action to force the finest debris to the outside perimeter for subsequent collection.
A. Raw Influent Pumping
B. Raw wastewater
C. Static Fine Screening
D. Grit Removal
E. None of the Above

81. This debris is then collected in hoppers, dewatered, and disposed into a landfill. The screened and de-gritted wastewater then enters into the Selector Tanks process, which is composed of two rectangular tanks which combine the flow with Return Sludge (consisting mainly of microorganisms) for entry into the biological, or _____ stage.
A. Hoppers
B. Secondary Treatment
C. Oxidation Ditches
D. Biological process
E. None of the Above

82. The Secondary Treatment stage consists of a biological process, _____and a physical process, Secondary Clarification.
A. Hoppers
B. Secondary Clarification
C. Oxidation Ditches
D. None of the Above

83. The _____ stage removed as much solids as possible using physical processes, however, very fine solids are still present that cannot be removed physically.
A. Preliminary Treatment
B. Secondary Clarification
C. Oxidation Ditches
D. Biological process
E. None of the Above

84. The wastewater enters from _____ into the Oxidation Ditches process which is a biological process consisting of two large oval-shaped basins which are capable of removing these finer solids.
A. Hoppers
B. Secondary Clarification
C. Preliminary Treatment
D. Biological process
E. None of the Above

85. This is accomplished by maintaining a population of microorganisms within the _____which consume the very fine solids (which are primarily organic) and also adhere to the solids themselves.
A. Hoppers
B. Secondary Clarification
C. Oxidation Ditches
D. Biological process
E. None of the Above

86. By consuming and adhering to these finer solids, they form larger and _____that can be physically separated.
A. Hoppers
B. Secondary Clarification
C. Oxidation Ditches
D. Biological process
E. None of the Above

87. After this process has taken place within the Oxidation Ditches Process the wastewater then enters _____process which can provide this physical separation.
A. Hoppers
B. Secondary Clarification
C. Oxidation Ditches
D. Biological process
E. None of the Above

88. The _____process consists of four rectangular tanks which provide quiescent (or calm) conditions which allow the larger aggregates of solids and microorganisms to settled out for collection.
A. Hoppers
B. Secondary Clarification
C. Oxidation Ditches
D. Biological process
E. None of the Above

89. The clear overflow (or upper layer) is collected at the end of the tank and passed onto the _____ process for additional treatment.
A. Hoppers
B. Pumping stations
C. Oxidation Ditches
D. Tertiary Filtration
E. None of the Above

90. The majority of microorganism-rich underflow (or lower layer) is re-circulated to Selector Tanks as Return Sludge to help sustain the microorganism population in the _____process.
A. Hoppers
B. Pumping stations
C. Oxidation Ditches
D. Tertiary Filtration
E. None of the Above

91. If all the underflow was returned the plant would soon become overloaded with solids, therefore, a small portion of this mixture termed _____, is removed from the system for disposal.
A. Waste Sludge
B. Pumping stations
C. Oxidation Ditches
D. Tertiary Filtration
E. None of the Above

92. The Waste Sludge is transported into the _____ process for disposal.
A. Hoppers
B. Solids Handling
C. Oxidation Ditches
D. Tertiary Filtration
E. None of the Above

93. One of the most common forms of pollution control in the United States is wastewater treatment. The country has a vast system of collection sewers, _____, and treatment plants.
A. Hoppers
B. Pumping stations
C. Oxidation Ditches
D. Tertiary Filtration
E. None of the Above

94. Sewers collect the _____ from homes, businesses, and many industries, and deliver it to plants for treatment.
A. Clarifiers
B. New bacterial cells
C. Wastewater
D. Wastewater for discharge
E. None of the Above

95. Most treatment plants were built to clean _____into streams or other receiving waters, or for reuse.
A. Clarifiers
B. New bacterial cells
C. Domestic and industrial wastewater
D. Wastewater for discharge
E. None of the Above

96. Years ago, when sewage was dumped into waterways, a natural process of _____. First, the sheer volume of clean water in the stream diluted wastes.
A. Clarifiers
B. Purification began
C. Domestic and industrial wastewater
D. Wastewater for discharge
E. None of the Above

97. Bacteria and other small organisms in the water consumed the sewage and other organic matter, turning it into _____; carbon dioxide and other products.
A. Clarifiers
B. New bacterial cells
C. Domestic and industrial wastewater
D. Wastewater for discharge
E. None of the Above

98. Today's higher populations and greater volume of domestic and industrial wastewater require communities to give nature a helping hand. The basic function of wastewater treatment is to speed up the _____ by which water is purified.
A. Clarifiers
B. Natural process
C. Domestic and industrial wastewater
D. Wastewater for discharge
E. None of the Above

99. There are two basic stages in the treatment of wastes: _____.
A. Clarifiers
B. Primary and secondary
C. Domestic and industrial wastewater
D. Wastewater for discharge
E. None of the Above

100. In the primary stage, solids are settled and removed from wastewater using _____.
A. Clarifiers
B. New bacterial cells
C. Domestic and industrial wastewater
D. Wastewater for discharge
E. None of the Above

101. The secondary stage uses _____ to further purify wastewater. Sometimes, these stages are combined into one operation.
A. Clarifiers
B. New bacterial cells
C. Biological processes
D. Wastewater for discharge
E. None of the Above

What is in Wastewater?
102. Wastewater is mostly water by weight. Other materials make up only a small portion of wastewater, but can be present in large enough quantities to _____ and the environment.
A. Pose a risk
B. Turn wastes
C. Potential pollutants
D. Endanger public health
E. None of the Above

103. Because practically anything that can be flushed down a toilet, drain, or sewer can be found in wastewater, even household sewage contains many _____.
A. Pose a risk
B. Turn wastes
C. Potential pollutants
D. Essential contributors
E. None of the Above

104. The wastewater components that should be of most concern to homeowners and communities are those that have the _____ or detrimental environmental effects.
A. Pose a risk
B. Potential to cause disease
C. Potential pollutants
D. Essential contributors
E. None of the Above

Organisms
105. Many different types of organisms live in wastewater and some are _____ to treatment.
A. Pose a risk
B. Turn wastes
C. Potential pollutants
D. Essential contributors
E. None of the Above

106. A variety of bacteria, protozoa, and worms work to_____ carbon-based (organic) pollutants in wastewater by consuming them.
A. Pose a risk
B. Break down certain
C. Potential pollutants
D. Essential contributors
E. None of the Above

107. Through this process, organisms turn wastes into carbon dioxide, water, or _____.
A. Pose a risk
B. Turn wastes
C. Potential pollutants
D. New cell growth
E. None of the Above

108. Bacteria and other microorganisms are particularly plentiful in wastewater and accomplish most of the treatment. Most wastewater treatment systems are designed to rely in large part on _____.
A. Pose a risk
B. Biological processes
C. Potential pollutants
D. Essential contributors
E. None of the Above

Pathogens
109. Many _____, parasites, and bacteria are also present in wastewater and enter from almost anywhere in the community.
A. Pose a risk
B. Disease-causing viruses
C. Potential pollutants
D. Essential contributors
E. None of the Above

110. These pathogens often _____ and animals that are infected with or are carriers of a disease.
A. Pose a risk
B. Originate from people
C. Potential pollutants
D. Essential contributors
E. None of the Above

111. Graywater and blackwater from typical homes contain _____ to pose a risk to public health. Other likely sources in communities include hospitals, schools, farms, and food processing plants.
A. Enough pathogens
B. Wastewater-related diseases
C. Some illnesses
D. Polluted by wastewater
E. None of the Above

112. Some illnesses from _____sources are relatively common.
A. Composed of the carbon-based chemicals
B. Wastewater-related
C. Some illnesses
D. Polluted by wastewater
E. None of the Above

113. Gastroenteritis can result from a variety of pathogens in wastewater, and cases of illnesses caused by the parasitic protozoa Giardia lambia and Cryptosporidium are not unusual in the U.S. Other important _____include hepatitis A, typhoid, polio, cholera, and dysentery.
A. Composed of the carbon-based chemicals
B. Wastewater-related diseases
C. Some illnesses
D. Polluted by wastewater
E. None of the Above

114. Outbreaks of these _____ can occur as a result of drinking water from wells polluted by wastewater, eating contaminated fish, or recreational activities in polluted waters. Some illnesses can be spread by animals and insects that come in contact with wastewater.
A. Composed of the carbon-based chemicals
B. Diseases
C. Some illnesses
D. Polluted by wastewater
E. None of the Above

115. Even municipal drinking water sources are not completely immune to _____ from wastewater pathogens.
A. Composed of the carbon-based chemicals
B. Wastewater-related diseases
C. Some illnesses
D. Health risks
E. None of the Above

116. Drinking water treatment efforts can become overwhelmed when water resources are heavily polluted by wastewater. For this reason, _____ is as important to public health as drinking water treatment.
A. Composed of the carbon-based chemicals
B. Wastewater treatment
C. Some illnesses
D. Polluted by wastewater
E. None of the Above

Organic Matter
117. _____are found everywhere in the environment. They are composed of the carbon-based chemicals that are the building blocks of most living things.
A. Synthetic organic compounds
B. Organic compounds
C. Organic materials
D. Biodegradable materials
E. None of the Above

118. _____in wastewater originate from plants, animals, or synthetic organic compounds, and enter wastewater in human wastes, paper products, detergents, cosmetics, foods, and from agricultural, commercial, and industrial sources.
A. Synthetic organic compounds
B. Organic compounds
C. Organic materials
D. Biodegradable materials
E. None of the Above

119. _____normally are some combination of carbon, hydrogen, oxygen, nitrogen, and other elements.
A. Synthetic organic compounds
B. Organic compounds
C. Organic materials
D. Biodegradable materials
E. None of the Above

120. Many _____ are proteins, carbohydrates, or fats and are biodegradable, which means they can be consumed and broken down by organisms.
A. Synthetic organic compounds
B. Organics
C. Organic materials
D. Biodegradable materials
E. None of the Above

121. Even _____can cause pollution. In fact, too much organic matter in wastewater can be devastating to receiving waters.
A. Synthetic organic compounds
B. Organic compounds
C. Organic materials
D. Biodegradable materials
E. None of the Above

122. Large amounts of _____are dangerous to lakes, streams, and oceans, because organisms use dissolved oxygen in the water to break down the wastes. This can reduce or deplete the supply of oxygen in the water needed by aquatic life, resulting in fish kills, odors, and overall degradation of water quality.
A. Synthetic organic compounds
B. Organic compounds
C. Organic materials
D. Biodegradable materials
E. None of the Above

123. The amount of _____ need to break down wastes in wastewater is referred to as the biochemical oxygen demand (BOD) and is one of the measurements used to assess overall wastewater strength.
A. Synthetic organic compounds
B. Organic compounds
C. Oxygen organisms
D. Biodegradable materials
E. None of the Above

124. Some _____ are more stable than others and cannot be quickly broken down by organisms, posing an additional challenge for treatment. This is true of many synthetic organic compounds developed for agriculture and industry.
A. Synthetic organic compounds
B. Organic compounds
C. Organic materials
D. Biodegradable materials
E. None of the Above

125. In addition, certain _____ are highly toxic. Pesticides and herbicides are toxic to humans, fish, and aquatic plants and often are disposed of improperly in drains or carried in stormwater.
A. Synthetic organics
B. Organic compounds
C. Organic materials
D. Biodegradable materials
E. None of the Above

126. In receiving waters, they kill or contaminate fish, making them unfit to eat. They can also damage _____ in treatment plants.
A. Bacteria
B. Petroleum-based waste oils
C. BOD
D. Oxygen
E. None of the Above

127. Benzene and toluene are two toxic _____ found in some solvents, pesticides, and other products.
A. Bacteria
B. Organic compounds
C. BOD
D. Oxygen
E. None of the Above

128. New synthetic _____ are being developed all the time, which can complicate treatment efforts.
A. Synthetic organic
B. Organic compounds
C. Organic materials
D. Biodegradable materials
E. None of the Above

Oil and Grease
129. Fatty _____ from animals, vegetables, and petroleum also are not quickly broken down by bacteria and can cause pollution in receiving environments.
A. Organic materials
B. Petroleum-based waste oils
C. BOD
D. Oxygen
E. None of the Above

130. When large amounts of oils and greases are discharged to receiving waters from community systems, they increase _____ and they may float to the surface and harden, causing aesthetically unpleasing conditions.
A. Bacteria
B. Petroleum-based waste oils
C. BOD
D. Oxygen
E. None of the Above

131. They also can trap trash, plants, and other materials, causing foul odors, attracting flies, mosquitoes and other disease vectors. In some cases, too much _____ causes septic conditions in ponds and lakes by preventing oxygen from the atmosphere from reaching the water.
A. Bacteria
B. Oil and grease
C. BOD
D. Oxygen
E. None of the Above

132. Onsite systems also can be harmed by too much _____, which can clog onsite system drainfield pipes and soils, adding to the risk of system failure.
A. Bacteria
B. Petroleum-based waste oils
C. Oil and grease
D. Oxygen
E. None of the Above

133. _____also adds to the septic tank scum layer, requiring more frequent tank pumping. Both possibilities can result in significant costs to homeowners.
A. Bacteria
B. Petroleum-based waste oils
C. BOD
D. Oxygen
E. None of the Above

134. _____ used for motors and industry are considered hazardous waste and should be collected and disposed of separately from wastewater.
A. Bacteria
B. Petroleum-based waste oils
C. BOD
D. Oxygen
E. None of the Above

Inorganics
135. Inorganic _____ metals, and compounds, such as sodium, potassium, calcium, magnesium, cadmium, copper, lead, nickel, and zinc are common in wastewater from both residential and nonresidential sources.
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Methemoglobinemia
D. Minerals
E. None of the Above

136. They can originate from a variety of sources in the community including _____sources, stormwater, inflow and infiltration from cracked pipes and leaky manhole covers.
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Methemoglobinemia
D. Inorganic substances or inorganic materials
E. None of the Above

137. Most _____are relatively stable, and cannot be broken down easily by organisms in wastewater.
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Methemoglobinemia
D. Inorganic substances
E. None of the Above

138. Large amounts of many _____can contaminate soil and water. Some are toxic to animals and humans and may accumulate in the environment.
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Methemoglobinemia
D. Inorganic substances
E. None of the Above

139. Extra treatment steps are often required to remove _____from industrial wastewater sources. For example, heavy metals which are discharged with many types of industrial wastewaters, are difficult to remove by conventional treatment methods.
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Methemoglobinemia
D. Inorganic materials
E. None of the Above

140. Although acute poisonings from heavy metals in drinking water are rare in the U.S., potential long-term health effects from ingesting small amounts of some _____over an extended period of time are possible.
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Methemoglobinemia
D. Inorganic substances
E. None of the Above

Nutrients
141. Wastewater often contains large amounts of the _____in the form of nitrate and phosphate, which promote plant growth.
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Methemoglobinemia
D. Inorganic substances or inorganic materials
E. None of the Above

142. Organisms only require small amounts of nutrients in biological treatment, so there is normally an excess available in treated wastewater. In severe cases, excessive nutrients in receiving waters cause algae and other plants to grow quickly _____ in the water.
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Depleting oxygen
D. Inorganic substances or inorganic materials
E. None of the Above

143. _____, fish and other aquatic life die, emitting foul odors.
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Deprived of oxygen
D. Inorganic substances or inorganic materials
E. None of the Above

144. Nutrients from wastewater have also been linked to ocean "_____" that poison fish and cause illness in humans.
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Methemoglobinemia
D. Inorganic substances or inorganic materials
E. None of the Above

145. Nitrogen in drinking water may contribute to miscarriages in pregnant women and is the cause of a serious illness in infants called _____ or "blue baby syndrome."
A. Nutrients nitrogen and phosphorus
B. Inflow and infiltration
C. Methemoglobinemia
D. Inorganic substances or inorganic materials
E. None of the Above

Solids

146. Solid materials in wastewater can consist of organic and/or inorganic materials and organisms. The solids must be _____by treatment or they can increase BOD when discharged to receiving waters and provide places for microorganisms to escape disinfection. They also can clog soil absorption fields in onsite systems.

A. Remain suspended
B. Significantly reduced
C. Special precautions
D. Adverse effects
E. None of the Above

147. Settleable solids-Certain substances, such as sand, grit, and heavier organic and inorganic _____ from the rest of the wastewater stream during the preliminary stages of treatment. On the bottom of settling tanks and ponds, organic material makes up a biologically active layer of sludge that aids in treatment.

A. Remain suspended
B. Significantly reduced
C. Special precautions
D. Materials settle out
E. None of the Above

148. Suspended solids-Materials that resist settling may _____in wastewater. Suspended solids in wastewater must be treated, or they will clog soil absorption systems or reduce the effectiveness of disinfection systems.

A. Remain suspended
B. Significantly reduced
C. Special precautions
D. Adverse effects
E. None of the Above

149. Dissolved solids-Small particles of certain wastewater materials can dissolve like salt in water. Some dissolved materials are consumed by microorganisms in wastewater, but others, such as heavy metals, are _____ by conventional treatment.

A. Remain suspended
B. Significantly reduced
C. Special precautions
D. Difficult to remove
E. None of the Above

150. Excessive amounts of dissolved solids in wastewater can have _____on the environment.

A. Remain suspended
B. Significantly reduced
C. Special precautions
D. Adverse effects
E. None of the Above

Gases

151. Certain gases in wastewater can cause odors, affect treatment, or are _____. Methane gas, for example, is a byproduct of anaerobic biological treatment and is highly combustible.

A. Potentially dangerous
B. Significantly reduced
C. Special precautions
D. Adverse effects
E. None of the Above

152. _____ need to be taken near septic tanks, manholes, treatment plants, and other areas where wastewater gases can collect.
A. Remain suspended
B. Significantly reduced
C. Special precautions
D. Adverse effects
E. None of the Above

153. The gases hydrogen sulfide and ammonia can be toxic and pose asphyxiation hazards. Ammonia as a dissolved gas in wastewater also is dangerous to fish. Both gases emit odors, which can be a _____.
A. Result of improper disposal
B. Disrupt the natural balance
C. Temporarily disrupt
D. Serious nuisance
E. None of the Above

154. Unless effectively contained or _____ and location, wastewater odors can affect the mental well-being and quality of life of residents. In some cases, odors can even lower property values and affect the local economy.
A. Result of improper disposal
B. Disrupt the natural balance
C. Temporarily disrupt
D. Minimized by design
E. None of the Above

Dispose of Household Hazardous Wastes Safely
155. Many household products are _____ to people and the environment and never should be flushed down drains, toilets, or storm sewers.
A. Result of improper disposal
B. Disrupt the natural balance
C. Temporarily disrupt
D. Potentially hazardous
E. None of the Above

156. Treatment plant workers can be injured and wastewater systems can be damaged as a _____of hazardous materials.
A. Result of improper disposal
B. Disrupt the natural balance
C. Temporarily disrupt
D. Evaluate wastewater
E. None of the Above

157. Other hazardous chemicals cannot be _____ by municipal wastewater systems and may reach local drinking water sources.
A. Treated effectively
B. Disrupt the natural balance
C. Temporarily disrupt
D. Evaluate wastewater
E. None of the Above

158. When flushed into septic systems and other onsite systems, they can _____the biological processes in the tank and soil absorption field, allowing hazardous chemicals and untreated wastewater to reach groundwater.
A. Result of improper disposal
B. Disrupt the natural balance
C. Temporarily disrupt
D. Evaluate wastewater
E. None of the Above

159. Some examples of hazardous household materials include motor oil, transmission fluid, antifreeze, paint, paint thinner, varnish, polish, wax, solvents, pesticides, rat poison, oven cleaner, and battery fluid. Many of these materials can be recycled or _____ of at community recycling centers.
A. Result of improper disposal
B. Disrupt the natural balance
C. Safely disposed
D. Evaluate wastewater
E. None of the Above

Other Important Wastewater Characteristics
160. In addition to the many substances found in wastewater, there are _____designers and operators use to evaluate wastewater. For example, the color, odor, and turbidity of wastewater give clues about the amount and type of pollutants present and treatment necessary.
A. Operators use to evaluate wastewater
B. Handle fluctuations in the quantity and quality of wastewater
C. Raise the temperature of receiving streams locally
D. Other characteristics system
E. None of the Above

Temperature
161. The best temperatures for wastewater treatment probably range from 77 to 95 degrees Fahrenheit. In general, biological treatment activity accelerates in warm temperatures and slows in cool temperatures, but extreme hot or cold can stop treatment processes altogether.
A. Operators use to evaluate wastewater
B. Accelerates in warm temperatures
C. Raise the temperature of receiving streams locally
D. Indicates increasing acidity
E. None of the Above

162. Some systems are less effective during cold weather and some may not be _____.
A. Operators use to evaluate wastewater
B. Handle fluctuations in the quantity and quality of wastewater
C. Raise the temperature of receiving streams locally
D. Appropriate for very cold climates
E. None of the Above

163. Wastewater temperature also affects receiving waters. Hot water, for example, which is a byproduct of many manufacturing processes, can be a pollutant. When discharged in large quantities, it can raise the temperature of receiving streams locally and _____.
A. Disrupt the natural balance of aquatic life
B. Handle fluctuations in the quantity and quality of wastewater
C. Raise the temperature of receiving streams locally
D. Indicates increasing acidity
E. None of the Above

pH

164. The acidity or alkalinity of wastewater affects both treatment and the environment. Low pH indicates increasing acidity, while a _____ (a pH of 7 is neutral).
A. High pH indicates increasing alkalinity
B. Handle fluctuations in the quantity and quality of wastewater
C. Raise the temperature of receiving streams locally
D. Indicates increasing acidity
E. None of the Above

165. The pH of wastewater needs to remain between 6 and 9 to protect organisms. Acids and other substances that alter pH can _____when they enter wastewater from industrial or commercial sources.
A. Operators use to evaluate wastewater
B. Handle fluctuations in the quantity and quality of wastewater
C. Raise the temperature of receiving streams locally
D. Inactivate treatment processes
E. None of the Above

Flow

166. Whether a system serves a single home or an entire community, it must be able to handle fluctuations in the _____ of wastewater it receives to ensure proper treatment is provided at all times.
A. Extreme fluctuations
B. Rises sharply
C. Hydraulically overloaded
D. Quantity and quality
E. None of the Above

167. Systems that are _____ or hydraulically overloaded may fail to provide treatment and allow the release of pollutants to the environment.
A. Extreme fluctuations
B. Inadequately designed
C. Hydraulically overloaded
D. Instantaneous peak flow events
E. None of the Above

168. To design systems are as safe and as_____ as possible, engineers must estimate the average and maximum (peak) amount of flows generated by various sources.
A. Cost-effective
B. Rises sharply
C. Hydraulically overloaded
D. Instantaneous peak flow events
E. None of the Above

169. _____ in flow can occur during different times of the day and on different days of the week, estimates are based on observations of the minimum and maximum amounts of water used on an hourly, daily, weekly, and seasonal basis.
A. Extreme fluctuations
B. Rises sharply
C. Hydraulically overloaded
D. Instantaneous peak flow events
E. None of the Above

170. The possibility of instantaneous peak flow events that result from several or all water-using appliances or fixtures being used at once is _____ into account.
A. Extreme fluctuations
B. Rises sharply
C. Hydraulically overloaded
D. Also taken
E. None of the Above

171. The number, type, and _____ all water-using fixtures and appliances at the source is factored into the estimate (for example, the number and amount of water normally used by faucets, toilets, and washing machines), as is the number of possible users or units that can affect the amount of water used (for example, the number of residents, bedrooms, customers, students, patients, seats, or meals served).
A. Extreme fluctuations
B. Rises sharply
C. Hydraulically overloaded
D. Efficiency of
E. None of the Above

172. According to studies, water use in many homes is _____about midnight to 5 a.m., averaging less than one gallon per person per hour, but then rises sharply in the morning around 6 a.m. to a little over 3 gallons per person per hour.
A. Extreme fluctuations
B. Lowest from
C. Hydraulically overloaded
D. Instantaneous peak flow events
E. None of the Above

173. During the day, water use drops off _____ again in the early evening hours. Weekly peak flows may occur in some homes on weekends, especially when all adults work during the week. In U.S. homes, average water use is approximately 45 gallons per person per day, but may range from 35 to 60 gallons or more.
A. Allow for additional flows
B. Moderately and rises
C. Estimating flow volumes
D. Reduce the BOD and COD
E. None of the Above

174. Peak flows at stores and other businesses typically occur during business hours and during meal times at restaurants. Rental properties, resorts, and commercial establishments in tourist areas may have _____ seasonally.
A. Allow for additional flows
B. Extreme flow variations
C. Estimating flow volumes
D. Reduce the BOD and COD
E. None of the Above

175. Estimating flow volumes for centralized treatment systems is a _____, especially when designing a new treatment plant in a community where one has never existed previously.
A. Allow for additional flows
B. Settles out suspended solids
C. Estimating flow volumes
D. Complicated task
E. None of the Above

176. Engineers must allow for additional flows during wet weather due to _____of extra water into sewers.
A. Allow for additional flows
B. Inflow and infiltration
C. Estimating flow volumes
D. Reduce the BOD and COD
E. None of the Above

177. Excess water can enter sewers through leaky manhole covers and cracked pipes and pipe joints, diluting wastewater, which affects its _____. This can increase flows to treatment plants sometimes by as much as three or four times the original design load.
A. Allow for additional flows
B. Overall characteristics
C. Estimating flow volumes
D. Reduce the BOD and COD
E. None of the Above

178. The main focus of wastewater treatment plants is to reduce the BOD and COD in the effluent _____, meeting state and federal discharge criteria.
A. Allow for additional flows
B. Settles out suspended solids
C. Estimating flow volumes
D. Discharged to natural waters
E. None of the Above

179. Wastewater treatment plants are designed to function as "microbiology farms," where bacteria and other microorganisms are _____.
A. Allow for additional flows
B. Fed oxygen and organic waste
C. Estimating flow volumes
D. Reduce the BOD and COD
E. None of the Above

180. Treatment of wastewater usually involves biological processes such as the activated sludge system in the secondary stage after preliminary screening to _____ and primary sedimentation that settles out suspended solids.
A. Remove coarse particles
B. Settles out suspended solids
C. Estimating flow volumes
D. Reduce the BOD and COD
E. None of the Above

181. These secondary treatment steps are generally considered environmental biotechnologies that harness natural _____ contained in bioreactors for the biodegradation of organic matter and bioconversion of soluble nutrients in the wastewater.
A. Allow for additional flows
B. Settles out suspended solids
C. Self-purification processes
D. Reduce the BOD and COD
E. None of the Above

Application Specific Microbiology

182. Each wastewater stream is unique, and so too are the community of microorganisms that process it. This "application-specific microbiology" is the preferred methodology in wastewater treatment affecting the efficiency of _____ removal.
A. Biofilm
B. Chains or planes
C. Biological nutrient
D. Bacteria
E. None of the Above

183. The right laboratory prepared bugs are more efficient in organics removal if they have the right growth environment. This efficiency is multiplied if _____ are allowed to grow as a layer of biofilm on specifically designed support media.
A. Microorganisms
B. Chains or planes
C. Spirochaetes
D. Bacteria
E. None of the Above

184. In this way, optimized biological processing of a waste stream can occur. To reduce the start-up phase for growing a mature biofilm one can also purchase "_____" from appropriate microbiology vendors.
A. Biofilm
B. Chains or planes
C. Spirochaetes
D. Bacteria
E. None of the Above

Bacteria

185. Bacteria are one of the most ancient of living things and scientists believe they have been on this planet. During this time they have acquired lots of fascinating and different ways of living. They also come in a variety of _____.
A. Biofilm
B. Chains or planes
C. Spirochaetes
D. Bacteria
E. None of the Above

186. The simplest shape is a round sphere or ball. _____ formed like this are called cocci (singular coccus).
A. Biofilm
B. Chains or planes
C. Spirochaetes
D. Bacteria
E. None of the Above

187. The next simplest shape is cylindrical. Cylindrical bacteria are called _____(singular rod).
A. Biofilm
B. Chains or planes
C. Cylindrical
D. Bacteria
E. None of the Above

188. Some bacteria are basically rods but instead of being straight they are twisted or bent or curved, sometimes in a _____. These bacteria are called spirilla (singular spirillum).
A. Biofilm
B. Chains or planes
C. Spirochaetes
D. Bacteria
E. None of the Above

189. Spirochaetes are tightly coiled up _____.
A. Biofilm
B. Chains or planes
C. Spirochaetes
D. Bacteria
E. None of the Above

190. Bacteria are friendly creatures; you never find one bacteria on its own. They tend to live together in clumps, _____.
A. Biofilm
B. Chains or planes
C. Spirochaetes
D. Bacteria
E. None of the Above

191. When they live in chains, one after the other, they are called filamentous bacteria that often have long thin cells. When they tend to collect in a _____ or a thin layer over the surface of an object they are called a biofilm.
A. Biofilm
B. Plane
C. Spirochaetes
D. Bacteria
E. None of the Above

192. Many bacteria exist as a biofilm and the study of _____ is very important. Biofilm bacteria secrete sticky substances that form a sort of gel in which they live. The plaque on your teeth that causes tooth decay is a biofilm.
A. Biofilms
B. Chains or planes
C. Spirochaetes
D. Bacteria
E. None of the Above

Filamentous Bacteria
193. Filamentous Bacteria are a type of _____ that can be found in a wastewater treatment system.
A. Floc structure
B. Biofilm building
C. Facultative in nature
D. Bacteria
E. None of the Above

194. They function similar to _____ in that they degrade BOD quite well. In small amounts, they are quite good to a biomass.
A. Floc forming bacteria
B. Biofilm building
C. Facultative in nature
D. Filamentous Bacteria
E. None of the Above

195. They can add stability and a backbone to the _____that keeps the floc from breaking up or shearing due to turbulence from pumps, aeration or transfer of the water. In large amounts they can cause many problems.
A. Floc structure
B. Biofilm building
C. Facultative in nature
D. Filamentous Bacteria
E. None of the Above

196. _____ are bacteria and fungi that grow in long thread-like strands or colonies.
A. Floc structure
B. Biofilm building
C. Facultative in nature
D. Filaments
E. None of the Above

Site Specific Bacteria
197. Aeration and _____are the key operational parameters that contribute to the efficient degradation of organic matter (BOD/COD removal).
A. Floc structure
B. Biofilm building
C. Facultative in nature
D. Filamentous Bacteria
E. None of the Above

198. Over time the application-specific bacteria become site specific as the _____ develops and matures and is even more efficient in treating that site-specific waste stream.
A. Floc structure
B. Biofilm
C. Facultative in nature
D. Filamentous Bacteria
E. None of the Above

Facultative Bacteria
199. Most of the bacteria absorbing the organic material in a wastewater treatment system are _____. This means they are adaptable to survive and multiply in either anaerobic or aerobic conditions.
A. Floc structure
B. Biofilm building
C. Facultative in nature
D. Filamentous Bacteria
E. None of the Above

200. The nature of individual bacteria is dependent upon the environment in which they live. Usually, _____ bacteria will be anaerobic unless there is some type of mechanical or biochemical process used to add oxygen to the wastewater.
A. Floc structure
B. Biofilm building
C. Facultative
D. Filamentous Bacteria
E. None of the Above

201. When bacteria are in the process of being transferred from one environment to another, the _____from anaerobic to aerobic state (and vice versa) takes place within a couple of hours.
A. Metamorphosis
B. Biofilm building
C. Facultative in nature
D. Filamentous Bacteria
E. None of the Above

Anaerobic Bacteria
202. Anaerobic bacteria live and reproduce in the absence of _____. They utilize compounds such as sulfates and nitrates for energy and their metabolism is substantially reduced.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

203. In order to remove a given amount of organic material in an _____ treatment system, the organic material must be exposed to a significantly higher quantity of bacteria and/or detained for a much longer period of time.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

204. A typical use for _____ bacteria would be in a septic tank. The slower metabolism of the anaerobic bacteria dictates the wastewater be held several days in order to achieve even a nominal 50% reduction in organic material. That is why septic tanks are always followed by some type of effluent treatment and disposal process.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

205. The advantage of using the _____ process is that electromechanical equipment is not required. Anaerobic bacteria release hydrogen sulfide as well as methane gas, both of which can create hazardous conditions.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

206. Even as the _____ action begins in the collection lines of a sewer system, deadly hydrogen sulfide or explosive methane gas can accumulate and be life threatening.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

Aerobic Bacteria
207. _____bacteria live and multiply in the presence of free oxygen.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

208. Facultative bacteria always achieve an _____ state when oxygen is present.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

209. While the name "_____" implies breathing air, dissolved oxygen is the primary source of energy for aerobic bacteria. The metabolism of aerobes is much higher than for anaerobes.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

210. This increase means that 90% fewer organisms are needed compared to the _____ process, or that treatment is accomplished in 90% less time.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

211. This provides a number of advantages including a higher percentage of organic removal. The by-products of _____bacteria are carbon dioxide and water.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

212. _____ bacteria live in colonial structures called floc and are kept in suspension by the mechanical action used to introduce oxygen into the wastewater.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

213. This mechanical action exposes the floc to the organic material while treatment takes place. Following digestion, a gravity clarifier separates and settles out the floc. Because of the mechanical nature of the _____ digestion process, maintenance and operator oversight are required.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

Activated Sludge
214. Aerobic floc in a healthy state are referred to as activated sludge. While _____ floc has a metabolic rate approximately ten times higher than anaerobic sludge, it can be increased even further by exposing the bacteria to an abundance of oxygen.
A. Free oxygen
B. Facultative
C. Anaerobic
D. Aerobic
E. None of the Above

215. Compared to a septic tank, which takes several days to reduce the organic material, an _____ tank can reduce the same amount of organic material in approximately 4-6 hours.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Higher quality effluent
E. None of the Above

216. This allows a much higher degree of overall _____. In most cases treatment efficiencies and removal levels are so much improved, additional downstream treatment components are dramatically reduced or totally eliminated.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Process efficiency
E. None of the Above

Filamentous Organisms
217. The majority of _____organisms are bacteria, although some of them are classified as algae, fungi or other life forms.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Higher quality effluent
E. None of the Above

218. There are a number of types of _____ bacteria which proliferate in the activated sludge process.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Higher quality effluent
E. None of the Above

219. _____ organisms perform several different roles in the process, some of which are beneficial and some of which are detrimental.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Higher quality effluent
E. None of the Above

220. When _____ organisms are in low concentrations in the process, they serve to strengthen the floc particles. This effect reduces the amount of shearing in the mechanical action of the aeration tank and allows the floc particles to increase in size.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Higher quality effluent
E. None of the Above

221. Larger floc particles are more readily settled in a clarifier. Larger floc particles settling in the clarifier also tend to accumulate smaller particulates (surface adsorption) as they settle, producing an even _____.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Higher quality effluent
E. None of the Above

222. If the _____organisms reach too high a concentration, they can extend dramatically from the floc particles and tie one floc particle to another (interfloc bridging) or even form a filamentous mat of extra large size.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Higher quality effluent
E. None of the Above

223. Due to the increased surface area without a corresponding increase in mass, the _____will not settle well.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Higher quality effluent
E. None of the Above

224. This results in less solids separation and may cause a washout of solid material from the system. In addition, air bubbles can become trapped in the mat and cause it to float, resulting in a floating _____.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Higher quality effluent
E. None of the Above

225. Due to the high surface area of the _____ bacteria, once they reach an excess concentration, they can absorb a higher percentage of the organic material and inhibit the growth of more desirable organisms.
A. Scum mat
B. Filamentous
C. Activated sludge
D. Higher quality effluent
E. None of the Above

Protozoans and Metazoans
226. In a wastewater treatment system, the next higher life form above bacteria is _____.
A. Protozoa(ns)
B. Metazoans
C. Activated sludge process
D. Wastewater sample
E. None of the Above

227. These single-celled animals perform three significant roles in the _____. These include floc formation, cropping of bacteria and the removal of suspended material.
A. Protozoa(ns)
B. Metazoans
C. Activated sludge process
D. Wastewater sample
E. None of the Above

228. Protozoans are also indicators of biomass health and effluent quality. Because _____ are much larger in size than individual bacteria, identification and characterization is readily performed.
A. Protozoa(ns)
B. Metazoans
C. Activated sludge process
D. Wastewater sample
E. None of the Above

229. _____are very similar to protozoans except they are usually multi-celled animals.
A. Protozoa(ns)
B. Metazoans
C. Activated sludge process
D. Wastewater sample
E. None of the Above

230. Macroinvertebrates such as nematodes and rotifers are typically found only in a well developed _____.
A. Protozoa(ns)
B. Metazoans
C. Biomass
D. Wastewater sample
E. None of the Above

231. The presence of protozoans and metazoans and the relative _____ can be a predictor of operational changes within a treatment plant. In this way, an operator is able to make adjustments and minimize negative operational effects simply by observing changes in the protozoan and metazoan population.
A. Protozoa(ns)
B. Metazoans
C. Activated sludge process
D. Wastewater sample
E. None of the Above

Dispersed Growth
232. Dispersed growth is material suspended within the _____ that has not been adsorbed into the floc particles.
A. Protozoa(ns)
B. Metazoans
C. Activated sludge process
D. Wastewater sample
E. None of the Above

233. This material consists of very small quantities of colloidal (too small to settle out) _____ as well as organic and inorganic particulate material.
A. Protozoa(ns)
B. Metazoans
C. Activated sludge process
D. Bacteria
E. None of the Above

234. While a small amount of dispersed growth in between the floc particles is normal, excessive amounts can be carried through a secondary clarifier. When discharged from the treatment plant, dispersed growth results in _____.
A. Protozoa(ns)
B. Metazoans
C. Activated sludge process
D. Higher effluent solids
E. None of the Above

Taxonomy
235. Taxonomy is the science of categorizing _____according to their characteristics. Eighteen different categories are used to define life forms from the broadest down to the most specific.
A. Sludge
B. Wastewater sample
C. Wastewater treatment system
D. Filamentous Identification
E. None of the Above

236. They are: Kingdom, Phylum, Subphylum, Superclass, Class, Subclass, Cohort, Superorder, Order, Suborder, Superfamily, Family, Subfamily, Tribe, Genus, Subgenus, Species and Subspecies. Identifying the genus is usually specific enough to determine the role of the organisms found in a _____.
A. Sludge
B. Wastewater sample
C. Wastewater treatment system
D. Filamentous Identification
E. None of the Above

Process Indicators

237. Following taxonomic identification, enumeration and evaluation of the characteristics of the various organisms and structures present in a _____, the information can be used to draw conclusions regarding the treatment process.
A. Sludge
B. Wastewater sample
C. Wastewater treatment system
D. Filamentous Identification
E. None of the Above

238. An excess of dispersed growth could indicate a very young _____, the presence of toxic material, excess mechanical aeration or an extended period of time at low dissolved oxygen levels.
A. Sludge
B. Wastewater sample
C. Wastewater treatment system
D. Filamentous Identification
E. None of the Above

239. Certain protozoans, such as amoebae and flagellates dominate during a system start-up. Free swimming ciliates are indicative of _____ of intermediate health and an effluent of acceptable or satisfactory quality.
A. Sludge
B. Wastewater sample
C. Wastewater treatment system
D. Filamentous Identification
E. None of the Above

240. A predominance of crawling ciliates, stalked ciliates and metazoans is an indicator of sludge with excellent health and an _____.
A. Sludge
B. Wastewater sample
C. Wastewater treatment system
D. Effluent of high quality
E. None of the Above

Filamentous Identification

241. Filamentous Identification should be used as a tool to monitor the health of the biomass when a _____ problem is suspected.
A. Filamentous bacteria
B. Filament
C. Floc Characterization
D. Killing the filaments
E. None of the Above

242. _____ is used to determine the type of filaments present, so a cause can be found and corrections can be made to the system to alleviate future problems.
A. Filamentous bacteria
B. Filamentous Identification
C. Floc Characterization
D. Killing the filaments
E. None of the Above

243. All _____usually have a process control variation associated with the type of filament present that can be implemented to change the environment present and select out for floc forming bacteria instead.
A. Filamentous bacteria
B. Filaments
C. Floc Characterization
D. Killing the filaments
E. None of the Above

244. _____with chlorine or peroxide will temporarily remove the filaments, but technically it is a band-aid.
A. Filamentous bacteria
B. Filaments
C. Floc Characterization
D. Killing the filaments
E. None of the Above

245. A process change must be made or the _____ will return with time. Find what filaments are present, find out the cause associated with them and make a process change for a lasting solution to the problems.
A. Filamentous bacteria
B. Filaments
C. Floc Characterization
D. Killing the filaments
E. None of the Above

Filamentous Identification
246. _____can be internal or external and can be free of the floc structures or found intertwined in the floc.
A. Filamentous bacteria
B. Filaments
C. Floc Characterization
D. Killing the filaments
E. None of the Above

247. Most labs think _____ need to be extending from the floc in order to be a problem. That is not true. Internal filaments can cause more problems than external filaments.
A. Filamentous bacteria
B. Filaments
C. Floc Characterization
D. Killing the filaments
E. None of the Above

248. Think of internal _____ causing a structure like a sponge. It will retain water easily, be harder to dewater, be hard to compress and will take up more space, thereby increasing solids handling costs.
A. Filamentous bacteria
B. Filaments
C. Floc Characterization
D. Killing the filaments
E. None of the Above

249. _____ present in the system do not always mean there is a problem. Some filaments are good if they form a strong backbone and add a rigid network to the floc. They help give the floc more structure and settle faster.
A. Filamentous bacteria
B. Filaments
C. Floc Characterization
D. Killing the filaments
E. None of the Above

250. Filaments are good BOD degraders also. They are only a problem when they become dominant. If filament abundance is in the abundant or excessive range, having a _____ performed is recommended.
A. Filamentous bacteria
B. Filaments
C. Filamentous Identification
D. Killing the filaments
E. None of the Above

251. When Gram and Neisser stains are performed for filamentous Identification, the types of filaments found present will be noted on the _____sheet to the right of the filament section and will be noted on the Cover Sheet.
A. Filamentous bacteria
B. Filaments
C. Floc Characterization
D. Killing the filaments
E. None of the Above

252. A Filament Causes sheet, _____ sheet and corrective actions will be given and included also with the report.
A. Filamentous bacteria
B. Filaments
C. Filamentous Predominance
D. Killing the filaments
E. None of the Above

253. A _____ will be included. Individual sheets on the actual filaments present in the sample will be included with more information on that particular filament.
A. Filamentous Worksheet
B. Filaments
C. Floc Characterization
D. Killing the filaments
E. None of the Above

Other Wastewater Treatment Components
Biochemical Oxygen Demand
254. Biochemical Oxygen Demand (BOD or BOD5) is an indirect measure of _____ in water, and is determined by measuring the dissolved oxygen decrease in a controlled water sample over a five-day period.
A. Biodegradable organic compounds
B. BOD
C. Organic carbon
D. Oxygen demand
E. None of the Above

255. During this five-day period, aerobic (oxygen-consuming) bacteria decompose organic matter in the sample and consume _____ in proportion to the amount of organic material that is present.
A. Nutrient parameters
B. BOD
C. Dissolved oxygen
D. Oxygen demand
E. None of the Above

256. In general, a high _____ reflects high concentrations of substances that can be biologically degraded, thereby consuming oxygen and potentially resulting in low dissolved oxygen in the receiving water.
A. Nutrient parameters
B. BOD
C. Organic carbon
D. Oxygen demand
E. None of the Above

257. The BOD test was developed for samples dominated by oxygen-demanding pollutants like sewage. While its merit as a pollution parameter continues to be debated, _____ has the advantage of a long period of record.
A. Nutrient parameters
B. BOD
C. Organic carbon
D. Oxygen demand
E. None of the Above

Nutrients
258. Nutrients are _____ or compounds essential for plant and animal growth.
A. Chemical elements
B. BOD
C. Organic carbon
D. Oxygen demand
E. None of the Above

259. _____include ammonia, organic nitrogen, Kjeldahl nitrogen, nitrate nitrogen (for water only) and total phosphorus.
A. Nutrient parameters
B. BOD
C. Organic carbon
D. Oxygen demand
E. None of the Above

260. High amounts of nutrients have been associated with _____ or overfertilization of a water body, while low levels of nutrients can reduce plant growth and (for example) starve higher level organisms that consume phytoplankton.
A. Eutrophication
B. BOD
C. Organic carbon
D. Oxygen demand
E. None of the Above

Organic Carbon

261. Most organic carbon in water occurs as partly degraded plant and animal materials, some of which are resistant to _____.

A. Microbial degradation
B. BOD
C. Organic carbon
D. Oxygen demand
E. None of the Above

262. _____ is important in the estuarine food web and is incorporated into the ecosystem by photosynthesis of green plants, then consumed as carbohydrates and other organic compounds by higher animals.

A. Nutrient parameters
B. BOD
C. Organic carbon
D. Oxygen demand
E. None of the Above

263. In another process, formerly living tissue containing carbon is decomposed as detritus by bacteria and other _____.

A. Nutrient parameters
B. Microbes
C. Organic carbon
D. Oxygen demand
E. None of the Above

Total organic carbon (TOC)

264. TOC bears a direct relationship with biological and chemical oxygen demand. High levels of TOC can result from human sources, high _____ being the main concern.

A. Nutrient parameters
B. BOD
C. Organic carbon
D. Oxygen demand
E. None of the Above

Priority Pollutants

265. Priority Pollutants refer to a list of 126 specific pollutants that includes heavy metals and specific organic chemicals. The priority pollutants are a subset of "_____" as defined in the Clean Water Act.

A. Toxic pollutants
B. Clean Water Act
C. Semi-volatile organic pollutants
D. Water quality criteria
E. None of the Above

266. These 126 pollutants were assigned a _____ for development of water quality criteria and effluent limitation guidelines because they are frequently found in wastewater. Many of the heavy metals, pesticides, and other chemicals are on the priority pollutant list.

A. High priority
B. Clean Water Act
C. Semi-volatile organic pollutants
D. Water quality criteria
E. None of the Above

267. High levels of mercury, copper, and cadmium have been proven to cause _____ and human health problems in some bays around the world.
A. Serious environmental
B. Clean Water Act
C. Semi-volatile organic pollutants
D. Water quality criteria
E. None of the Above

Pesticides
268. Typical pesticides and herbicides include _____, Aldrin, Chlordane, Endosulfan, Endrin, Heptachlor, and Diazinon.
A. DDT
B. Clean Water Act
C. Semi-volatile organic pollutants
D. Water quality criteria
E. None of the Above

269. Some of the more persistent compounds including _____and dioxin (not a pesticide) are subject to stringent regulation including outright bans.
A. DDT
B. Clean Water Act
C. Semi-volatile organic pollutants
D. Water quality criteria
E. None of the Above

Polycyclic Aromatic Hydrocarbons (PAHs)
270. Polycyclic Aromatic Hydrocarbons include a family of _____such as naphthalene, anthracene, pyrene, and benzo(a)pyrene.
A. Organic chemicals
B. Class of chemicals
C. Semi-volatile organic pollutants
D. Water quality criteria
E. None of the Above

Polychlorinated Biphenyls (PCBs)
271. Polychlorinated biphenyls are _____that formerly had widespread use in electrical transformers and hydraulic equipment.
A. Organic chemicals
B. Class of chemicals
C. Semi-volatile organic pollutants
D. Water quality criteria
E. None of the Above

272. This _____is extremely persistent in the environment and has been proven to bioconcentrate in the food chain, thereby leading to environmental and human health concerns in areas such as the Great Lakes.
A. Organic chemicals
B. Class of chemicals
C. Semi-volatile organic pollutants
D. Water quality criteria
E. None of the Above

273. Because of the potential to accumulate in the food chain, _____ were intensely regulated and subsequently prohibited from manufacture by the Toxic Substances Control Act (TSCA) of 1976. Disposal of PCBs is tightly restricted by TSCA.
A. Organic chemicals
B. Class of chemicals
C. Semi-volatile organic pollutants
D. PCBs
E. None of the Above

Basic Wastewater Treatment Processes
274. Plant Influent: Waste enters the treatment facility through the municipal sewer system. Raw _____ enters the treatment facility at the beginning of the treatment plant, referred to as the "headworks" of the plant.
A. Inorganic material
B. Wastewater
C. Debris
D. Organic waste
E. None of the Above

275. The _____ is then pumped to the wastewater treatment facility using pumps.
A. Inorganic material
B. Wastewater
C. Debris
D. Organic waste
E. None of the Above

276. Preliminary treatment removes large objects from the _____ to help prevent clogging of pipes and damaging the treatment equipment.
A. Inorganic material
B. Wastewater
C. Debris
D. Organic waste
E. None of the Above

277. The _____ removed during preliminary treatment is typically hauled to a landfill for disposal.
A. Inorganic material
B. Wastewater
C. Debris
D. Organic waste
E. None of the Above

278. Coarse Bar Screen: Metal bars collect large _____ such as rags, wood, plastics, etc.
A. Inorganic material
B. Wastewater
C. Debris
D. Organic waste
E. None of the Above

279. Grit Removal: The _____ flows through a channel, allowing dense, inorganic material to settle on the bottom. Scrapers, hoppers and clam buckets remove the collected grits.
A. Inorganic material
B. Wastewater
C. Debris
D. Organic waste
E. None of the Above

280. Primary Settling: The wastewater flows into large settling tanks which allow _____ and organic material to sink to the bottom of this tank.
A. Inorganic material
B. Wastewater
C. Suspended solids
D. Organic waste
E. None of the Above

281. Phosphorous Removal: Partially treated _____ is drawn from the top of the settling tanks and in some treatment facilities, chemicals are added to remove phosphorous.
A. Inorganic material
B. Wastewater
C. Debris
D. Organic waste
E. None of the Above

282. Aeration Basins: Large aeration basins or tanks mix the partially treated _____ with oxygen to support bacteria which devour organic waste. The bacteria levels are managed to provide the most efficient removal process.
A. Inorganic material
B. Wastewater
C. Debris
D. Organic waste
E. None of the Above

283. Final Settling: The _____ is drawn from the top of the aeration tanks through spillways. By this point the water is already quite clear.
A. Analyzed in the lab
B. Suspended particles
C. Aeration tanks
D. Cleanest wastewater
E. None of the Above

284. Polymers may be added to concentrate any remaining material. Once again, _____settle to the bottom and are removed by scrapers or hoppers.
A. Analyzed in the lab
B. Suspended particles
C. Aeration tanks
D. Cleanest water
E. None of the Above

285. Disinfection: The _____is drawn from the surface and disinfected with chlorine or ultra-violet light to kill bacteria.
A. Analyzed in the lab
B. Suspended particles
C. Aeration tanks
D. Cleanest water
E. None of the Above

286. De-chlorination: The treated water is de-chlorinated. The treated water is tested to ensure it meets the EPA standards and is returned to the original water source. Before the treated water is discharged to the receiving stream, _____.
A. Analyzed in the lab
B. Suspended particles
C. Aeration tanks
D. Cleanest water
E. None of the Above

287. The samples are then analyzed in a laboratory. An automatic sampler will automatically take samples at designated times. The samples are then kept refrigerated in the sampler until they can be _____.
A. Analyzed in the lab
B. Suspended particles
C. Aeration tanks
D. Cleanest water
E. None of the Above

288. Sludge Digestion: Sludge from the final settling tanks is drawn from the bottom of the tanks and pumped to the primary settling tank. Not only does this sludge have a _____, but it also contains oxygen and bacteria which improve the efficiency of the treatment process.
A. Raw primary biosolids
B. Biosolids
C. Floating objects
D. High water content
E. None of the Above

289. The gravity belt thickener is one way to reduce the amount of water in the biosolids before further treatment. The _____ is occurring from the loss of water.
A. Raw primary biosolids
B. Volume reduction
C. Floating objects
D. Suspended solids
E. None of the Above

290. Thickening of the _____ improves digester operation and reduces the cost of sludge digestion. Aerobic sludge digestion produces a sludge that has higher water content.
A. Raw primary biosolids
B. Biosolids
C. Floating objects
D. Suspended solids
E. None of the Above

Primary Treatment
291. As sewage enters a plant for treatment, it flows through a screen, which removes large _____such as rags and sticks that might clog pipes or damage equipment.
A. Raw primary biosolids
B. Biosolids
C. Floating objects
D. Suspended solids
E. None of the Above

292. After sewage has been_____, it passes into a grit chamber, where cinders, sand, and small stones settle to the bottom.
A. Raw primary biosolids
B. Biosolids
C. Floating objects
D. Screened
E. None of the Above

293. A _____ is particularly important in communities with combined sewer systems where sand or gravel may wash into sewers along with stormwater.
A. Raw primary biosolids
B. Biosolids
C. Grit chamber
D. Suspended solids
E. None of the Above

294. After screening is completed and grit has been removed, sewage still contains organic and _____ along with other suspended solids.
A. Raw primary biosolids
B. Biosolids
C. Floating objects
D. Inorganic matter
E. None of the Above

295. These solids are _____ that can be removed from sewage in a sedimentation tank.
A. Minute particles
B. Biosolids
C. Floating objects
D. Suspended solids
E. None of the Above

296. When the speed of the flow through one of these tanks is reduced, the suspended solids will gradually sink to the bottom, where they form a _____ called raw primary biosolids formerly called sludge.
A. Raw primary biosolids
B. Mass of solids
C. Floating objects
D. Suspended solids
E. None of the Above

297. _____ are usually removed from tanks by pumping, after which it may be treated further for use as a fertilizer, or disposed of in a landfill or incinerated.
A. Raw primary biosolids
B. Biosolids
C. Floating objects
D. Suspended solids
E. None of the Above

Grit Chamber
298. Over the years, primary treatment alone has been unable to meet many communities' demands for higher water quality. To meet them, cities and industries normally treat to a secondary treatment level, and in some cases, also use advanced treatment to _____and other contaminants.
A. Screening completed
B. Remove nutrients
C. Chemical coagulation
D. Settle out microorganisms
E. None of the Above

Primary Sedimentation
299. Clarifiers are used to _____from the activated sludge process. Clarifiers typically have rotating arms, these are used to remove scum from the surface of the water.
A. Screening completed
B. Remove nutrients
C. Chemical coagulation
D. Settle out microorganisms
E. None of the Above

300. The sludge or biosolids are _____of the clarifier and sent to a digester for further treatment.
A. Screening completed
B. Remove nutrients
C. Collected at the bottom
D. Settle out microorganisms
E. None of the Above

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