Registration form

WASTEWATER TREATMENT TRAINING COURSE $100.00
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

List number of hours worked on assignment must match State Requirement. _____

Name_____Signature_____
I have read and understood the disclaimer notice on page 2. Digitally sign XXX

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Email_____ Fax (_____)_____

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

Operator ID #_____Exp Date_____

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

Collection___ Wastewater Treatment ___ Pretreatment____ Other _____

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

Technical Learning College TLC PO Box 3060, Chino Valley, AZ 86323
Toll Free (866) 557-1746 Fax (928) 272-0747 info@tlch2o.com

If you've paid on the Internet, please write your Customer#_____

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Please pay with your credit card on our website under Bookstore or Buy Now. Or call us and provide your credit card information.

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 fully understand that this type of study program deals with dangerous, changing conditions and various laws and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable in any fashion for any errors, omissions, advice, suggestions or neglect contained in this CEU education training course or for any violation or injury, death, neglect, damage or loss of your license or certification caused in any fashion by this CEU education training or course material suggestion or error or my lack of submitting paperwork. It is my responsibility to 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. It is my responsibility to ensure all information is correct and to abide with all rules and regulations.

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.

You can obtain a printed version of the course manual from TLC for an additional $69.95 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.

Do not solely depend on TLC's Approval list for it may be outdated.

A second certificate of completion for a second State Agency $50 processing fee.

All downloads are electronically tracked and monitored for security purposes.

Some States and many employers require the final exam to be proctored.
http://www.abctlc.com/downloads/PDF/PROCTORFORM.pdf

For Texas Wastewater Licensed Operators Information Changes

Wastewater/Collections Rule Changes (Texas Only)

Rule Changes and Updates for Domestic Wastewater Systems
On Nov. 4, 2014, TCEQ commissioners adopted revisions to 30 Texas Administrative Code (TAC), Chapter 217, Design Criteria for Domestic Wastewater Systems, and "re-adopted" previously repealed rules in 30 TAC, Chapter 317, Design Criteria Prior to 2008.

***Some of the changes to Chapter 217 include**:*

- Adding new definitions and clarifying existing definitions;
- Adding design criteria and approval requirements for rehabilitation of existing infrastructure;
- Adding design criteria for new technologies, including cloth filters and air lift pumps;
- Making changes to reflect modern practices, standards and trends;
- Modifying rule language to improve readability and enforceability; and
- Modifying the design organic loadings and flows for a new wastewater treatment facility.

SUBCHAPTER A: ADMINISTRATIVE REQUIREMENTS §§217.1 - 217.18
Effective December 4, 2015 §217.1. Applicability. (a) Applicability. (1) This chapter applies to the design, operation, and maintenance of: (A) domestic wastewater treatment facilities that are constructed with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter; (B) treatment units that are altered, constructed, or re-rated with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter; (C) collection systems that are constructed with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter; (D) collection system units that are altered, constructed, or re-rated with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter; (E) existing domestic wastewater treatment facilities that do not have a current Texas Pollutant Discharge Elimination System permit or a Texas Land Application Permit and are required to have an active wastewater permit; (F) existing wastewater treatment facilities and collection systems that never received approval for plans and specifications from the executive director; and (G) collection system rehabilitation projects covered in §217.56(c) and §217.69 of this title (relating to Trenchless Pipe Installation; and Maintenance, Inspection, and Rehabilitation of the Collection System). (2) Domestic wastewater treatment facilities, treatment units, collection systems, and collection system units with plans and specifications approved by the executive director that were received on or after August 28, 2008 and before the effective date of this chapter must comply with the rules in this chapter, as they existed immediately before the effective date of the amendments to this chapter.

The rules in Texas Commission on Environmental Quality Page 2 Chapter 217 - Design Criteria for Domestic Wastewater Systems effect immediately before the effective date of the amendments to this chapter are continued in effect for that purpose. (3) This chapter does not apply to: (A) the design, installation, operation, or maintenance of domestic wastewater treatment facilities, treatment units, collection systems, or collection system units with plans and specifications that were approved by the executive director on or before August 27, 2008, which are governed by Chapter 317 of this title (relating to Design Criteria Prior to 2008) or design criteria that preceded Chapter 317 of this title; and (B) systems regulated by Chapter 285 of this title (relating to On-Site Sewage Facilities); or collection systems or wastewater treatment facilities that collect, transport, treat, or dispose of wastewater that does not have the characteristics of domestic wastewater, although the wastewater may contain domestic wastewater.
(b) The executive director may grant variances from new requirements added by the amendments of this chapter to a person who proposes to construct, alter, or re-rate a collection system or wastewater treatment facility if the plans and specifications for the project are submitted within 180 days after the date the amendments to this chapter are effective, provided the plans and specifications comply with the rules in effect immediately prior to the amendment. Adopted November 4, 2015 Effective December 4, 2015

The link to the rules is available on the TCEQ website at
https://www.tceq.texas.gov/rules/indxpdf.html

*For Texas Students Only****....***

Please sign and date this notice

Printed Name

_____

Signature Date

_____

Texas Students Only

Acknowledgement of Notice of Potential Ineligibility for License

You are required to sign and return to TLC or your credit will not be reported.

Name: _____

Date of Birth: _____

Email Address: _____

By signing this form, I acknowledge that Technical Learning College notified me of the following:

- the potential ineligibility of an individual who has been convicted of an offense to be issued an occupational license by the Texas Commission on Environmental Quality (TCEQ) upon completion of the educational program;
- the current TCEQ Criminal Conviction Guidelines for Occupational Licensing, which describes the process by which the TCEQ's Executive Director determines whether a criminal conviction:
- renders a prospective applicant an unsuitable candidate for an occupational license;
- warrants the denial of a renewal application for an existing license; or
- warrants revocation or suspension of a license previously granted.
- the right to request a criminal history evaluation from the TCEQ under Texas Occupations Code Section 53.102; and
- that the TCEQ may consider an individual to have been convicted of an offense for the purpose of denying, suspending or revoking a license under circumstances described in Title 30 Texas Administrative Code Section 30.33.

Enrollee Signature: _____ Date: _____

Name of Training Provider/Organization: Technical Learning College

Contact Person: Melissa Durbin Role/Title: Dean

Wastewater Treatment Answer Key

Name_____

Phone #_____

You are solely responsible that this course is accepted for credit by your State. Did you check with your State agency to ensure this course is accepted for credit? No refunds.

Method of Course acceptance confirmation. Please fill this section
Do not solely depend on TLC's Approval list for it may be outdated.

Website ___ Telephone Call___ Email____ Spoke to_____

Did you receive the approval number, if applicable? _____

What is the course approval number, if applicable? _____

You can use Adobe Acrobat DC Program to complete the assignment.

Multiple Choice. Pick only one answer per question.

Circle, Mark off, underline or Bold the answer

1. A B C D E F	16. A B C D E F	31. A B C D E F
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Please fax or e-mail the answer key to TLC
Western Campus Fax (928) 272-0747.

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.

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…

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

WASTEWATER TREATMENT CEU COURSE

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Any other concerns or comments.

Wastewater Treatment CEU Training Course Assignment

The Assignment (Exam) is also 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'll have 90 days from the start of this course to complete in order to receive your Professional Development Hours (**PDHs**) or Continuing Education Unit (**CEU**). A score of 70 % is necessary to pass this course. We prefer if this exam is proctored. No intentional trick questions. If you should need any assistance, please email all concerns and the completed manual to info@tlch2o.com.

We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your Answer Key and make copy for yourself. You can e-mail or fax your Answer Key along with the Registration Form to TLC. **(S) Means answer may be plural or singular**. **Multiple Choice Section, One answer per question and please use the answer key.**

Basic Wastewater Treatment Processes

1. In wastewater treatment, particles with _____, float to the top of water and can also be removed.

A. Biosolid(s) D. Organic material
B. Activated Sludge E. Entrapped air
C. Chemical(s) F. None of the Above

Biological

2. Which of the following wastewater terms is a suspended growth process for removing organic matter from sewage by saturating it with air and microorganisms that can break down the organic matter?

A. Biosolid(s) D. Organic material
B. Activated Sludge E. Entrapped air
C. Chemical(s) F. None of the Above

3. Which of the following wastewater terms involves treatment levels beyond secondary treatment?

A. Oxygen D. Advanced Treatment
B. Carbon dioxide E. Physical separation step
C. Gravity F. None of the Above

4. To remove organic material from wastewater, Scientists observed that _____ could be contained and accelerated in systems.

A. These natural processes D. Organic material
B. Activated Sludge E. Entrapped air
C. Chemical(s) F. None of the Above

Chemical

5. Which of the following wastewater terms are often used at the later stages of treatment to improve the settling of excess microbiological growth or biosolids?

A. Biosolid(s) D. Organic material
B. Activated Sludge E. Polymers
C. Chemical(s) F. None of the Above

6. According to the text, chemicals can be used to create changes in pollutants that increase the removal of these new forms by physical processes.

A. True B. False

7. _____ can cause pollution, too much organic matter in wastewater can be devastating to receiving waters.

A. Short chained organic
B. Biodegradable material(s)
C. Organic material(s)
D. Wastewater-related source(s)
E. Supply of oxygen
F. None of the Above

8. Which of the following wastewater terms are toxic to humans, fish, and aquatic plants and often are disposed of improperly in drains or carried in stormwater?

A. BOD
B. Most inorganic substances
C. Nitrogen and phosphorus
D. Pesticides and herbicide(s)
E. Turbidity
F. None of the Above

9. Two toxic _____ like benzene and toluene are found in some solvents, pesticides, and other products.

A. Nutrients from wastewater
B. Inorganic materials
C. Inorganic minerals
D. Excessive grease
E. Organic compounds
F. None of the Above

10. _____used for motors and industry are considered hazardous waste and should be collected and disposed of separately from wastewater.

A. BOD
B. Most inorganic substances
C. Nitrogen and phosphorus
D. Pesticides and herbicide(s)
E. Petroleum-based waste oil(s)
F. None of the Above

11. When large amounts of oils and greases are discharged, these increase _____and they may float to the surface and harden, causing aesthetically unpleasing conditions.

A. BOD
B. Most inorganic substances
C. Nitrogen and phosphorus
D. Nitrogen and phosphorus
E. Petroleum-based waste oil(s)
F. None of the Above

12. Which of the following wastewater terms are relatively stable, and cannot be broken down easily by organisms in wastewater?

A. Metals
B. Most inorganic substances
C. Nitrogen and phosphorus
D. Pesticides and herbicide(s)
E. Petroleum-based waste oil(s)
F. None of the Above

13. Extra treatment steps are often required to remove this term from industrial wastewater sources.

A. Nutrients from wastewater
B. Inorganic materials
C. Inorganic minerals
D. BOD
E. DON
F. None of the Above

14. According to the text, heavy metals can be discharged with many types of industrial wastewaters are difficult to remove by conventional treatment methods.

A. True b. False

Nutrients

15. Normally, excessive nutrients in receiving waters cause algae and other plants to grow quickly adding oxygen in the water, because of this additional of oxygen, fish and other aquatic life thrive.

A. True B. False

16. Which of the following wastewater terms have also been linked to ocean "red tides" that poison fish and cause illness in humans?

A. Nutrients from wastewater
B. Inorganic materials
C. Inorganic minerals
D. Excessive grease
E. Nitrogen and phosphorus
F. None of the Above

17. _____ in drinking water may contribute to miscarriages and is the cause of a serious illness in infants called methemoglobinemia or "blue baby syndrome."

A. BOD
B. Most inorganic substances
C. Phosphorus
D. Pesticides and herbicide(s)
E. Nitrogen
F. None of the Above

18. According to the text, wastewater often contains large amounts of this term in the form of nitrate and phosphate, which promote plant growth.

A. Nutrients from wastewater
B. Inorganic materials
C. Inorganic minerals
D. Nutrients nitrogen and phosphorus
E. Nitrogen and phosphorus
F. None of the Above

19. Organisms only require small amounts of _____in biological treatment, so there normally is an excess available in treated wastewater.

A. BOD
B. Most inorganic substances
C. Nitrogen and phosphorus
D. Microorganisms
E. Nutrients
F. None of the Above

Solids

20. Which of the following terms must be treated or they will clog soil absorption systems or reduce the effectiveness of disinfection systems?

A. BOD
B. Organic material
C. The solids
D. Microorganisms
E. Suspended solids in wastewater
F. None of the Above

21. Settleable solids: Certain substances, such as sand, grit, and oxygen-demanding substances settle out from the rest of the wastewater stream during the preliminary stages of treatment.

A. True B. False

22. On the bottom of settling tanks and ponds, _____ makes up a biologically active layer of sludge that aids in treatment.

A. BOD
B. Organic material
C. The solids
D. Heavier organic and inorganic materials
E. Suspended solids in wastewater
F. None of the Above

23. _____represents materials that resist settling may remain suspended in wastewater.

A. Suspended solids
B. Organic material
C. The solids
D. Microorganisms
E. Dissolved solids
F. None of the Above

24. Some dissolved materials are consumed by _____ in wastewater.

A. BOD
B. Organic material
C. The solids
D. Microorganisms
E. Suspended solids in wastewater
F. None of the Above

Gases

25. Certain gases in wastewater can cause odors, affect treatment, or are potentially dangerous.
A. True B. False

26. Methane gas is a byproduct of _____and is highly combustible.
A. Dissolved oxygen
B. Oxygen-demanding
C. Magnesium hydroxide
D. Biochemical oxygen demand or BOD
E. Anaerobic biological treatment
F. None of the Above

Hydrogen Sulfide and Ammonia

27. The gases hydrogen sulfide along with this substance can be toxic and pose asphyxiation hazards.
A. Ammonia
B. Wastewater odor(s)
C. Hydrogen sulfide or H_2S problem(s)
D. The lack of oxygen
E. Less oxygen
F. None of the Above

28. Ammonia as a dissolved gas in wastewater and is not dangerous to fish.
A. True B. False

29. The best method of controlling hydrogen sulfide is to eliminate its habitat or growth area by keeping sewers cleaner. This action will harbor?
A. Fewer slime bacteria
B. Wastewater odor(s)
C. Hydrogen sulfide or H_2S problem(s)
D. The lack of oxygen
E. Less oxygen
F. None of the Above

30. Salts of zinc and iron may precipitate in to this term?
A. Dissolved oxygen
B. Sulfides
C. Magnesium hydroxide
D. Biochemical oxygen demand, or BOD
E. Wastewater odor(s)
F. None of the Above

31. Which of the following terms will create conditions in the sewer system because of the lack of oxygen?
A. Slime bacteria
B. Wastewater odor(s)
C. Hydrogen sulfide
D. The lack of oxygen
E. Less oxygen
F. None of the Above

32. Unless effectively contained or minimized by design and location, wastewater odors can affect the mental well-being and?
A. Dissolved oxygen
B. Oxygen-demanding
C. Quality of life of residents
D. Biochemical oxygen demand or BOD
E. Wastewater odor(s)
F. None of the Above

33. Which of the following terms are very common in the collection and wastewater system?
A. Slime bacteria
B. Wastewater odor(s)
C. Hydrogen sulfide or H_2S problem(s)
D. High DO
E. Lack of Turbidity
F. None of the Above

34. These chemicals or compounds are utilized in the treatment of hydrogen sulfide problems: Salts of zinc, lime, hydrogen peroxide, _____and magnesium hydroxide.
A. Dissolved oxygen
B. Oxygen
C. Chlorine
D. Ammonia
E. Carbon dioxide
F. None of the Above

35. Hydrogen dioxide production in collection systems can cause a number of problems such as corrosion of the pipes, manholes, and creation of hazardous atmospheres and foul odors.
A. True B. False

Pollutants, Oxygen-Demanding Substances

36. Which of the following terms is a key element in water quality that is necessary to support aquatic life?
A. Dissolved oxygen
B. Oxygen-demanding
C. Magnesium hydroxide
D. Biochemical oxygen demand, or BOD
E. Wastewater odor(s)
F. None of the Above

37. Biochemical oxygen demand, or BOD is used to measure how well a sewage treatment plant is working, it is a demand placed on the unnatural supply of pollutants in wastewater.
A. True B. False

38. If the effluent, the treated wastewater produced by a treatment plant, has a high content of organic pollutants or ammonia, it will demand more oxygen from the water and leave the water with less of _____to support fish and other aquatic life.
A. Slime bacteria
B. Wastewater odor(s)
C. Hydrogen sulfide or H_2S problem(s)
D. The lack of oxygen
E. Oxygen
F. None of the Above

39. Organic matter and this term are “oxygen-demanding” substances.
A. Dissolved oxygen
B. Ammonia
C. Magnesium hydroxide
D. Biochemical oxygen demand, or BOD
E. Wastewater odor(s)
F. None of the Above

40. According to the text, oxygen-demanding substances are contributed by this missing term and agricultural and industrial wastes.
A. Slime bacteria
B. Wastewater odor(s)
C. Hydrogen sulfide or H_2S problem(s)
D. The lack of oxygen
E. Domestic sewage
F. None of the Above

41. Oxygen-demanding substances are usually destroyed or converted to other compounds by this _____if there is sufficient oxygen present in the water.
A. Dissolved oxygen
B. Oxygen-demanding
C. Magnesium hydroxide
D. Biochemical oxygen demand, or BOD
E. Bacteria
F. None of the Above

Pathogens

42. According to the text, modern disinfection techniques have greatly reduced the danger of waterborne disease.
A. True B. False

Nutrients

43. Which of the following wastewater terms - are essential to living organisms and are the chief nutrients present in natural water?
A. Oxygen
B. Ecology
C. Nutrient enrichment
D. Carbon, nitrogen, and phosphorus
E. Phosphorus and nitrogen
F. None of the Above

44. Uncontrolled algae growth blocks out sunlight and chokes aquatic plants and animals by depleting _____in the water at night.

A. Pathogen(s)
B. Dissolved oxygen
C. Nutrient enrichment
D. Excessive growth of algae
E. Phosphorus and nitrogen
F. None of the Above

45. Primarily _____but occasionally nitrogen, causes nutrient enrichment which results in excessive growth of algae.

A. Phosphorus
B. Heavy metals
C. Nutrient enrichment
D. Excessive growth of algae
E. Phosphorus and nitrogen
F. None of the Above

Inorganic and Synthetic Organic Chemicals

46. Inorganic and Synthetic Organic Chemicals can cause _____problems, and many are not effectively removed by conventional wastewater treatment.

A. Toxic
B. Ecology
C. Nutrient enrichment
D. Excessive growth of algae
E. Taste and odor
F. None of the Above

Thermal

47. Which of the following terms reduces the capacity of water to retain oxygen?

A. Heat
B. Heavy metals
C. Nutrient enrichment
D. Excessive growth of algae
E. Phosphorus and nitrogen
F. None of the Above

48. Unchecked discharges of _____can seriously alter the ecology of a lake, a stream, or estuary.

A. Toxic
B. Waste heat
C. Nutrient enrichment
D. Eutrophication or cultural enrichment
E. Phosphorus and nitrogen
F. None of the Above

Primary Treatment

49. The initial stage in the treatment of domestic wastewater is known as bar screens.

A. True B. False

50. Coarse solids are removed from the wastewater in the primary stage of treatment. In some treatment plants, _____may be combined into one basic operation.

A. Solid(s)
B. Finer debris
C. Grit and gravel
D. Suspended growth process(es)
E. Primary and secondary stages
F. None of the Above

51. There are two basic stages in the treatment of wastes, RAS and WAS.

A. True B. False

Preliminary Treatment

52. The Preliminary Treatment is a physical stage consisting of Coarse Screening, Raw Influent Pumping, Static Fine Screening, Grit Removal, and Selector Tanks.

A. True B. False

53. Which term enters from the collection system into the coarse screening process?

A. Solid(s)
B. Finer debris
C. Grit and gravel
D. Raw wastewater
E. Dissolved organic and inorganic constituents
F. None of the Above

54. After the wastewater has been screened, it may flow into a grit chamber where sand, grit, cinders, and small stones settle to the bottom.
A. True B. False

55. Especially in cities with combined sewer systems, removing the _____that washes off streets or land during storms is very important.
A. Very fine solids D. Primary sludge
B. Grit and gravel E. Grit and screenings
C. Pollutant(s) F. None of the Above

56. The coarse screening process consists of a basket shaped bar screen which collects larger debris (several inches in diameter) prior to the raw influent pumping.
A. True B. False

57. Which of the following terms is removed and placed into a dumpster for disposal into the landfill?
A. Compounds D. Debris
B. Finer debris E. Dissolved organic and inorganic constituents
C. Liquids F. None of the Above

58. Which of the following terms passes into the Raw Influent Pumping process that consists of submersible centrifugal pumps?
A. Wastewater D. Dissolved organic and inorganic constituents
B. Split samples E. Grit and gravel
C. Duplicate samples F. None of the Above

Primary Sedimentation
59. Pollutants that are dissolved or are very fine and remain suspended in the wastewater are easily removed effectively by gravity settling.
A. True B. False

60. When the wastewater enters a sedimentation tank, it slows down and the suspended solids gradually sink to the bottom, this mass of solids is called?
A. Very fine solids D. Primary sludge
B. Wastewater E. Grit and screenings
C. Pollutant(s) F. None of the Above

61. When the screening completed and the grit removed, wastewater is clear of dissolved organic and inorganic constituents along with suspended solids.
A. True B. False

Secondary Treatment
62. The wastewater enters from preliminary preatment into the clarifier process which is a biological process consisting of large oval shaped basins which are capable of removing these finer solids.
A. True B. False

63. Maintaining a population of microorganisms within the oxidation basins which consumes the _____ and also adhere to the solids themselves.
A. Total Solids D. Elevated Hardness, Salty Taste, or Corrosiveness
B. TDS E. Wastewater temperature
C. Very fine solids F. None of the Above

64. After _____ has been through primary treatment processes, it flows into the next stage of treatment called secondary.
A. Very fine solids D. Primary sludge
B. Wastewater E. Grit and screenings
C. Pollutant(s) F. None of the Above

65. The two most common conventional methods used to achieve secondary treatment are: this missing term and suspended growth processes.
A. Solid(s) D. Unsuspended growth process(es)
B. Finer debris E. Organic matter
C. Attached growth processes F. None of the Above

Natural Systems
66. According to the text, wetland systems are typically described in terms of the position of the water surface and/or the type of vegetation grown.
A. True B. False

67. FWS wetlands with long detention times can remove minor amounts of _____ through plant uptake, adsorption, complexation, and precipitation.
A. Total Solids D. Elevated Hardness, Salty Taste, or Corrosiveness
B. TDS E. Phosphorus
C. pH F. None of the Above

68. _____ is typically greater in the first year or two because of soil absorption.
A. Ammonia oxidation D. An aerobic wastewater treatment facility
B. Phosphorus removal E. Oxygen demand of wastewater
C. Nitrate removal F. None of the Above

69. Which of the following terms is also possible with the use of an addition process, such as chemical addition and mixing prior to a final deep settling pond?
A. Ammonia oxidation D. An aerobic wastewater treatment facility
B. Phosphorus removal E. Oxygen demand of wastewater
C. Nitrate removal F. None of the Above

70. Duckweed are floating macrophytes.
A. True B. False

71. Although duckweed can be found in most regions, the rate of growth is optimal at 20 to 30^{o} C and they grow best in a pH range of 3.5 to 8.5.
A. True B. False

72. Which of the following terms are a modification of subsurface flow wetlands that contain gravel or coarse sand and are loaded intermittently at the top surface?
A. Trickling filter(s) D. Vertical flow wetland beds
B. Oxidation Ditches E. Recirculating sand filters (RSFs)
C. Nitrogen removal system(s) F. None of the Above

73. _____in a subsurface flow wetland can be rapid and effective because the anoxic conditions and carbon sources.
A. Wastewater temperature D. An aerobic wastewater treatment facility
B. Phosphorus removal E. Oxygen demand of wastewater
C. Nitrate removal F. None of the Above

74. A disadvantage of duckweed systems is the large amount of biomass produced by the rapidly growing plants, which creates a _____requirement.

A. Ammonia oxidation
B. Phosphorus removal
C. Nitrate removal
D. Solids handling
E. Oxygen demand of wastewater
F. None of the Above

Nitrogen Removal

75. Processes that remove 75 to 100 percent of total nitrogen include aerobic biological systems and media filters, especially recirculating filters.

A. True B. False

76. The vast majority of on-site and cluster nitrogen-removal systems employ nitrification and?

A. Groundwater recharge
B. Community drainfield(s)
C. High-aluminum mud(s)
D. Denitrification biological reactions
E. Small volumes of wastewater
F. None of the Above

77. SBRs, and an array of _____ combined with an anoxic/anaerobic process to perform denitrification.

A. Trickling filter(s)
B. Oxidation Ditches
C. Nitrogen removal system(s)
D. Aerobic nitrification processes
E. Recirculating sand filters (RSFs)
F. None of the Above

Secondary Clarification Process

78. The SCP provides quiescent (or calm) conditions which allow the larger aggregates of solids and microorganisms to settle out for collection.

A. True B. False

79. In the SCP, the majority of microorganism-rich underflow (or lower layer) is re-circulated to Tanks as Return Sludge to help sustain the microorganism population in the?

A. Trickling filter(s)
B. Oxidation Ditches
C. Nitrogen removal system(s)
D. Aerobic nitrification processes
E. Recirculating sand filters (RSFs)
F. None of the Above

Fixed Film Systems

80. Which of the following wastewater terms grow microorganisms on substrates such as rocks, sand or plastic?

A. Mature biofilm
B. Activated sludge system
C. Advanced treatment technologies
D. Application-specific microbiology
E. Fixed film systems
F. None of the Above

81. The wastewater is spread over the substrate, allowing the wastewater to flow past the film of microorganisms fixed to the substrate.

A. True B. False

Other Important Wastewater Characteristics

82. One important wastewater characteristic that can affect public health and the environment, as well as the design, cost, and?

A. Treatment processes
B. Total dissolved solids (TDS)
C. Quality of the water
D. The environment
E. Effectiveness of treatment
F. None of the Above

Temperature

83. The best temperatures for wastewater treatment probably range from 77 to 95 degrees Fahrenheit.
A. True B. False

84. Biological treatment activity accelerates in warm temperatures and slows in cool temperatures, but _____can stop treatment processes altogether.
A. Oxygen
B. High TSS
C. Settling sediments
D. Total Suspended Solids (TSS)
E. Extreme hot or cold
F. None of the Above

pH

85. The acidity or alkalinity of wastewater affects both treatment and the environment.
A. True B. False

86. Low pH indicates increasing acidity while a low pH indicates increasing alkalinity.
A. True B. False

87. Which of the following terms of wastewater needs to remain between 6 and 9 to protect organism?
A. Total Solids
B. TDS
C. pH
D. Elevated Hardness, Salty Taste, or Corrosiveness
E. Wastewater temperature
F. None of the Above

88. Other substances and some acids can alter _____ can inactivate treatment processes when they enter wastewater from industrial or commercial sources.
A. Total Solids
B. TDS
C. pH
D. Elevated Hardness, Salty Taste, or Corrosiveness
E. Wastewater temperature
F. None of the Above

Total Dissolved Solids

89. Pure water is tasteless, colorless, and odorless and is often called “the universal solvent”.
A. True B. False

90. Which of the following wastewater terms is a good solvent and picks up impurities easily?
A. Treatment processes
B. Total dissolved solids (TDS)
C. Quality of the water
D. Wastewater
E. Water
F. None of the Above

91. Which of the following wastewater terms refer to any minerals, salts, metals, cations or anions dissolved in water?
A. Total Solids
B. TDS
C. pH
D. Elevated Hardness, Salty Taste, or Corrosiveness
E. Dissolved solids
F. None of the Above

92. Which of the following wastewater terms comprise inorganic salts and some small amounts of organic matter that are dissolved in water?
A. Treatment processes
B. Total dissolved solids (TDS)
C. Quality of the water
D. Both treatment and the environment
E. Universal solvent
F. None of the Above

93. TDS in drinking water originate from natural sources, sewage, urban run-off, industrial wastewater, and chemicals used in the water treatment process.
A. True B. False

94. The total dissolved solids test provides a qualitative measure of the amount of dissolved ions, but does not tell us the nature or ion relationships.
A. True B. False

95. Which of the following wastewater terms has been due to natural environmental features such as: mineral springs, carbonate deposits, salt deposits, and seawater intrusion?
A. Total Solids D. Elevated Hardness, Salty Taste, or Corrosiveness
B. TDS E. Wastewater temperature
C. pH F. None of the Above

96. Which of the following wastewater terms is the concentration of the sum of the cations (positively charged) and anions (negatively charged) ions in the water?
A. Treatment processes D. Both treatment and the environment
B. Total dissolved solids (TDS) E. Universal solvent
C. Quality of the water F. None of the Above

97. The TDS test does not provide us insight into the specific water quality issues, such as: Elevated Hardness, Salty Taste, or_____.
A. Total Solids D. Corrosiveness
B. TDS E. Wastewater temperature
C. pH F. None of the Above

Total Solids
98. Which of the following wastewater terms refers to matter suspended or dissolved in water or wastewater, and is related to both specific conductance and turbidity?
A. Total Solids D. Elevated Hardness, Salty Taste, or Corrosiveness
B. TDS E. Wastewater temperature
C. pH F. None of the Above

99. _____ can be measured by evaporating a water sample in a weighed dish, and then drying the residue in an oven at 103 to 105° C.
A. Treatment processes D. Total Suspended solids
B. Total dissolved solids (TDS) E. Wastewater
C. Quality of the water F. None of the Above

100. The increase in weight of the dish represents the total solids. Instead of total solids, laboratories often measure total suspended solids and/or total dissolved solids.
A. True B. False

Total Suspended Solids (TSS)
101. Total Suspended Solids (TSS) are solids in water that can be trapped by a filter.
A. True B. False

102. Which of the following wastewater terms can include a wide variety of material, such as silt, decaying plant and animal matter, industrial wastes, and sewage?
A. Total Solids D. TSS
B. TDS E. Wastewater
C. pH F. None of the Above

103. _____ can block light from reaching submerged vegetation.
A. Total Solids D. Total Suspended Solids (TSS)
B. TDS E. High TSS
C. pH F. None of the Above

104. Wastewater treatment plants are designed to function as "microbiology farms," where bacteria and other microorganisms are fed oxygen and organic waste.
A. True B. False

Coagulation-Sedimentation Process
105. Solids heavier than water settle out of wastewater by gravity. With the addition of specific chemicals, solids can become heavier than water and will settle.
A. True B. False

106. Which of the following wastewater treatment terms is considered an advanced process because it is not routinely applied to the treatment of municipal wastewater?
A. Carbon adsorption
B. An advanced process
C. Coagulation-sedimentation
D. A form of stabilization
E. Processed wastewater solids (“sewage sludge”)
F. None of the Above

Carbon Adsorption
107. Carbon adsorption technology can remove organic materials from wastewater that resist removal by?
A. Denitrification process
B. Biological treatment
C. Bulking sludge
D. Insufficient aeration in the reactor
E. Anaerobic sludge
F. None of the Above

The Use or Disposal of Wastewater Residuals and Biosolids
108. When pollutants are removed from water, there may be the _____ that settle to the bottom of sedimentation tanks.
A. Other alkaline materials
B. Solids
C. Sewage solids, or sludge
D. Biosolids
E. Rags and sticks
F. None of the Above

Processed Wastewater Solids
109. Which of the following wastewater treatment terms - are considered biosolids and need to meet rigorous standards allowing safe reuse for beneficial purposes?
A. Other alkaline materials
B. A form of stabilization
C. Sewage solids, or sludge
D. Processed wastewater solids
E. Rags and sticks
F. None of the Above

Biosolids Stabilization
110. Prior to utilization or disposal, _____ are stabilized to control odors and reduce the number of disease-causing organisms.
A. Biosolids
B. An advanced process
C. Sewage solids, or sludge
D. Other alkaline materials
E. Processed wastewater solids (“sewage sludge”)
F. None of the Above

111. To improve dewatering effectiveness, the solids can be pretreated with chemicals such as lime, ferric chloride, or polymers to produce larger particles which are easier to remove.
A. True B. False

Digestion
112. Digestion is a form of _____where the volatile material can decompose naturally and the potential for odor production is reduced.
A. Dewatering processes
B. Release
C. Sewage solids, or sludge
D. Stabilization of solids
E. Stabilization
F. None of the Above

Aquatic Life Criteria
113. Allowable concentrations provide protection for plants and animals that are found in surface waters.
A. True B. False

Sediment Quality Criteria Guidance
114. Which of the following wastewater treatment terms provides a habitat for many living organisms?
A. Allowable concentrations
B. Water quality
C. Sediments
D. Acute (short term) and chronic (long term)
E. Human health and aquatic life criteria
F. None of the Above

Pollutants in the Sediment
115. Which of the following wastewater treatment terms helps to protect bottom dwelling species and prevents harmful toxins from moving up the food chain?
A. Pollutants in the sediment
B. Water pollutant(s)
C. Water quality standard(s)
D. Concentration of pollutant(s)
E. A pollutant level
F. None of the Above

Biological Criteria
116. A water body in its natural condition is free from this term, habitat loss, and other negative stressors.
A. Allowable concentrations
B. Harmful effects of pollution
C. In a healthy aquatic community
D. Acute (short term) and chronic (long term)
E. Human health and aquatic life criteria
F. None of the Above

Aerobic Processes
117. The most common aerobic processes are: activated sludge systems, lagoons, trickling filters and rotating disk contactors.
A. True B. False

118. Which of the following terms is the amount of food provided to the bacteria in the aeration tank (the food-to-microorganism ratio, F/M)?
A. Carbonaceous BOD
B. Attached growth processes
C. Mean cell residence time (MCRT)
D. Suspended growth processes
E. Food-to-microorganism ratio, F/M
F. None of the Above

Microorganisms in Lagoons
119. Swimming and _____engulf bacteria or other prey.
A. Strict aerobes
B. Predators
C. Bacteria
D. Heterotrophic bacteria
E. Gliding ciliates
F. None of the Above

120. The following changes in food, dissolved oxygen, temperature, pH, total dissolved solids, sludge age, presence of toxins, and other factors create a dynamic environment for the?
A. Treatment organism(s)
B. Aerobic bacteria
C. Stalked ciliate(s)
D. Floc-forming bacteria
E. Filamentous bacteria
F. None of the Above

121. Food (organic loading) regulates_____.
A. Strict aerobes
B. Predators
C. Microorganism numbers
D. Heterotrophic bacteria
E. Many bacterial species
F. None of the Above

Aerobic Bacteria

122. Three bacteria groups occur: freely dispersed, single bacteria; floc-forming bacteria; and filamentous bacteria. All function similarly to oxidize organic carbon to produce CO_2 and new bacteria.
A. True B. False

123. Which of the following bugs or terms, grow in a large aggregate due to exocellular polymer production?
A. Treatment organism(s)
B. Aerobic bacteria
C. Stalked ciliate(s)
D. Floc-forming bacteria
E. Filamentous bacteria
F. None of the Above

124. Growth form is important as these flocs degrade _____and settle at the end of the process, producing a low TSS effluent.
A. Anaerobic action
B. Absence of free oxygen
C. BOD
D. Aerobic bacteria
E. Application-specific bacteria
F. None of the Above

125. A very specialized group of bacteria occurs to some extent in lagoons (and other wastewater treatment systems) that can oxidize ammonia via nitrite to nitrate, termed _____ .
A. Strict aerobes
B. Predators
C. Nitrifying bacteria
D. Heterotrophic bacteria
E. Many bacterial species
F. None of the Above

Protozoans and Microinvertebrates

126. Many higher life forms (animals) develop in lagoons. These include protozoans and microinvertebrates such as rotifers, daphnia, annelids, chironomids, and mosquito larvae.
A. True B. False

127. _____ best describe the most common higher life forms in lagoons with about 250 species identified in lagoons to date.
A. Mosquitoes
B. Bacteria and algae
C. Protozoans
D. Rotifers and daphnia
E. Culex tarsalis
F. None of the Above

Paramecium sp.

128. Which of the following bugs is a medium to large size (100-300 µm) swimming ciliate, commonly observed in activated sludge, sometimes in abundant numbers?
A. Shelled amoeba(s)
B. Euglypha
C. Vorticella
D. Stalked ciliate
E. Paramecium
F. None of the Above

Vorticella sp.

129. Which of the following bugs feeds by producing a vortex with its feeding cilia?
A. Shelled amoeba(s)
B. Euglypha
C. Vorticella
D. Stalked ciliate
E. Paramecium
F. None of the Above

130. According to the text, if treatment conditions are bad, for example low DO or toxicity, _____ will leave their stalks.
A. Shelled amoeba(s)
B. Euglypha
C. Vorticella
D. Stalked ciliate
E. Ciliate
F. None of the Above

131. According to the text, Vorticella are oval to round shaped, have a contractile stalk, a domed feeding zone, and a water vacuole located near the terminal end of the false foot.
A. True B. False

132. After reproducing, the offspring develops a band of swimming cilia and goes off to form its own stalk, the evicted organism is called a?
A. Shelled amoeba(s) D. Swarmer
B. Euglypha E. Paramecium
C. Vorticella F. None of the Above

Euglypha sp.
133. _____may be single or in groups of two or three?
A. Shelled amoeba(s) D. Stalked ciliate
B. Euglypha E. Paramecium
C. Vorticella F. None of the Above

134. Which of the following bugs is a shelled (testate) amoeba?
A. Shelled amoeba(s) D. Stalked ciliate
B. Euglypha E. Paramecium
C. Vorticella F. None of the Above

Euchlanis sp.
135. Which of the following bugs is an omnivore, meaning that its varied diet includes detritus, bacteria, and small protozoa?
A. Euglypha D. Euchlanis
B. Shelled amoeba(s) E. Spirochaetes
C. Rotifer(s) F. None of the Above

136. According to the text, Euchlanis is commonly found in_____.
A. Biofilm bacteria D. Activated sludge
B. Filamentous bacteria E. An omnivore
C. Some bacteria F. None of the Above

Bacteria Section
137. Which of the following terms is tightly coiled up bacteria?
A. Cocci D. Spiral
B. Rods E. Spirochaetes
C. Balls F. None of the Above

138. Many bacteria exist as _____and the study of biofilms is very important.
A. Filamentous Bacteria D. Either anaerobic or aerobic conditions
B. A biofilm E. Anaerobic to aerobic state
C. Application-specific bacteria F. None of the Above

139. Which of the following terms secrete sticky substances that form a sort of gel in which they live?
A. Biofilm bacteria D. Activated sludge
B. Filamentous bacteria E. An omnivore
C. Some bacteria F. None of the Above

Filamentous Bacteria

140. Which of the following terms are a type of bacteria that can be found in a wastewater treatment system?

A. Filamentous Bacteria
B. Facultative
C. Application-specific bacteria
D. Either anaerobic or aerobic conditions
E. Anaerobic to aerobic state
F. None of the Above

141. According to the text, filaments are _____that grow in long thread-like strands or colonies.

A. Bacteria
B. Facultative
C. Application-specific bacteria
D. Bacteria and fungi
E. Anaerobic to aerobic state
F. None of the Above

Site Specific Bacteria

142. Aeration and biofilm building are the key operational parameters that contribute to the efficient degradation of organic matter (BOD/COD removal).

A. True B. False

Facultative Bacteria

143. According to the text, when bacteria are in the process of being transferred from one environment to another, the metamorphosis from _____ (and vice versa) takes place within a couple of hours.

A. Filamentous Bacteria
B. Facultative
C. Application-specific bacteria
D. Either anaerobic or aerobic conditions
E. Anaerobic to aerobic state
F. None of the Above

Anaerobic Bacteria

144. _____live and reproduce in the absence of free oxygen?

A. Anaerobic action
B. Anaerobic bacteria
C. Facultative bacteria
D. Aerobic bacteria
E. Application-specific bacteria
F. None of the Above

145. Which of the following terms begins in the collection lines of a sewer system, causing deadly hydrogen sulfide or explosive methane gas can accumulate and be life threatening?

A. Anaerobic action
B. Absence of free oxygen
C. Facultative bacteria
D. Aerobic bacteria
E. Application-specific bacteria
F. None of the Above

Aerobic Bacteria

146. The metabolism of aerobes is much higher than?

A. Anaerobic action
B. Anaerobes
C. Facultative bacteria
D. Aerobic bacteria
E. Application-specific bacteria
F. None of the Above

147. The by-products of _____ are carbon dioxide and water.

A. Anaerobic action
B. Absence of free oxygen
C. Facultative bacteria
D. Aerobic bacteria
E. Application-specific bacteria
F. None of the Above

Filamentous Bacteria Identification

148. Filamentous Identification should be used as a tool to monitor the health of the biomass when a floating scum mat is suspected.

A. True B. False

Nocardia amarae

149. N. amarae, member of the Actinomycetes family, is very motile, so it doesn't rely on movement of the water to carry it through the system.

A. True B. False

Nostocoida limicola

150. Nostocoida limicola is yet another common cause of disruptive foaming in waste treatment plants, motile in its Hormogonia and sometimes Trichome phases. This oxygenic phototrophic species often forms multicellular rigid filaments, forming non-symbiotic relationships with other species.

A. True B. False

151. Nostocoida can also be identified by their starburst effect formations using phase contrast microscopy at 400 to 1000x magnification. After chlorination, a few dead cells sticking out identify stress to this species.

A. True B. False

Thiothrix

152. Thiothrix are considered this term, using several small organic carbons and reduced inorganic sulfur sources for growth and energy.

A. Viscous brown color
B. Staining gram-positive
C. Mixotrophic
D. Gram-positive, chemoautotrophic, filamentous
E. Disruptive foaming
F. None of the Above

153. According to the text, Thiothrix II produces rectangular filaments up to 200 microns in length and is easily identified by their _____using phase contrast microscopy at 400 to 1000x magnification.

A. Stain gram-negative
B. Not casease
C. Slower growing filaments
D. Starburst effect formations
E. Multicellular rigid filaments
F. None of the Above

Microthrix parvicella

154. Microthrix parvicella is another common cause of?

A. Viscous brown color
B. Staining gram-positive
C. Mixotrophic
D. Gram-positive, chemoautotrophic, filamentous
E. Disruptive foaming
F. None of the Above

Sphaeroliticus natans

155. Sphaeroliticus natans is another filamentous species, and yet it is reputed to increase settleability by branching between flocs, increasing surface area.

A. True B. False

156. A low F/M ratio favors filamentous organisms, because their higher ratio of surface area to volume provides them with a selective advantage for?

A. Viscous brown color
B. Staining gram-positive
C. Mixotrophic
D. Gram-positive, chemoautotrophic, filamentous
E. Securing nutrients in nutrient limited environments
F. None of the Above

157. Which of the following terms requires high levels of oxygen are necessary?

A. Stain gram-negative
B. A strict aerobe
C. Slower growing filaments
D. Disruptive foaming
E. Multicellular rigid filaments
F. None of the Above

Filamentous Bacteria

158. There is a potential for instability with _____is an acute problem when strict demands on treatment performance are in place.

A. Organic carbon
B. Activated sludge
C. Domestic wastewater
D. High BOD
E. Growth of filamentous bacteria
F. None of the Above

Other Wastewater Treatment Components

Biochemical Oxygen Demand

159. Biochemical Oxygen Demand (BOD or BOD5) is an indirect measure of Biodegradable organic compounds in water, and is determined by measuring the dissolved oxygen decrease in a controlled water sample over a five-day period.

A. True B. False

160. The BOD test has merit as a pollution parameter continues to be debated, _____has the advantage of a long period of record.

A. BOD
B. Dissolved oxygen decrease
C. Sludge bulking
D. Bacteria and other microbes
E. Oxygen-demanding pollutants
F. None of the Above

Nutrient Constituents in Wastewater and Measurement Methods

The TKN method has three major steps:

161. Digestion to convert organic nitrogen to_____.

A. TKN
B. Organic nitrogen
C. Aliphatic N compounds
D. Ammonium sulfate
E. Dissolved, biodegradable compounds
F. None of the Above

162. Wastewater treatment plants are designed for nitrification and denitrification and these can remove 80 to 95 percent of _____, but the removal of organic nitrogen is typically much less efficient.

A. TKN
B. Organic nitrogen
C. Aliphatic N compounds
D. Ammonium sulfate
E. Inorganic nitrogen
F. None of the Above

163. According to the text, domestic wastewater organic nitrogen may be present in particulate, colloidal or dissolved forms and consist of proteins, amino acids, _____, refractory natural compounds in drinking water.

A. Ammonia gas
B. Effluent limits
C. DON
D. Aliphatic N compounds
E. Domestic wastewater organic nitrogen
F. None of the Above

Phosphorus

164. _____in domestic wastewater typically ranges between 4 and 8 mg/L but can be higher depending on sources.

A. Phosphorus as phosphate
B. Phosphorus
C. Orthophosphate
D. Pyrophosphate and trimetaphosphate
E. Total phosphorus (TP)
F. None of the Above

165. Which of the following terms can either be in the form of soluble colloids or particulate?

A. Phosphorus
B. Orthophosphate
C. Organic phosphorus
D. Organically bound phosphorus
E. Soluble organically bound non-biodegradable phosphorus
F. None of the Above

POTW's Wastewater Samples
General
166. Which of the following terms used depends largely on the types of analyses to be run, and the nature of the wastestream being sampled?
A. An analysis D. Taste test
B. The sampling method E. Blanks
C. Duplicate samples F. None of the Above

167. Which of the following sampling terms is an individual sample collected in less than 15 minutes without regard for flow or time of day.
A. Entire batch discharge D. An individual sample
B. The volume of sample E. Proportional composite sampling
C. A grab sample F. None of the Above

168. pH, cyanide, oil and grease, sulfide, and volatile organics must be collected as composite samples.
A. True B. False

Wastewater Grab Samples
169. Which of the following sampling terms are normally taken manually, but can be pumped?
A. Quantify the pollutants D. Time proportional composite sampling methods
B. Grab samples E. Flow proportional composites
C. Hand composites F. None of the Above

A grab sample is usually taken when a sample is needed to:
170. Provide information about _____of pollutants at a specific time.
A. Entire batch discharge D. An individual sample
B. The volume of sample E. An instantaneous concentration
C. Concentration of pollutants F. None of the Above

171. Which of the following sampling terms - not amenable to compositing such as pH, temperature, dissolved oxygen, chlorine, purgeable organics and sulfides, oil and grease, coliform bacteria, and sulfites?
A. Quantify the pollutants D. Monitor parameters
B. Grab samples E. Flow proportional composites
C. Hand composites F. None of the Above

Timed Composites
172. Which of the following sampling terms - are usually taken in instances where the intention is to characterize the wastes over a period without regard to flow?
A. Timed samples D. Time proportional composite sampling methods
B. Grab samples E. Flow proportional composites
C. Hand composites F. None of the Above

Wastewater Sample Preservation
173. One or more unstable pollutants that require immediate analysis or preservation until _____ can be made.
A. An analysis D. Taste test
B. Split samples E. Blanks
C. Duplicate samples F. None of the Above

Dissolved Oxygen

174. At least two general forms of bacteria act in balance in a wastewater digester: Saprophytic organisms and?

A. Methane Fermenters
B. DO fermenters
C. Carbon dioxide fermenters
D. Butyric acid fermenters
E. Aerobic fermenters
F. None of the Above

175. Dissolved oxygen level is important because too much or not enough dissolved oxygen can create?

A. Unfavorable conditions
B. DO analysis
C. Carbon dioxide
D. Frequent dissolved oxygen measurement
E. Aerobic conditions
F. None of the Above

176. Which of the following wastewater terms – in a water sample can be detrimental to metal pipes in high concentrations because oxygen helps accelerate corrosion?

A. Winkler Method
B. Dissolved Oxygen
C. Only molecular oxygen
D. Anaerobic conditions
E. The iodometric (titration) test
F. None of the Above

177. Oxygen's primary value is to oxidize iron and manganese into forms that will precipitate out of the water; it also removes excess carbon dioxide.

A. True B. False

Methods of Determination

178. _____procedure is based on the rate of diffusion of molecular oxygen across a membrane.

A. Membrane electrode method
B. Dissolved Oxygen
C. Only molecular oxygen
D. Anaerobic conditions
E. Iodometric (titration) test
F. None of the Above

179. Many factors determine the _____in a water sample.

A. Solubility of oxygen
B. DO analysis
C. Carbon dioxide
D. Frequent dissolved oxygen measurement
E. Aerobic conditions
F. None of the Above

Iodometric Test

180. The iodometric (titration) test is not a very precise and reliable for (DO) analysis of samples.

A. True B. False

181. Which of the following wastewater terms – effectively removes interference caused by nitrates in the water sample, so a more accurate determination of (DO) can be made?

A. Winkler Method
B. Dissolved Oxygen
C. Only molecular oxygen
D. The alkaline Iodide-Azide reagent
E. The iodometric (titration) test
F. None of the Above

Sludge Volume Index (SVI)

182. The higher the (SVI), the better is the settling quality of the aerated mixed liquor, low (SVI) of 50 or less is considered a good settling sludge.

A. True B. False

183. The Sludge Volume Index (SVI) of activated sludge is defined as the volume in milliliters occupied by _____ after settling for 30 minutes.

A. A closed loop
B. 1g of activated sludge
C. Optimal DO levels
D. Trickling filter FFSs
E. A portion of the denitrified effluent
F. None of the Above

Chlorine Exposure Limits

184. OSHA PEL _____

A. 10 PPM
B. 1 PPM
C. 00.1 PPM
D. 1,000 PPM
E. 100 PPM
F. None of the Above

185. Physical and chemical properties: A yellowish green, nonflammable and liquefied gas with an unpleasant and irritating smell.

A. Cl3
B. Chlorine
C. HOCl and OCl-
D. Combined Available Chlorine
E. Monochloramine
F. None of the Above

186. This can be readily compressed into a clear, amber-colored liquid, a _____, and a strong oxidizer.

A. Cl2
B. Cl
C. HOCl and OCl-
D. Combined Available Chlorine
E. Noncombustible gas
F. None of the Above

187. Solid chlorine is about _____ times heavier than water and gaseous chlorine is about 2.5 times heavier than air.

A. 1.5
B. 1.0
C. 0.5
D. 2.5
E. 3.0
F. None of the Above

188. Cl2 IDLH?

A. 10 PPM
B. 1 PPM
C. 00.1 PPM
D. 1,000 PPM
E. 100 PPM
F. None of the Above

189. Cl2 Fatal Exposure Limit?

A. 10 PPM
B. 1 PPM
C. 00.1 PPM
D. 1,000 PPM
E. 100 PPM
F. None of the Above

190. The current Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) for chlorine is 10 PPM (3 milligrams per cubic meter (mg/m (3))) as a ceiling limit. A worker's exposure to chlorine shall at no time exceed this ceiling level.

A. True B. False

191. When using chlorine gas: In addition to protective clothing and goggles, chlorine gas should be used only in a well-ventilated area so that _____ cannot concentrate.

A. Chlorine exposure
B. Connection
C. Leak area
D. Any leaking gas
E. Several safety precautions
F. None of the Above

192. HOCl and OCl-: The OCL- is the hypochlorite ion and both of these species are known as free available chlorine, they are the two main chemical species formed by chlorine in water and they are known collectively as _____and the_____.

A. Hypochlorous acid, Cl2
B. Hypochlorous acid, Hypochlorite ion
C. HOCl2 and OCl2
D. Combined Available Chlorine, Total
E. Monochloramine, Cl2
F. None of the Above

193. Which of the following terms when added to water, rapidly hydrolyzes, the chemical equations best describe this reaction is Cl2 + H2O --> H+ + Cl- + HOCl?

A. Chlorine gas
B. Cl
C. HOCl and OCl-
D. Combined Available Chlorine
E. Monochloramine
F. None of the Above

194. Which of the following substances is the most germicidal of the chlorine compounds with the possible exception of chlorine dioxide?

A. Hydrochlorous acid
B. Sulfuric acid
C. Hypochlorous acid
D. Combined Available Chlorine
E. Monochloramine
F. None of the Above

195. What is the Atomic number of chlorine?

A. 17 7
B. 17
C. 0.17
D. 17 PPM
E. 23
F. None of the Above

196. _____is the elemental symbol and _____ is the chemical formula.

A. Cl, Cl2
B. Cl2, Cl
C. HOCl and OCl-
D. Chlorine, Cl2
E. Cl2, ClH4
F. None of the Above

197. Monochloramine, _____, and trichloramine are also known as Combined Available Chlorine. Cl2 + NH4.

A. Cl2
B. Dichloramine
C. HOCl and OCl-
D. Combined Available Chlorine
E. Monochloramine
F. None of the Above

198. Always follow your manufacturer's instructions when changing the connection from a _____ to a chlorinator.

A. Chlorine exposure
B. Connection
C. Chlorine cylinder
D. Protective bonnet
E. Several safety precautions
F. None of the Above

199. Emergency procedures in the case of a large uncontrolled chlorine leak are to: notify local emergency response team, warn and evacuate people in adjacent areas, and be sure that no one enters the leak area without adequate self-contained breathing equipment.

A. True B. False

200. Here are several symptoms of chlorine exposure: burning of eyes, nose, and mouth; coughing, sneezing, choking; nausea and vomiting; headaches and dizziness; fatal pulmonary edema, pneumonia and skin blisters.

A. True B. False