Registration form

Chemical Contaminants 201 CEU Training Course $200.00

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

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/PDH's.

Wastewater Collection____ Wastewater Treatment____ Distribution ____

Water Treatment _____ Other _____

Technical Learning College
PO Box 3060, Chino Valley, AZ 86323
(928) 468-0665 Fax (928) 272-0747 Back-up Fax (928) 468-0675
Toll Free (866) 557-1746 info@tlch2o.com

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

Please invoice me, My PO #_____
We will stop mailing the certificate of completion so we need your e-mail address. We will e-mail the certificate to you, if no e-mail address; we will mail 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.abctlc.com/downloads/PDF/CEU%20State%20Approvals.pdf

You can obtain a printed version of the course manual from TLC for an additional $99.95 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.

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.

Chemical Contaminants 201 Answer Key

Name_____

Phone# _____

Did you check with your State agency to ensure this course is accepted for credit?

Method of Course acceptance confirmation. Please fill this section

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 to complete your assignment.

Please write down any questions that cannot be found or has problems

Please circle, underline, bold or X only one correct answer
A felt tipped pen works best.

1. A B	15. A B	29. A B C D	43. A B C D
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Please write down any questions that cannot be found or has problems

CHEMICAL CONTAMINANTS 201
CEU TRAINING 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?

Poor___ Fair ____ Average ____ Good _____ Great_____

Any other concerns or comments.

Please fax the answer key to TLC
(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. Thank you…

Chemical Contaminants 201 CEU Training Course Assignment

You will have 90 days from the start of this assignment to successfully complete it with a score of 70%. If you should need any assistance, please call or e-mail the Student Service Department, please fax or e-mail all concerns and the final test to TLC.

You are expected to circle the correct answer on the enclosed answer key. Please include your name and address on your exam. The answer key is in the front. There are no intentional trick questions.

You can e-mail or fax your Answer Key along with the Registration Form to TLC.

Please write down any questions that cannot be found or has problems

1. Physical characteristics are the elements found that are considered alkali, metals, and non-metals such as fluoride, sulfides or acids.
A. True B. False

2. Total Dissolved Solids (TDS) is a primary pollutant; it is an indicator of water characteristics such as hardness and an indication of an assortment of chemical contaminants that might be present such as pH.
A. True B. False

3. pH is the negative logarithm of the hydrogen ion concentration, [H+], a measure of the degree to which a solution is acidic or alkaline.
A. True B. False

Turbidity Introduction

4. The turbidity in natural surface waters is composed of a large number of sizes of particles. The sizes of particles can be changing constantly, depending on precipitation and manmade factors.
A. True B. False

5. When heavy rains occur, runoff into streams, rivers, and reservoirs occurs, causing turbidity levels to increase. In most cases, the particle sizes are relatively large and settle relatively quickly in both the water treatment plant and the source of supply.
A. True B. False

6. Low turbidity waters can be very difficult to coagulate due to the difficulty in inducing collision between the colloids. In this instance, floc formation is poor, and much of the turbidity is carried directly to the filters.
A. True B. False

7. Organic colloids may be present in a water supply due to pollution, and these colloids can be difficult to remove in the coagulation process. In this situation, higher coagulant dosages are generally required.
A. True B. False

8. High levels of turbidity may interfere with proper water treatment and monitoring. If high quality raw water is low in turbidity, there will be a reduction in water treatment costs. Turbidity is undesirable because it causes health hazards.
A. True B. False

9. An MCL for turbidity established by the EPA because turbidity interferes with disinfection. This characteristic of water changes the most rapidly after a heavy rainfall.
A. True B. False

10. Lead usually occurs naturally in water supplies.
A. True B. False

Hardness
11. There are two types of hardness: temporary and permanent. Temporary hardness comes out of the water when it's heated and is deposited as scale and fur on kettles, coffee makers and taps and appears as a scum or film on tea and coffee.
A. True B. False

Radiological Characteristics
12. Radiological characteristics are the result of water coming in contact with radioactive materials.
A. True B. False

Regulated Chemical Contaminants
13. Non-Detects (ND) - laboratory analysis indicates that the constituent is not present.
A. True B. False

14. Parts per million (ppm) or Milligrams per liter (mg/L) - one part per million corresponds to ten minutes in one year or a single penny in $1,000.
A. True B. False

15. The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow is called the “Action level” .
A. True B. False

16. Maximum Contaminant Level - the “Maximum Allowed” (MCL) is the lowest level of a contaminant that is allowed in drinking water.
A. True B. False

17. Maximum Contaminant Level Goal - the “Goal” (MCLG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
A. True B. False

18. Parts per billion (ppb) or Micrograms per liter (ug/L) - one part per billion corresponds to one minute in 10,000 years, or a single penny in $10,000.
A. True B. False

19. Picocuries per liter (pCi/L) - picocuries per liter is a measure of the radioactivity in water.
A. True B. False

20. This series of rules are known as the Chemical Phase Rules define regulations for three contaminant groups:_____, Synthetic Organic Chemicals (SOC), and Volatile Organic Chemicals (VOC).
A. Inorganic Chemicals (IOC) C. Carcinogens
B. Products and reactants D. None of the above

Inorganic Chemical Introduction

21. Which of the following in biological systems includes carbohydrates into the molecular structure?
A. Organic Chemicals (SOCs) C. Organic compounds
B. Organic matter D. None of the above

22. Which of the following are rather simple chemicals present in groundwater?
A. Presence of a carbon atom C. Inorganic compounds
B. Minerals D. None of the above

23. Which of the following are dissolved from the rock/soil that make up the aquifer or water-bearing rock formations below the soil surface?
A. Presence of a carbon atom C. Inorganic compounds
B. Minerals D. None of the above

24. Organic chemists usually refer to any molecule containing carbon as an organic compound and by default this means that _____deals with molecules lacking carbon.
A. Organic chemistry C. Carbon
B. Inorganic chemistry D. None of the above

25. Which of the following that have been metabolically incorporated into living tissues persist in decomposing tissues?
A. Organic Chemicals (SOCs) C. Organic compounds
B. Organic matter D. None of the above

26. The difference between inorganic and organic compounds is not always clear when dealing with open and closed systems, some view the open environment (i.e., the ecosphere) as an extension of life and from this perspective may consider atmospheric CO_2 as?
A. Compounds C. Inorganic compound
B. An organic compound D. None of the above

27. Which of the following may be introduced into ground water by human activities?
A. Compounds C. Inorganic compounds
B. An organic compound D. None of the above

28. Water purveyors shall to test for 30 different _____ including all arsenic, barium, cadmium, lead, mercury, selenium, and thallium
A. Compounds C. Inorganic compounds
B. An organic compound D. None of the above

29. Which of the following these are once living, or are living and can bring life to cells?
A. Compounds C. Inorganic compounds
B. Organic compounds D. None of the above

30. Which of the following these were never living, without carbon and cannot bring life to cells?
A. Compounds C. Inorganic compounds
B. Organic compounds D. None of the above

Inorganic Chemistry

31. Inorganic chemistry is the study of the synthesis and behavior of?
A. Inorganic compounds C. Inorganic and organometallic compounds
B. Some metals D. None of the above

32. The distinction between the two disciplines is far from absolute, and there is much overlap, most importantly in the sub-discipline of?
A. Crystallization C. Organometallic chemistry
B. Electrically neutral D. None of the above

Key Concepts

33. Many inorganic compounds are ionic compounds, consisting of _____ joined by ionic bonding.
A. Myriad organic compounds C. Cations and anions
B. Inorganic compounds D. None of the above

34. In any salt, the proportions of the ions are such that the electric charges cancel out, so that the bulk compound is?
A. An inorganic salt C. Electrically positive
B. Electrically neutral D. None of the above

35. The ions are described by their oxidation state and their ease of formation can be inferred from the ionization potential (for cations) or from the electron affinity (anions).
A. True B. False

36. When one reactant contains hydrogen atoms, a reaction can take place by exchanging protons in acid-base chemistry. In a more general definition, an acid can be any chemical species capable of binding to electron pairs is called a Lewis acid; conversely any molecule that tends to donate an electron pair is referred to as a Lewis base.
A. True B. False

37. Important classes of inorganic salts are the_____, the sulfates and the halides.
A. Oxides, the carbonates C. Sulfites
B. Electrically neutral cations D. None of the above

38. Many inorganic compounds are characterized by high melting points. Inorganic salts typically are poor conductors in the?
A. Myriad C. Ionic compound
B. Solid state D. None of the above

39. Another important feature is their solubility in water, e.g?
A. And ease of crystallization C. Sub-discipline of organometallic chemistry
B. Electrically neutral D. None of the above

40. In redox reactions one reactant, the oxidant, lowers its _____and the reductant, has its oxidation state increased.
A. Redox state C. Electron affinity (anions)
B. Oxidation state D. None of the above

41. Which of the following can occur indirectly as well, e.g., in batteries, a key concept in electrochemistry?
A. Crystallization C. Electron exchange
B. Electrically neutral charges D. None of the above

42. Soil may contain iron sulfide as pyrite or?
A. Calcium sulfate C. Man-made inorganic compounds
B. Nature-made inorganic compounds D. None of the above

43. Which of the following was ammonium nitrate for soil fertilization through the Haber process?
A. Man-made inorganic compounds C. Nature-made inorganic compounds
B. Classification of compounds D. None of the above

44. Inorganic compounds are found multitasking as biomolecules: as electrolytes, in energy storage (ATP) or in construction.
A. True B. False

45. Subdivisions of inorganic chemistry are active areas of research in inorganic chemistry, aimed toward new catalysts, superconductors, and therapies.
A. True B. False

Descriptive Inorganic Chemistry
46. Descriptive inorganic chemistry focuses on the _____ based on their properties.
A. Man-made inorganic compounds C. Nature-made inorganic compounds
B. Classification of compounds D. None of the above

47. Partly the classification focuses on the position in the periodic table of the heaviest element in the compound, partly by grouping compounds by their?
A. Supramolecular similarities C. Structural similarities
B. Classical coordination compounds D. None of the above

48. When studying inorganic compounds, one often encounters parts of the different classes of inorganic chemistry; an organometallic compound is characterized by its coordination chemistry, and may show interesting?
A. Coordination complexes C. Solid state properties
B. Classification of compounds D. None of the above

Coordination Compounds

49. Which of the following almost all organic and inorganic compounds can be used as ligands?
A. Supramolecular coordination chemistry C. Modern coordination compounds
B. Inorganic compounds D. None of the above

50. The "metal" usually is a metal from the groups 3-13, as well as the trans-lanthanides and trans-actinides, all chemical compounds can be described as?
A. Reactivity C. Man-made inorganic compound
B. Coordination complexes D. None of the above

51. The stereochemistry of coordination complexes can be a topical theme within this specialization is?
A. Supramolecular coordination chemistry C. Bathtub chemistry
B. Classical coordination chemistry D. None of the above

Main Group Compounds

52. Which of the following from groups 1, 2 and 13-18 (excluding hydrogen) of the periodic table?
A. Coordination colors C. Minerals
B. Elements D. None of the above

53. Which of the following have been known since the beginnings of chemistry, e.g., elemental sulfur and the distillable white phosphorus?
A. Main group compounds C. Metal-metal bonded dimetallic complexes
B. Organometallic compounds D. None of the above

54. Experiments on oxygen, by Lavoisier and Priestley not only identified an important diatomic gas, but also opened the way for describing compounds and reactions according to?
A. Diatomic gases C. Transition metal compounds
B. Stoichiometric ratios D. None of the above

55. The discovery of a practical synthesis of ammonia using iron catalysts by Carl Bosch and Fritz Haber in the early 1900s deeply impacted mankind, demonstrating the significance of?
A. Organometallic chemistry synthesis C. Inorganic chemical synthesis
B. Organometallic synthesis D. None of the above

56. According to the text, main group compounds are SiO_2, $SnCl_4$, and N_2O. Many main group compounds can also be classed as?
A. Transition metals C. Metal carbonyls and even metal alkoxides
B. Organometallic D. None of the above

57. Which of the following such as the fullerenes, buckytubes and binary carbon oxides?
A. Inorganics C. Organic compounds
B. Organometallic compounds D. None of the above

Transition Metal Compounds

58. Compounds with a metal from group 3 or 12 are sometimes also incorporated into this group, but also often classified as?
A. Transition metal compounds C. Carbonyls compounds
B. Main group compounds D. None of the above

59. Transition metal compounds show a rich coordination chemistry, varying from tetrahedral for titanium (e.g., $TiCl_4$) to square planar for some nickel complexes to octahedral for _____of cobalt.

A. Organometallic complexes C. Coordination complexes
B. Organometallic compounds D. None of the above

60. Which of the following can be found in biologically important compounds, such as iron in hemoglobin?

A. Transition metals C. Metal complexes
B. Organometallic complexes D. None of the above

Organometallic Compounds

61. Usually, M-C-H group the metal (M) in these species can either be a main group element or a?

A. Transition metal compound C. Metal-metal bonded dimetallic complex
B. Transition metal D. None of the above

62. Which of the following is more relaxed to include also highly lipophilic complexes such as metal carbonyls and even metal alkoxides?

A. An important diatomic gas C. Transition metal compounds
B. An organometallic compound D. None of the above

63. Which of the following employs more specialized preparative methods than was traditional in Werner-type complexes?

A. Transition metal compounds C. Metal-metal chemistry
B. Organometallic chemistry D. None of the above

64. Which of the following has the ability to manipulate complexes in solvents of low coordinating power, enabled the exploration of very weakly coordinating ligands such as hydrocarbons?

A. Synthetic gas methodology C. Transition metal compounds
B. Synthetic methodology D. None of the above

Cluster Compounds

65. Clusters can be found in all classes of?

A. Transition metal compounds C. Chemical compounds
B. Organometallic compounds D. None of the above

66. Which of the following organometallic chemistry, main group chemistry, and bioinorganic chemistry?

A. Transition metals C. Metal carbonyls and even metal alkoxides
B. Inorganic systems D. None of the above

67. The interface is the chemical basis of nanoscience or nanotechnology and specifically arise from the study of quantum size effects in _____.

A. Transition metal compounds C. Metal-metal bonded dimetallic complexes
B. Cadmium selenide clusters D. None of the above

Bioinorganic Compounds

68. The field, which incorporates many aspects of biochemistry, includes many kinds of compounds, e.g., the phosphates in DNA, and also metal complexes containing ligands that range from biological macromolecules, commonly peptides, to ill-defined species such as humic acid, and to water (e.g., coordinated to gadolinium complexes employed for MRI).

A. True B. False

69. Which of the following includes the study of both non-essential and essential elements with applications to diagnosis and therapies?

A. Symmetry to spectroscopy C. Medicinal inorganic chemistry
B. Qualitative approach D. None of the above

Solid State Compounds

70. Which of the following uses techniques such as crystallography to gain an understanding of the properties that result from collective interactions between the subunits of the solid?

A. Crystallography C. Computational chemistry
B. Solid state inorganic chemistry D. None of the above

71. Which of the following are metals and their alloys or intermetallic derivatives?

A. Theoretical calculations C. Solid state chemistry
B. Qualitative approach D. None of the above

Bioinorganic Compounds

72. The phosphates in DNA, and metal complexes containing ligands that range from_____, commonly peptides, to ill-defined species such as humic acid, and to water (e.g., coordinated to gadolinium complexes employed for MRI).

A. Biological macromolecules C. Molecular symmetry
B. Inter alia D. None of the above

Solid State Compounds

73. Which of the following uses techniques such as crystallography to gain an understanding of the properties that result from collective interactions between the subunits of the solid?

A. Crystallography C. Theoretical chemistry
B. Solid state inorganic chemistry D. None of the above

Theoretical Inorganic Chemistry

74. Which of the following using the tools and models of theoretical chemistry and computational chemistry, expands into bonding in simple and then more complex molecules?

A. Crystallography C. Theoretical chemistry and computational chemistry
B. Bohr model of the atom D. None of the above

75. Which of the following the province of inorganic chemistry?

A. Symmetry C. Quantum mechanical descriptions
B. Qualitative approaches D. None of the above

Qualitative Theories

76. Which of the following powerfully predicts, or at least rationalizes, the structures of main group compounds?

A. VSEPR theory
B. Inter alia theory
C. Molecular symmetry theory
D. None of the above

Molecular Symmetry Group Theory

77. A central construct in inorganic chemistry is the theory of?

A. VSEPR theory
B. Inter alia theory
C. Molecular symmetry
D. None of the above

78. Which of the following provides the language to describe the shapes of molecules according to their point group symmetry?

A. Mathematical group theory
B. Theoretical theory
C. Evolutionary theory
D. None of the above

Synthetic Inorganic Chemistry

79. Which of the following can be obtained in pure form from nature, most are synthesized in chemical plants and in the laboratory?

A. Species
B. Organisms
C. Inorganic species
D. None of the above

80. Which of the following are prepared using methods of organic synthesis, for metal-containing compounds that are reactive toward air?

A. Soluble inorganic compounds
B. Products and reactants
C. Carcinogens
D. None of the above

81. Which of the following are manipulated in “vacuum manifolds” consisting of glass piping interconnected through valves?

A. Gas and Chains
B. Volatile compounds and gases
C. Inorganic species
D. None of the above

82. Which of the following are condensed using liquid nitrogen or other cryogens?

A. Compounds
B. Products and reactants
C. Carcinogens
D. None of the above

83. Solids are typically prepared using tube furnaces, the reactants and products being sealed in containers, often made of fused silica (amorphous SiO_2) but sometimes more specialized materials such as welded Ta tubes or Pt “boats”. Products and reactants are transported between temperature zones to drive reactions.

A. True
B. False

pH Section

84. What is the theory that states than an acid is a substance that produces Hydronium ions when it is dissolved in water, and a base is one that produces hydroxide ions when dissolved in water?

A. Newton’s
B. Lord Calvin’s
C. Arrhenius
D. None of the above

85. What is the term associated with a charged species, an atom or a molecule, that has lost or gained one or more electrons?
A. A proton C. An electron
B. Ion D. None of the above

86. What is a substance that has the ability to reduce other substances and is said to be reductive in nature?
A. Oxidizer C. Reducing agents, reductants, or reducers
B. An electron donor D. None of the above

87. Pure water has a pH very close to _____.
A. 5 C. 7.7
B. 7 D. None of the above

88. According to the text, which of the following parameter/methods/measurements determine a parameter using a concentration cell with transference by measuring the potential difference?
A. Primary pH standard values C. pH measurement(s)
B. Alkalinity D. None of the above

89. Mathematically speaking, pH is the negative logarithm of the activity of the (solvated) hydronium ion, often expressed as the measurement of _____.
A. Electrons C. Cation measurement(s)
B. Hydronium ion concentration D. None of the above

90. One definition of pH is that it is defined as the decimal logarithm of the reciprocal of the _____ , a_{H^+}, in a solution.
A. Hydrogen ion activity C. Brønsted–Lowry acid–base theory
B. (Solvated) hydronium ion D. None of the above

91. Commercial standard buffer solutions usually comes with information about value and a correction factor to be applied for what temperatures?
A. 4 °C C. 10 °C
B. 25 °C D. None of the above

92. Because the pH scale is logarithmic, therefore pH is _____.
A. Universal indicator C. Excess of Ion concentrations
B. A dimensionless quantity D. None of the above

93. What is the new pH scale is referred to as?
A. Total scale C. pH_3
B. POH D. None of the above

94. Alkalinity is able to neutralize _____ and is measured in a quantitative capacity in an aqueous solution.
A. Acid C. pH measurement(s)
B. pH D. None of the above

95. When using a visual comparison of the test solution with a standard color chart, measuring pH values should be done to the?
A. Universal indicator C. Spectrophotometer Example
B. Nearest whole number D. None of the above

96. According to the manual, this device/method/calculation consists of a mixture of indicators which shows a continuous color change from pH 2 to pH 10.
A. Universal indicator C. Excess of alkaline earth metal concentrations
B. Spectrophotometer D. None of the above

97. A(n) _____is an example of a mathematical procedure for calculating the concentrations of all chemical species that are present in the solution.
A. Universal indicator C. A chemical speciation calculation
B. A set of linear equations D. None of the above

98. According to the manual, under normal circumstances strong acids and bases are compounds that, for practical purposes, are completely dissociated in water, this means that the concentration of hydrogen ions in acidic solution can be taken to be equal to the concentration of the acid. The pH is then equal to minus the logarithm of_____.
A. The concentration value C. A set of non-linear simultaneous equations
B. The Spectrophotometer D. None of the above

99. The sum of all the titratable bases is the Alkalinity of water and its acid-neutralizing capacity. What would cause the measured value to vary significantly?
A. Alkalinity C. End-point pH
B. pH D. None of the above

100. When measuring alkalinity in determining a stream's ability to neutralize acidic pollution from rainfall or wastewater, this measurement can be one of the best measures of the sensitivity of the stream to acid inputs.
A. True B. False

101. For strong acids and bases no calculations are necessary except in extreme situations. The pH of a solution containing a weak acid requires the solution of a quadratic equation.
A. True B. False

102. While the general case requires the pH solution of?
A. The solution of a linear equation C. A set of non-linear simultaneous equations
B. The solution of a squared equation D. None of the above

103. Because alkalinity is significant in many uses and treatments of natural waters and wastewaters. The measured values also may include contributions from _____or other bases if these are present.
A. Acids C. Borates, phosphates, silicates
B. Caustics D. None of the above

104. Since pH is a logarithmic scale, a difference of one pH unit is equivalent to a _____difference in hydrogen ion concentration

A. 1 C. 10
B. 5 D. None of the above

Wastewater Priority Pollutants Section

Wastewater/Pretreatment Sampling General Information

105. In accordance with the Clean Water Act and_____ , the POTW conducts a variety of sampling activities which must be closely coordinated.

A. General Pretreatment Program Regulations C. Priority Pollutants within
B. All industrial users D. None of the above

Permit Application Policy Example

106. All industrial users that require a permit must be sampled to determine the characteristics of the _____ to be discharged into the POTW's sewer system.

A. Local limits C. Wastes
B. Outer limits D. None of the above

107. Prior to the issuance of a permit for existing industrial users, the POTW samples the user's effluent, and performs the analyses required by the applicable discharge standards (i.e., Categorical standards or?

A. Local limits C. Characteristics of the wastes
B. SDWA D. None of the above

108. For new industrial users, estimates of the _____ to be discharged into the POTW's sewer system must be submitted along with the permit application.

A. Wastes C. Priority Pollutants
B. Characteristics of the wastes D. None of the above

109. No sampling would be performed at these new facilities, since they do not presently discharge wastes into the?

A. Sewer system C. Interceptor
B. CMOM D. None of the above

110. A four-day sampling program is usually conducted at _____ to collect both composite and grab (for pollutants not amenable to composite sampling) samples as needed.

A. POTWs C. The interceptor
B. Each site D. None of the above

Wastewater Priory Pollutants

111. The concentrations of various substances in _____in dissolved, colloidal or suspended form are typically low but vary considerably.

A. Concentrations C. Water
B. New users D. None of the above

112. 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 (USA).
A. POTWs C. Priority substances
B. Toxic pollutants D. None of the above

113. Which of the following were assigned a high priority for development of water quality criteria and effluent limitation guidelines because they are frequently found in wastewater?
A. Priority Pollutants C. The concentrations of various substances
B. 126 pollutants D. None of the above

114. Which of the following with an approved pretreatment program must develop local limits for arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, silver and zinc?
A. Each POTW C. Priority pollutant producers
B. All industrial users D. None of the above

115. The POTW must also identify all _____and evaluate the need for limits for these pollutants.
A. Other pollutants of concern C. Priority substances
B. New substances D. None of the above

116. Concentrations of various substances is defined as any pollutant limited in the POTW's NPDES permit or found in the collection system in sufficient quantity to have a reasonable potential to cause pass through or interference at the treatment plant, pose a threat to worker health and safety, or to cause other problems within the collection system or at the treatment plant, such as explosions or obstruction of wastewater flow.
A. True B. False

117. The priority pollutant scans performed periodically by POTWs with approved pretreatment programs are useful in identifying?
A. Pollutants of concern C. Priority substances
B. New users D. None of the above

118. POTWs with multiple plants may wish to develop _____for each plant or after calculating the limits for each plant choose the most stringent as uniform local limits across all plants.
A. Local limits C. Industrial pollutants
B. Industrial users D. None of the above

119. Local limits are most often associated with the control of toxic pollutants. However, if a POTW has experienced violations of their?
A. POTWs C. NPDES permit effluent limits for conventional pollutants
B. Surcharge programs D. None of the above

120. Many POTWs have surcharge programs for?
A. POTWs C. Priority discharges
B. Conventional pollutants D. None of the above

121. A POTW should set absolute upper limits for _____in its sewer use ordinance (SUO) or industrial user (IU) permits, based on total plant capacity.
A. Conventional pollutants C. Priority substances
B. Local substances D. None of the above

122. Which of the following can stimulate the growth of algae and other aquatic plants?
A. Excess nutrients C. Heavy Metal
B. Industrial discharges D. None of the above

123. When these plants die and decompose, they may reduce the amount of _____ in the water.
A. Nutrients C. Carbon, nitrogen and phosphorus
B. Oxygen D. None of the above

124. Which of the following can also get into wastewater from industrial discharges, common household detergents and cleaners, runoff from streets and lawns and air pollutants that fall to the ground.
A. Nutrients C. Industrial discharges
B. Heavy Metal D. None of the above

125. Treatment plants cannot remove all _____ from the wastewater.
A. Nutrients C. Industrial discharges
B. Heavy Metal D. None of the above

126. "Heavy Metal" in the water treatment field refers to heavy, dense, _____that occur only at trace levels in water, but are very toxic and tend to accumulate.
A. Compounds C. Metallic elements
B. Industrial discharges D. None of the above

127. Which of the following include DDT, Aldrin, Chlordane, Endosulfan, Endrin, Heptachlor, and Diazinon. Surprisingly, concentrations of pesticides in urban runoff may be equal or greater than the pesticides in agricultural runoff?
A. Agricultural runoff C. Typical pesticides and herbicides
B. Industrial discharges D. None of the above

128. Which of the following spilled or released petroleum products (from oil spills or discharge of oil production brines) and combustion products that are found in urban runoff?
A. PAHs C. Open-ended groups of pollutants
B. Chemical standards D. None of the above

129. The Priority Pollutants are a set of _____EPA regulates, and for which EPA has published analytical test methods.
A. Chemical pollutants C. Sampling requirements for inorganics
B. Chemical standards D. None of the above

130. Which of the following list is more practical for testing and for regulation in that chemicals are described by their individual chemical names?
A. Organics C. List of toxic pollutants
B. Priority Pollutant D. None of the above

131. Which of the following contains hundreds of compounds; there is no test for the group as a whole, nor is it practical to regulate or test for all of these compounds?
A. Priority Pollutants C. The list of toxic pollutants
B. Chemical standards D. None of the above

132. Polychlorinated biphenyls are Organic chemicals that formerly had widespread use in electrical transformers and hydraulic equipment. This class of chemicals 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. True B. False

Proper Sample Handling
133. Gloves not only protect field personnel, but also prevent potential contamination to the water sample. Always wear powderless, disposable gloves.
A. True B. False

134. When sampling for organics, wear latex gloves.
A. True B. False

135. Nitrile gloves are not appropriate for organics.
A. True B. False

136. Use chain-of-custody procedures when coolers and containers are prepared, sealed and shipped. They will remain sealed until used in the field.
A. True B. False

137. When making arrangements with the laboratory, make sure you request enough containers, including those for blank and duplicate samples. Order extra sample bottles to allow for breakage or contamination in the field.
A. True B. False

138. Make sure you can tell which containers are a one-time inorganic chemical analysis because extra care must be taken not to overfill them when collecting samples in the field.
A. True B. False

139. Check with the laboratory about field parameters procedures when using pre-preserved bottles.
A. True B. False

140. The proper handling of _____also includes wearing gloves.
A. Water quality samples C. Samples in the shade
B. The most common preservatives D. None of the above

141. Some samples require _____and/or preservation with chemicals to maintain their integrity during shipment and before analysis in the laboratory.
A. Containers and preservatives C. Pre-preserved bottles
B. Low-temperature storage D. None of the above

142. Which of the following are hydrochloric, nitric, sulfuric and ascorbic acids, sodium hydroxide, sodium thiosulfate, and biocides?
A. Containers and preservatives C. Pre-preserved bottles
B. Preservatives D. None of the above

143. Some federal and state agencies allow the use of _____, some may require either cool temperatures or added preservatives in the field.
A. Preservatives C. Environmental and human health concerns
B. Pre-preserved sample containers D. None of the above

144. Which of the following are received from the laboratory, check to see that none have leaked?
A. Containers and preservatives C. Pre-preserved bottles
B. Most common preservatives D. None of the above

Field Parameters
145. Measure and record the _____of temperature, electrical conductivity, pH and dissolved oxygen in an undisturbed section of streamflow.
A. Process C. Grab samples
B. Field parameters D. None of the above

Chemical Monitoring
146. The final federal rules regarding Phase II and V contaminants were promulgated by the U.S. EPA in 1992 and initial monitoring began in January 1993. This group of contaminants consists of Inorganic Chemicals (IOC), Volatile Organic Chemicals (VOC) and Synthetic Organic Chemicals (SOC) and the rule applies to all community and non-transient non-community public water systems.
A. True B. False

Inorganic Chemical Monitoring
147. The one-time inorganic chemical analysis sample is to be collected at_____ to the distribution system representative of each source after any application of treatment.
A. Contamination sources C. Entry points (POE)
B. Areas of surface and ground water D. None of the above

Nitrates
148. Nitrate is an organic chemical that occurs unnaturally in some groundwater but most often is introduced into ground and surface waters by man.
A. True B. False

149. At high levels (over 100 mg/l) it can cause the “blue baby” syndrome in young infants, which can lead to serious illness and even death. It is regarded as an “Chronic health risk” because it can quickly cause illness.
A. True B. False

150. A surface water system may go to yearly testing if community and nontransient noncommunity water must do quarterly monitoring whenever they exceed 5 mg/l in a test.
A. True B. False

151. After 4 quarters of testing and the results show that the nitrate level is not going up, they may go back to yearly testing.
A. True B. False

152. Every water system must test for Nitrate at least yearly, systems that use _____ must test yearly.
A. Mix surface and ground water
B. Ground water only
C. A one-time inorganic chemical analysis
D. None of the above

Radiological Contaminants
153. Some of the community water systems may monitor for gross beta activity every four years for each source.
A. True B. False

154. If the average annual concentration is less than one tenth the MCL, an analysis of a single sample may be substituted for the quarterly sampling procedure.
A. True B. False

155. Depending on your state rules, compliance will be based on the annual composite of 4 consecutive quarters or average of the analyses of 4 quarterly samples.
A. True B. False

Total Trihalomethanes (TTHM)
156. All community water systems serving a population of 10,000 or more and which add a disinfectant in any part of the drinking water treatment process shall monitor for total trihalomethanes (**TTHM**).
A. True B. False

157. The MCL is 0.1 mg/l and consists of a calculation of _____of the concentrations of bromodichloromethane, di-bromochloromethane, bromoform and chloroform.
A. Optimal corrosion control
B. Surface water system
C. The running average of quarterly analyses of the sum
D. None of the above

Lead and Copper Rule
158. The Lead and Copper Rule applies to all community and nontransient, noncommunity water systems and _____for these two contaminants at the consumer's tap.
A Establishes action levels
B. Establishes MCL levels
C. Average annual concentration
D. None of the above

159. Lead and Copper Rule establishes maximum contaminant level goals (MCLGs) for lead and copper, treatment technique requirements for optimal corrosion control, _____, public education and lead service line replacement.
A. Source water treatment
B. A surface water system
C. All systems
D. None of the above

160. The Lead and Copper Rule also includes the best available technology (**BAT**) for complying with the treatment technique requirements, mandatory health effects language for public notification of violations and analytical methods and _____.
A. Sample instructions C. Laboratory performance requirements
B. Establishes action levels D. None of the above

IOC Sample Collection – Things to Remember
161. If the laboratory fails to include sample instructions, contact the laboratory and?
A. Collect samples C. Do not change the flow
B. Request sample instructions D. None of the above

Some general practices to remember:
162. Samples should be collected at _____after all treatment (finished water).
A. Homes C. The entry point to the distribution system
B. All systems D. None of the above

163. Select a sampling faucet that does NOT have an aerator (sampling must be done with?
A. Sample instructions C. Laboratory performance requirements
B. Minimum aeration D. None of the above

164. The owner or operator of a water supply must maintain chemical analysis reports (results) or a summary of those reports for at least _____ years
A. 3 C. 5
B. 10 D. None of the above

Antimony
165. Antimony is a lustrous gray metalloid; it is found in nature mainly as the?
A. Analytical element C. Stibnite with iron
B. Sulfide mineral stibnite (Sb_2S_3) D. None of the above

166. Which of the following have been known since ancient times and were used for cosmetics?
A. Gray allotrope of arsenic C. Metallic antimony
B. Antimony compounds D. None of the above

167. The industrial methods to produce antimony are roasting and subsequent carbothermal reduction or direct reduction of?
A. Copper C. Lead
B. Stibnite with iron D. None of the above

168. Antimony is a toxic chemical element with symbol **Sb** and atomic number 51.
A. True B. False

What are EPA's drinking water regulations for antimony?
169. The Phase VI Rule, the regulation for antimony, became effective in 2001.
A. True B. False

170. Contaminants are any physical, chemical, biological or radiological substances or matter in water.
A. True B. False

171. The Safe Drinking Water Act requires _____ to periodically review the national primary drinking water regulation for each contaminant and revise the regulation, if appropriate.
A. OSHA C. MCLs
B. EPA D. None of the above

172. Which of the following reviewed antimony as part of the Six Year Review and determined that the 0.006 mg/L or 6 ppb MCLG and 0.006 mg/L or 6 ppb MCL for antimony?
A. OSHA C. MCLs
B. EPA D. None of the above

173. EPA has set an enforceable regulation for antimony, called a _____, at 0.006 mg/L or 6 ppb.
A. MCLG C. Emergency Planning and Community Right to Know Act (EPCRA)
B. MCL D. None of the above

Applications
174. Which of the following with antimony improves the properties of the alloys that are used in solders, bullets and plain bearings?
A. Gray allotrope of arsenic C. Metallic antimony
B. Alloying lead and tin D. None of the above

175. Which of the following are prominent additives for chlorine- and bromine-containing fire retardants found in many commercial and domestic products?
A. Gray allotrope of arsenic C. Prominent additives
B. Antimony compounds D. None of the above

176. Antimony is in the nitrogen group (group 15) and it is_____, and less electronegative than tellurium or arsenic.
A. A gray allotrope of arsenic C. More electronegative than tin or bismuth
B. A metallic antimony D. None of the above

177. Pure antimony is?
A. Very hard C. Not used to make hard objects
B. Highly chemical reactive D. None of the above

178. Four allotropes of antimony are known, a stable metallic form and_____, explosive, black and yellow.
A. Gray C. Liquid
B. Three metastable forms D. None of the above

179. Metallic antimony is a brittle, silver-white shiny metal. When molten antimony is slowly cooled, metallic antimony crystallizes?
A. In a trigonal cell C. Metallic
B. Nitrogen group (group 15) D. None of the above

180. Antimony is stable in air at room temperature, but reacts with oxygen if heated to form antimony trioxide, Sb_2O_3.
A. True B. False

181. Antimony is a silvery, lustrous gray metal that has a Mohs scale hardness of 7.
A. True B. False

182. Black antimony is formed upon rapid cooling of vapor derived from metallic antimony. It has the same crystal structure as red phosphorus and black arsenic; it oxidizes in air and may ignite spontaneously.
A. True B. False

183. At 70 °C, antimony gradually transforms into the stable form.
A. True B. False

184. The yellow allotrope of antimony is the most unstable. It has only been generated by oxidation of stibine (SbH_3) at −90 °C.
A. True B. False

185. A rare explosive form of antimony can be formed from the electrolysis of antimony (III) trichloride.
A. True B. False

Asbestos
186. EPA has set an enforceable regulation for asbestos, called a maximum contaminant level (MCL), at .07 MFL.
A. True B. False

187. EPA reviewed asbestos as part of the Six Year Review and determined that the .07 MFL MCLG.
A. True B. False

Barium
188. The MCLG for barium is 20 mg/L or 20 ppm
A. True B. False

189. When routine monitoring indicates that barium levels are above the MCL; your water supplier must take steps to reduce the amount of barium so that it is below that level. Water suppliers must notify their customers as soon as practical, but no later than 30 days after the system learns of the violation.
A. True B. False

190. Which of the following providing alternative drinking water supplies, may be required to prevent serious risks to public health?
A. MCLG C. Additional actions
B. MFL D. None of the above

191. Which of the following the regulation for barium, became effective in 1993?
A. Phase IIB Rule C. EPA
B. Safe Drinking Water Act D. None of the above

192. Major sources of barium in drinking water are discharge of drilling wastes; _____; and erosion of natural deposits.
A. Discharge from metal refineries C. Soluble barium compounds
B. Barium carbonate, $BaCO_3$ D. None of the above

193. Which of the following requires facilities in certain industries, which manufacture, process, or use significant amounts of toxic chemicals?
A. MCLG Rule C. Emergency Planning and Community Right to Know Act (EPCRA)
B. EPA D. None of the above

Barium Explained
194. The most common naturally occurring minerals of barium are barite (barium sulfate, $BaSO_4$) and witherite (_____), both being insoluble in water.
A. Baryta C. Highly reactive chemical
B. Barium carbonate, $BaCO_3$ D. None of the above

195. Which of the following was identified as a new element in 1774, but not reduced to a metal until 1808?
A. Beryllium C. Soluble barium compound
B. Barium D. None of the above

196. Which of the following has only a few industrial applications. The metal has been historically used to scavenge air in vacuum tubes?
A. Beryllium C. Soluble barium compound
B. Barium D. None of the above

197. Barium is a _____with symbol **Ba** and atomic number 56.
A. Erosion of natural deposits C. Soluble compounds
B. Chemical element D. None of the above

198. Barium is the fifth element in Group 3, a hard silvery metallic alkaline earth metal.
A. True B. False

199. Because of its high chemical reactivity barium is easily found in nature as a free element.
A. True B. False

200. Barium's hydroxide was known in pre-modern history as?
A. Baryta C. Highly reactive chemical
B. Barium carbonate, $BaCO_3$ D. None of the above

201. Which of the following are added to fireworks to impart a green color?
A. Barium C. Barium compounds
B. Barium carbonate, $BaCO_3$ D. None of the above

202. Which of the following terms are poisonous due to release of the soluble barium ion, and therefore have been used as rodenticides?
A. Beryllium C. Soluble barium compounds
B. Baryta D. None of the above

Beryllium

203. Which of the following terms for beryllium is 0.004 mg/L or 4 ppb.

A. MCLG C. Action level
B. MCL D. None of the above

How does Beryllium get into my Drinking Water?

204. Beryllium naturally enters surface water and ground water through the weathering of rocks and soils or from industrial wastewater discharges.

A. True B. False

How will I know if Beryllium is in my Drinking Water?

205. Water suppliers must notify their customers as soon as practical, but no later than 90 days after the system learns of the violation. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.

A. True B. False

206. When routine monitoring indicates that beryllium levels are above the _____, your water supplier must take steps to reduce the amount of beryllium so that it is below that level.

A. MCLG C. SDWA limit
B. MCL equals the MCLG D. None of the above

Beryllium Explained

207. Beryllium is the chemical element with the symbol **Be** and atomic number 4. Because any beryllium synthesized in stars is short-lived, _____ in both the universe and in the crust of the Earth.

A. It is a divalent element c. Hard and resistant to corrosion
B. It is a relatively rare element D. None of the above

208. As a free element, Beryllium is_____, lightweight and brittle alkaline earth metal.

A. A divalent element C. Hard and resistant to corrosion
B. A steel-gray, strong D. None of the above

209. Beryllium increases _____ when alloyed to aluminum, cobalt, copper (notably beryllium copper), iron and nickel.

A. A divalent element C. Hard and resistance to corrosion
B. Coal based D. None of the above

210. Beryllium is a quality aerospace material for high-speed aircraft, missiles, space vehicles and communication satellites.

A. True B. False

Cadmium

211. The MCLG for cadmium is?

A. .002 C. 0.005 mg/L or 5 ppb
B. 1.3 D. None of the above

212. EPA has set an enforceable regulation for cadmium, called a maximum contaminant level (MCL), at?
A. .002 C. 0.005 mg/L or 5 ppb
B. 1.3 D. None of the above

213. EPA reviewed cadmium as part of the Six Year Review and determined that the _____ MCLG and 0.005 mg/L or 5 ppb MCL for cadmium are still protective of human health.
A. .002 C. 0.005 mg/L or 5 ppb
B. 1.3 D. None of the above

How does cadmium get into my drinking water?
214. The major sources of cadmium in drinking water are corrosion of galvanized pipes; erosion of natural deposits; _____; runoff from waste batteries and paints.
A. Brittle alkaline earth metal C. Discharge from metal refineries
B. Coal and fuel oil combustion D. None of the above

How will I know if cadmium is in my drinking water?
215. When routine monitoring indicates that cadmium levels are above the _____, your water supplier must take steps to reduce the amount of cadmium so that it is below that level.
A. MCLG C. SDWA limit
B. MCL D. None of the above

How will cadmium be removed from my drinking water?
216. The following treatment method(s) have proven to be effective for removing cadmium to below _____: coagulation/filtration, ion exchange, lime softening, and reverse osmosis.
A. .002 C. 0.005 mg/L or 5 ppb
B. 1.3 D. None of the above

Characteristics
Physical Properties
217. As a bulk metal, cadmium is?
A. Insoluble in water and is not flammable C. It may burn and release toxic fumes
B. Normal industrial waste disposal practices D. None of the above

218. Cadmium is a soft, malleable, ductile, bluish-white divalent metal. It is similar in many respects to zinc but forms complex compounds.
A. True B. False

219. Like other metals, cadmium is subject to corrosion.
A. True B. False

Chromium
220. Chromium is found naturally in rocks, plants, soil and volcanic dust, humans and animals. The most common forms of chromium that occur in natural waters in the environment are trivalent chromium (chromium-3), and hexavalent chromium (chromium-6).
A. True B. False

221. Chromium-5 is an essential human dietary element.
A. True B. False

222. There are demonstrated instances of chromium being released to the environment by leakage, poor storage, or inadequate industrial waste disposal practices.
A. True B. False

223. Chromium-6 occurs naturally in the environment from the erosion of natural chromium deposits but it can also be produced by?
A. Making steel and other alloys C. Chemistry
B. Industrial processes D. None of the above

224. Chromium is?
A. An odorless and tasteless metallic element C. Flammable
B. Normally found in industrial waste disposal D. None of the above

What are Chromium's Health Effects?
225. Chromium has relatively high toxicity and would be a concern in drinking water only at very high levels of contamination.
A. True B. False

226. Chromium-6 is less toxic and poses potential health risks.
A. True B. False

227. People who use water containing total chromium in excess of the _____over many years could experience allergic dermatitis.
A. MCLG C. Rule
B. MCL D. None of the above

What are EPA's drinking water regulations for Chromium?
228. Which of the following requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur?
A. Safe Drinking Water Act C. EPCRA
B. OSHA D. None of the above

229. Which of the following for total chromium is 0.1 mg/L or 100 parts per billion (ppb).
A. MCLG C. Rule
B. MCL D. None of the above

230. EPA has set an enforceable regulation for total chromium, called a maximum contaminant level (MCL), at 10 mg/L or 1000 ppb.
A. True B. False

Chromium Description
231. Chromium is a chemical element that has the symbol **Cr** and atomic number 24.
A. True B. False

232. Chromium is the first element in?
A. Group 6 C. Group 7
B. Group 5 D. None of the above

233. Chromium metal and ferrochromium alloy are commercially produced from chromite by silicothermic or aluminothermic reactions, or by?
A. Adding copper C. Roasting and leaching processes
B. Adding Aluminum D. None of the above

234. Chromium metal has proven of high value due to?
A. Adding trivalent chromium C. Its high corrosion resistance and hardness
B. Adding Aluminum D. None of the above

235. A major development was the discovery that steel could be made highly resistant to corrosion and discoloration by adding metallic chromium to form stainless steel.
A. True B. False

236. Trivalent chromium (Cr(III)) ion is possibly required in trace amounts for sugar and lipid metabolism, although the issue remains in debate. In larger amounts and in different forms, chromium can be_____.
A. Toxic and carcinogenic C. Part of the leaching processes
B. Toxic chromium D. None of the above

237. The most prominent example of toxic chromium is_____. Abandoned chromium production sites often require environmental cleanup.
A. Stainless steel C. Hexavalent chromium (Cr(VI))
B. Toxic chromium D. None of the above

Copper
What are Copper's Health Effects?
238. Some people who drink water containing copper in excess of the _____may, with short term exposure, experience gastrointestinal distress, and with long-term exposure may experience liver or kidney damage.
A. MCLG C. Action level
B. MCL D. None of the above

239. People with Zackery's Disease should consult their personal doctor if the amount of copper in their water exceeds the action level.
A. True B. False

What are EPA's Drinking Water Regulations for Copper?
240. An action technique is a guideline procedure or level of technological performance that water systems must follow to ensure control of a contaminant.
A. True B. False

241. The treatment technique regulation for copper (referred to as the Lead and Copper rule) requires water systems to control the corrosivity of the water.
A. True B. False

242. The regulation also requires systems to collect piping samples from sites served by the system that are more likely to have plumbing materials containing plastic.
A. True B. False

243. Which of the following for copper is 1.3 mg/L or 1.3 ppm?
A. MCLG C. Action level
B. MCL D. None of the above

244. Which of the following as feasible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies?
A. MCL C. MCLs are set as close to the MCLGs
B. MCLG D. None of the above

245. If more than 10 percent of tap water samples exceed the copper action level of 1.3_____, water systems must take additional steps to reduce corrosiveness.
A. MCLG C. Milligrams per Liter (mg/L)
B. MCL D. None of the above

246. Which of the following promulgated the Lead and Copper Rule in 1991, and revised the regulation in 2000 and in 2007?
A. SDWA C. Emergency Planning and Community Right to Know Act (EPCRA)
B. EPA D. None of the above

Copper Explained
247. Pure copper is?
A. Related to turquoise C. Soft and malleable
B. A liquid like Mercury D. None of the above

248. Its compounds are commonly encountered as _____, which often impart blue or green colors to minerals such as turquoise and have been widely used historically as pigments.
A. Copper (II) salts C. A mixture of gold and copper
B. Salts D. None of the above

Cyanide - Inorganic Contaminant 0.2 mg/L MCL
249. Cyanide is a carbon-nitrogen chemical unit which combines with many?
A. Organic and inorganic compounds C. Salts
B. Carbon-nitrogen chemicals D. None of the above

Uses for Cyanide.
250. The most commonly used form, _____, is mainly used to make compounds and other synthetic fibers and resins.
A. Copper (II) salts C. Hydrogen cyanide
B. Cyanide (II) D. None of the above

What are EPA's Drinking Water Regulations for Cyanide?
251. Which of the following for cyanide is 0.2 mg/L or 200 ppb?
A. MCLG C. Standard
B. MCL D. None of the above

252. EPA has set this level of protection based on the best available science to prevent potential health problems. EPA has set an enforceable regulation for cyanide, called a maximum contaminant level (MCL), at 0.2 mg/L or 200 ppb.
A. True B. False

253. Which of the following are any physical, chemical, biological or radiological substances or matter in water?
A. Naked contaminants C. Solutions of inorganic contaminants
B. Contaminants D. None of the above

Cyanide Explained
254. A cyanide is a chemical compound that contains the _____, which consists of a carbon atom triple-bonded to a nitrogen atom.
A. Halides C. Cyanides
B. Cyano group D. None of the above

255. Cyanides most commonly refer to _____which is isoelectronic with carbon monoxide and with molecular nitrogen.
A. Salts of the anion CN^- C. Cyanides solutions
B. Carbon-nitrogen chemical D. None of the above

256. Most cyanides are not toxic.
A. True B. False

Fluoride
257. EPA has set an enforceable regulation for fluoride, called a maximum contaminant level (MCL), at 4.0 mg/L or 4.0 ppm.
A. True B. False

258. The secondary standard of 4.0 mg/L is intended as a guideline for an upper bound level in areas which have high levels of naturally occurring fluoride.
A. True B. False

259. Tooth strengthening is caused by excess fluoride exposures during the formative period prior to eruption of the teeth in children.
A. True B. False

260. The _____ for fluoride is 4.0 mg/L or 4.0 ppm.
A. MCLG C. Standard
B. MCL D. None of the above

261. The level of the _____ was set based upon a balancing of the beneficial effects of protection from tooth decay and the undesirable effects of excessive exposures leading to discoloration.
A. MCLG C. Secondary standard (SMCL)
B. MCL D. None of the above

262. Which of the following is voluntarily added to some drinking water systems as a public health measure for reducing the incidence of cavities among the treated population?
A. Naked fluoride C. Solutions of inorganic fluorides
B. Fluoride D. None of the above

263. In the case for Fluoride the_____, because analytical methods or treatment technology do not pose any limitation.
A. MCL C. MCL equals the MCLG
B. Limit D. None of the above

264. EPA has also set a _____for fluoride at 2.0 mg/L or 2.0 ppm.
A. MCLG C. Secondary standard (SMCL)
B. MCL D. None of the above

Fluoride Explained
265. Structurally Fluoride and to some extent chemically, the _____resembles the hydroxide ion.
A. Naked fluoride C. Solutions of inorganic fluorides
B. Fluoride ion D. None of the above

266. Fluoride is the cation F^+, the reduced form of fluorine when as an ion and when bonded to another element. Inorganic fluorine containing compounds are called fluorides.
A. True B. False

267. Fluoride, like other halides, is a monovalent ion (−1 charge). Its compounds often have properties that are distinct relative to other halides.
A. True B. False

268. The presence of fluoride and its compounds can be detected by F NMR spectroscopy.
A. True B. False

Occurrence
269. According to the text, solutions of inorganic fluorides in water contain F^- and bifluoride HF−2.
A. True B. False

270. Few inorganic fluorides are soluble in water without undergoing significant hydrolysis. In terms of its reactivity, fluoride differs significantly from chloride and other halides, and is more strongly solvated due to its smaller radius/charge ratio. Its closest chemical relative is hydroxide.
A. True B. False

271. When relatively unsolvated, fluoride anions are called?
A. Naked C. Solutions of inorganic fluorides
B. Fluoride D. None of the above

272. Which of the following is a very strong lewis base?
A. Naked fluoride C. Solutions of inorganic fluorides
B. Fluoride D. None of the above

Natural Occurrence

273. Which of the following are known of paramount commercial importance are fluorite and fluorapatite?

A. Halides
B. Many fluoride minerals
C. Fluorite and fluorapatite
D. None of the above

274. Which of the following is usually found naturally in low concentration in drinking water and foods. The concentration in seawater averages 1.3 parts per million (ppm)?

A. Halides
B. Fluoride
C. Fluorite and fluorapatite
D. None of the above

275. Fresh water may contains dangerously high levels of _____ , leading to serious health problems.

A. Naked fluoride
B. Fluoride
C. Solutions of inorganic fluorides
D. None of the above

Mercury - Inorganic Contaminant

276. Mercury is a liquid metal found in natural deposits such as ores containing?

A. Aluminum
B. Cinnabar (mercuric sulfide)
C. Other elements
D. None of the above

Uses for Mercury

277. According to the text, electrical products such as dry-cell batteries, fluorescent light bulbs, switches, and other control equipment account for 50 percent of?

A. Mercury
B. Cinnabar (mercuric sulfide)
C. Lead
D. None of the above

What are Mercury's Health Effects?

278. Some people who drink water containing mercury well in excess of the maximum contaminant level (MCL) for many years could experience liver damage.

A. True B. False

What are EPA's Drinking Water Regulations for Mercury?

279. The MCLG for mercury is 0.002 mg/L or 2 ppb. EPA has set this level of protection based on the best available science to prevent potential health problems.

A. True B. False

280. EPA reviewed mercury as part of the Six Year Review and determined that the 0.002 mg/L or 2 ppb MCLG and 0.002 mg/L or 2 ppb MCL for mercury are still protective of human health.

A. True B. False

How will Mercury be removed from my Drinking Water?

281. The following treatment method(s) have proven to be effective for removing mercury to below 0.002 mg/L or 2 ppb: coagulation/filtration, granular activated carbon, _____, and reverse osmosis.

A. A carbon filter
B. Backwash carbon
C. Lime softening
D. None of the above

Mercury Explained

282. The red pigment vermilion is mostly obtained by?

A. Aluminum
B. Reduction from cinnabar
C. Mercury-aluminum amalgam
D. None of the above

283. Mercury poisoning can also result from exposure to _____of mercury (such as mercuric chloride or methylmercury), inhalation of mercury vapor, or eating seafood contaminated with mercury.

A. Water-soluble forms
B. Cinnabar (mercuric sulfide)
C. Reduction from cinnabar
D. None of the above

284. Mercury is used in thermometers, barometers, manometers, sphygmomanometers, though concerns about the element's toxicity have led to mercury thermometers and sphygmomanometers being largely phased out in clinical environments in favor of alcohol-filled,_____.

A. Bottles
B. Machinery
C. Galinstan-filled, digital, or thermistor-based instruments
D. None of the above

285. Mercury is used in lighting: electricity passed through mercury vapor in a phosphor tube produces short-wave ultraviolet light which then causes the _____to fluoresce, making visible light.

A. Ultraviolet light
B. Cinnabar (mercuric sulfide)
C. Phosphor
D. None of the above

286. Mercury occurs in deposits throughout the world mostly as cinnamon.

A. True B. False

Amalgams

287. Mercury dissolves to form amalgams with gold, zinc and many other metals.

A. True B. False

288. Copper is an exception; copper flasks have been traditionally used to trade mercury.

A. True B. False

289. Other metals that do not form amalgams with mercury include tantalum, tungsten and platinum. _____is a common reducing agent in organic synthesis, and is also used in high-pressure sodium lamps.

A. Aluminum amalgam
B. Cinnabar (mercuric sulfide)
C. Sodium amalgam
D. None of the above

290. Mercury readily combines with aluminum to form a _____ when the two pure metals come into contact.

A. Aluminum amalgam
B. Cinnabar (mercuric sulfide)
C. Mercury-aluminum amalgam
D. None of the above

291. Amalgam destroys the _____which protects metallic aluminum from oxidizing in-depth.

A. Aluminum oxide layer
B. Cinnabar (mercuric sulfide)
C. Sodium amalgam
D. None of the above

292. Mercury is not allowed aboard an aircraft under most circumstances because of the risk of it forming an amalgam with exposed aluminum parts in the aircraft unless it is in a copper pot.
A. True B. False

Nitrate (Measured as Nitrogen)
293. Nitrate may cause health problems if present in public or private water supplies in amounts greater than the drinking water standard set by EPA.
A. True B. False

294. EPA regulates _____in drinking water to protect public health.
A. Nitrates and nitrites C. Nitrates are converted to nitrites
B. Nitrate D. None of the above

What is Nitrate?
295. Nitrates and nitrites are _____which combine with various organic and inorganic compounds.
A. Nitrogen-oxygen chemical units C. Nitrates are converted to nitrites
B. Nitrate D. None of the above

Uses for Nitrate.
296. According the text, once taken into the body, nitrates are converted to?
A. Nitrates and nitrites C. Nitrites
B. Nitrate D. None of the above

What are EPA's Drinking Water Regulations for Nitrate?
297. The MCLG for nitrate is 50 mg/L or 50 ppm. EPA has set this level of protection based on the best available science to prevent potential health problems.
A. True B. False

298. EPA has set an enforceable regulation for nitrate, called a maximum contaminant level (MCL), at 50 mg/L or 50 ppm.
A. True B. False

How will I know if Nitrate is in my Drinking Water?
299. Water suppliers must notify their customers as soon as practical, but no later than 24 hours after the system learns of the violation.
A. True B. False

300. Additional actions, such as providing alternative drinking water supplies, may be required to prevent serious risks to public health.
A. True B. False

Nitrate Explained
301. The nitrate ion is a polyatomic ion with the _____and a molecular mass of 62.0049 g/mol.
A. Nitrates and nitrites C. Molecular formula NO_3^-
B. Nitrate D. None of the above

Structure

302. It is the conjugate base of nitric acid, consisting of one central nitrogen atom surrounded by three identically bonded oxygen atoms in a trigonal planar arrangement. The nitrate ion carries a formal charge of -1.

A. True B. False

303. This results from a combination formal charge in which each of the three oxygens carries a $-\frac{2}{3}$ charge, whereas the nitrogen carries a +1 charge, all these adding up to formal charge of the_____.

A. Nitrates and nitrites C. Polyatomic nitrate ion
B. Nitrate D. None of the above

Nitrite (Measured as Nitrogen) - Inorganic Contaminant 1 mg/L MCL

304. EPA regulates nitrite in drinking water to protect public health. Nitrite may cause health problems if present in public or private water supplies in amounts greater than the drinking water standard set by _____.

A. MCLG C. Emergency Planning and Community Right to Know Act (EPCRA)
B. EPA D. None of the above

What is Nitrite?

305. Nitrates and nitrites are _____which combine with various organic and inorganic compounds.

A. Nitrogen-oxygen chemical units C. Nitrates are converted to nitrites
B. Nitrate D. None of the above

Uses for Nitrite.

306. Once taken into the body, _____ are converted to nitrites.

A. Nitrate ions C. Various organic and inorganic compounds
B. Nitrates D. None of the above

What are EPA's Drinking Water Regulations for Nitrite?

307. The MCLG for nitrite is 1 mg/L or 1 ppm. EPA has set this level of protection based on the best available science to prevent potential health problems.

A. True B. False

308. Which of the following is the regulation for nitrite, became effective in 1992?

A. MCLs C. The Phase III Rule
B. The Phase II Rule D. None of the above

How does Nitrite get into my Drinking Water?

309. The major sources of _____ in drinking water are runoff from fertilizer use; leaching from septic tanks, sewage; and erosion of natural deposits.

A. Nitrites C. Nitrogen ions
B. Nitrate D. None of the above

Selenium- Inorganic Contaminant 0.05 mg/L MCL

310. Selenium (Se) is an essential element for_____, with the majority of our intake coming from foods such as nuts, cereals, meat, fish, and eggs.

A. Drinking water C. Human nutrition
B. Minerals D. None of the above

311. In soils, selenium often occurs in soluble forms such as selenate, which are leached into rivers very easily by runoff increasing the amount of?

A. Selenide or selenate compounds C. Selenium in ground water
B. Minerals D. None of the above

312. Which of the following is also a by-product of copper mining / smelting.

A. Selenium C. Selenide or selenate compounds
B. Selenium in water D. None of the above

313. Acute toxicity caused by _____or other sources of intake has been observed in laboratory animals and in animals grazing in areas where high selenium levels exist in the soil.

A. Selenide or selenate compounds C. High levels of selenium in water
B. Minerals D. None of the above

314. The US EPA has established the MCL for selenium in water at 0.05 mg/l.

A. True B. False

315. The concentration of Selenium in drinking water is usually high, and comes from natural minerals.

A. True B. False

316. Selenium is used in photoelectric devises because its electrical conductivity varies with light.

A. True B. False

Selenium Explained

317. Selenium is found impurely in metal sulfide ores, where it partially replaces the oxygen.

A. True B. False

318. Commercially, selenium is produced as _____in the refining of these ores, most often during copper production.

A. Natural deposits C. Byproduct
B. Antioxidant enzymes D. None of the above

319. Minerals that are pure selenide or selenate compounds are known, but are?

A. Rare C. Compounds
B. Found in drinking water D. None of the above

320. Selenium continues to be used in a few types of DC power surge protectors and one type of?

A. Natural deposits C. Fluorescent quantum dot
B. Selenium D. None of the above

321. Selenium salts are toxic in_____, but trace amounts are necessary for cellular function in many organisms, including all animals.
A. The poisoner's poison C. Large amounts
B. Selenium salts D. None of the above

Thallium- Inorganic Contaminant 0.002 mg/L MCL
322. Thallium is a metal found in natural deposits such as ores containing_____.
A. Natural deposits C. Other elements
B. Selenium D. None of the above

Uses for Thallium.
323. The greatest use of _____is in specialized electronic research equipment.
A. Thallium C. This soft gray poor metal
B. Selenium D. None of the above

What are Thallium's Health Effects?
324. Some people who drink water containing thallium well in _____ for many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver problems.
A. MCLs C. Excess of the maximum contaminant level (MCL)
B. The Phase II Rule D. None of the above

Thallium Explained
325. Thallium is a chemical element with symbol **Tl** and atomic number 81.
A. True B. False

326. Thallium tends to oxidize to the +3 and +1 oxidation states as ionic salts. The +3 state resembles that of the other elements in thallium's group (boron, aluminum, gallium, indium).
A. True B. False

327. Thallium poisoning notably results in tooth loss.
A. True B. False

328. Thallium is soft gray poor metal is not found free in nature._____, it resembles tin, but discolors when exposed to air.
A. Nonselective C. Like Potassium ores
B. When isolated D. None of the above

329. The +1 state, which is far more prominent in thallium than the elements above it, recalls the chemistry of alkali metals, and thallium(I) ions are found geologically mostly in potassium-based ores, and (when ingested) are handled in many ways like _____by ion pumps in living cells.
A. Metal sulfide ores C. Potassium ions (K^+)
B. Selenium D. None of the above

330. Which of the following is used in small, nontoxic amounts as an agent in a nuclear medicine scan, during one type of nuclear cardiac stress test?
A. Thallium 111 C. Thallium-201
B. Thallium 3 D. None of the above

331. Soluble thallium salts (many of which are nearly tasteless) are highly toxic in quantity, and were historically used in?
A. Thallium-201 C. Rat poisons and insecticides
B. Thallium 3 D. None of the above

332. Thallium has gained notoriety as "the poisoner's poison" and "_____" (alongside arsenic).
A. Inheritance powder C. Soluble sleeping powder
B. Sleeping powder D. None of the above

SOC Section
SOC Introduction
333. SOCs are identified carcinogens (cancer causing). EPA has set Maximum Contaminant Levels (MCL) for 30 _____ under the Safe Drinking Water Act.
A. Volatile Organic Compounds (VOCs) C. Maximum Contaminant Levels (MCL)
B. Synthetic Organic Chemicals (SOCs) D. None of the above

334. The Safe Drinking Water Act requires that all water sources of all public water systems be periodically monitored for regulated?
A. Volatile Organic Compounds (VOCs) C. Maximum Contaminant Levels (MCL)
B. Synthetic Organic Chemicals (SOCs) D. None of the above

335. Which of the following are very persistent in the environment, whether in soil or water?
A. Volatile Organic Compounds (VOCs) C. Maximum Contaminant Levels (MCL)
B. Synthetic Organic Chemicals (SOCs) D. None of the above

336. Which of the following or "blue baby syndrome" is from ingestion of elevated levels of nitrate or nitrite?
A. Methemoglobinemia C. Elevated levels of Chlorofluorocarbons
B. Most contaminants D. None of the above

337. All public water systems must monitor for?
A. Valuable Organic Compounds (VOCs) C. Maximum Constant Levels (MCL)
B. Nitrate and Nitrite) D. None of the above

Volatile Organic Compounds (VOCs)
VOCs Explained
338. Which of the following are organic chemicals that have a high vapor pressure at ordinary, room-temperature conditions?
A. Volatile Organic Compounds (VOCs) C. Maximum Contaminant Levels (MCL)
B. Synthetic Organic Chemicals (SOCs) D. None of the above

339. Which of the following _____ are of VOCs?.
A. Most scents or odors C. Substances
B. Five contaminant groups D. None of the above

340. Which of the following are regulated by law, especially indoors, where concentrations are the highest?
A. Anthropogenic VOCs C. Benzene
B. VOCs D. None of the above

Specific Components
Paints and Coatings
341. Which of the following are required to spread a protective or decorative film. Approximately 12 billion liters of paints are produced annually?
A. Solvents C. Cleaning products
B. VOC D. None of the above

Chlorofluorocarbons and Chlorocarbons
342. Which of the following which are banned or highly regulated, were widely used cleaning products and refrigerants?
A. VOC C. Chlorofluorocarbons
B. Benzene D. None of the above

Benzene
343. One VOC that is a known human carcinogen?
A. VOC C. Chlorofluorocarbons
B. Benzene D. None of the above

344. Which of the following evaporates into the air quickly and the vapor of benzene is heavier than air allowing the compound to sink into low-lying areas?
A. VOC C. Chlorofluorocarbons
B. Benzene D. None of the above

345. Which of the following has also been known to contaminate food and water and if digested can lead to vomiting, dizziness, sleepiness, rapid heartbeat?
A. VOC C. Chlorofluorocarbons
B. Benzene D. None of the above

Methylene Chloride
346. Which of the following is converted to carbon monoxide and a person will suffer the same symptoms as exposure to carbon monoxide?
A. Solvent C. Methylene chloride
B. Benzene D. None of the above

Perchloroethylene
347. Perchloroethylene is a Volatile organic compound that has been linked to causing cancer in animals. It is also suspected to cause many of the breathing related symptoms of exposure to VOC's.
A. True B. False

348. To avoid exposure to perchlorothylene, if a _____is coming from clothing when picked up from the dry cleaner.
A. Fume C. Strong chemical odor
B. Plume D. None of the above

MTBE

349. MTBE was used as an octane booster and?

A. Formaldehyde C. Oxygenated-additive
B. FDE D. None of the above

Formaldehyde

350. Many building materials such as paints, adhesives, wallboards, and ceiling tiles slowly emit?

A. Organic chemicals C. Formaldehyde
B. Some organics D. None of the above

Health Risks

351. Which of the following terms -are important in the creation of smog?

A. MT C. Organic chemicals
B. VOCs D. None of the above

Health effects include:

352. Which of the following can cause cancer in animals; some are suspected or known to cause cancer in humans?

A. Organic chemicals C. Formaldehyde
B. Some organics D. None of the above

Reducing Exposure

353. Use products with _____ in well ventilated areas.

A. MTBE C. Organic chemicals
B. VOCs D. None of the above

354. The exhaled human breath contains a few hundred volatile organic compounds and is used in breath analysis to serve as a _____biomarker to test for diseases such as lung cancer.

A. MTBE C. Organic chemicals
B. VOC D. None of the above

355. Allotropy or allotropism is the property of _____to exist in two or more different forms, known as allotropes of these elements.

A. Allotropy C. Some chemical elements
B. Allotropes D. None of the above

356. Which of the following are different structural modifications of an element; the atoms of the element are bonded together in a different manner?

A. Allotropes C. Metalloids
B. Molecular formulae D. None of the above

357. The term allotropy is used for elements only, not for compounds. The more general term, used for any crystalline material, is?

A. Allotropy C. Polymorphism
B. Molecular formulae D. None of the above

List of Allotropes

358. Which of the following are typically more noticeable in non-metals (excluding the halogens and the noble gases) and metalloids?

A. Allotropes C. Metalloids
B. Molecular formulae D. None of the above

359. Which of the following capable of variable coordination number and/or oxidation states tend to exhibit greater numbers of allotropic forms?

A. Allotropy C. Elements
B. Allotropes D. None of the above

Synthetic Organic Chemicals

360. Synthetic organic chemicals (**SOC**) include all?

A. Carbon based units C. Man-made organics
B. Re-activated carbon D. None of the above

361. According to the text, which of the following terms can substantially reduce many VOCs such as benzene, trichlorethane and carbon tetrachloride?

A. Activated carbon C. A carbon filter or system
B. The adsorption process D. None of the above

362. According to the text, which of the following terms also removes SOCs such as Alachlor, EDB and toluene?

A. Backwash carbon C. Organic filters
B. Activated carbon D. None of the above

363. Before recommending_____, water suspected of containing any of these and other substances must be analyzed to determine their concentrations and whether they exceed the EPA standards.

A. Reverse Osmosis C. Treatment
B. The adsorption process D. None of the above

364. According to the text, which of the following terms compact with use so they may need occasional backwashing?

A. Backwash carbon C. Activated carbon beds
B. Organic matter filtering D. None of the above

365. When operating _____ on turbid water supplies, remove suspended particles with a depth filter before treating it with activated carbon.

A. Activated carbon filters C. A carbon filter or system
B. The adsorption process D. None of the above

366. According to the text, which of the following terms typically backwashes at 10 gpm/ft (25 m/hr) for about 10 minutes, followed by a 5 minute downflow rinse?

A. A carbon filter C. Osmosis
B. Activated carbon process D. None of the above

367. Over a period of several months to two years, the carbon's adsorption capacity diminishes. The exhausted _____should be replaced with fresh carbon. The old carbon should be hauled to an approved disposal facility.
A. Reverse Osmosis C. Carbon bed
B. Adsorption process D. None of the above

Small Water Filters
368. Water filters are used for "_____" drinking water, that is, to filter out harmful or unwanted particles before the water is used for human consumption.
A. Backwash carbon C. Point of use
B. Activated carbon D. None of the above

369. Reverse Osmosis works by forcing the water through a _____that stops certain particles from passing through.
A. Semi-permeable membrane C. Recommend treatment
B. Activated carbon D. None of the above

370. Portable water filters work using a cartridge containing activated carbon and?
A. A carbon filter C. Ion exchange resin
B. Activated carbon D. None of the above

Activated Carbon Filtration
371. According to the text, which of the following has been used for many years to solve water problems?
A Activated carbon C. Ion exchange resin
B. The adsorption process D. None of the above

372. According to the text, which of the following quickly and effectively removes chlorine from water?
A. A carbon filter C. Man-made organics
B. Activated carbon D. None of the above

373. According to the text, which of the following _____ takes time, so service rates should be limited to 5 gpm/ft (12m/hr) or less for these applications?
A. Activated carbon C. A carbon filter or system
B. The adsorption process D. None of the above

Membrane Filtration Processes
374. According to the text, which of the following a process in which water from a dilute solution will naturally pass through a porous membrane into a concentrate solution?
A. A carbon filter C. Osmosis
B. Activated carbon process D. None of the above

375. Over the years, scientists have attempted to develop membranes that would be useful in industrial processes, but it wasn't until the late 1950s that membranes were produced that could be used for what is known as?
A. MF C. Reverse osmosis
B. Desalinization D. None of the above

376. According to the text, which of the following water is forced to move through a membrane from a concentrate solution to a dilute solution?
A. Reverse osmosis C. Potable water treatment
B. Rapid sand filters D. None of the above

377. According to the text, which of the following membranes have been used for desalinization, removal of dissolved inorganic and organic chemicals, water softening, and removal of the fine solids.
A. Reverse osmosis C. Potable water treatment
B. Rapid sand filters D. None of the above

378. According to the text, which of the following enables some water systems having contaminated water sources to meet new, more stringent regulations?
A. Membrane technology C. Rapid sand filters
B. Potable water D. None of the above

379. There is great potential for the continuing wide use of this method in potable water treatment, especially as technology improves and costs are reduced.
A. Direct filtration process C. Membrane filtration processes
B. Desalinization D. None of the above

Microfiltration
380. Microfiltration (MF) is a process in which water is forced under pressure through?
A. A porous membrane C. Rapid sand filters
B. Potable water D. None of the above

381. Membranes with a pore size of 0.45µ m are normally used; this size is relatively large compared with the other?
A. Direct filtration process C. Membrane filtration processes
B. Desalinization D. None of the above

382. This process has not been generally applicable to drinking water treatment because it either does not remove substances or the problem substances can be removed more economically using?
A. A porous membrane C. Rapid sand filters
B. Other processes D. None of the above

383. According to the text, which of the following is by industries to remove very fine particles from process water?
A. MF C. Reverse osmosis
B. Desalinization D. None of the above

384. According to the text, which of the following are susceptible to clogging or filter binding unless the water being processed is already quite clean?
A. Reverse osmosis filters C. RO membranes
B. Probable water filters D. None of the above

385. Microfiltration has been proposed as a filtering method for particles resulting from the?
A. Direct filtration process C. Membrane filtration processes
B. Desalinization D. None of the above

386. According to the text, which of the following has used the injection of coagulants such as alum or polymers into the raw water stream to remove turbidity such as clay or silts?
A. Direct filtration process C. Membrane filtration processes
B. Desalinization D. None of the above

387. The formed particles were then removed by?
A. A porous membrane C. Rapid sand filters
B. Portable water filter D. None of the above

Ultrafiltration
388. Ultrafiltration is a process that uses a membrane with a pore size generally below _____ µm.
A. 0.1 C. 10
B. 1.0 D. None of the above

389. According to the text, which of the following can be designed to pass material that weigh less than or equal to a certain molecular weight?
A. NF C. Membrane process
B. UF membranes D. None of the above

390. According to the text, which of the following does not generally work well for removal of salt or dissolved solids, it can be used effectively for removal or most organic chemicals?
A. NF C. Membrane process
B. UF D. None of the above

Nanofiltration
391. Nanofiltration (NF) is a process using membranes that will reject even smaller molecules than?
A. NF C. Membrane process
B. UF D. None of the above

392. NF's capability will undoubtedly increase the use of _____ for potable water treatment.
A. NF C. Membrane process
B. UF D. None of the above

Reverse Osmosis
393. Reverse Osmosis (RO) is a membrane process that has the highest rejection capability of all the?
A. UF C. Membrane processes
B. Processes for this service D. None of the above

394. Which of the following have very low MWC pore size that can reject ions at very high rates, including chloride and sodium?
A. RO process C. Electrodialysis Reversal (EDR) membranes
B. RO membranes D. None of the above

395. Water from this process is very pure due to the_____.
A. High reject rates C. Low reject rates
B. Service D. None of the above

396. Industrial water uses such as semiconductor manufacturing is also an important _____.
A. RO process C. UF process
B. NF membranes D. None of the above

Electrodialysis

397. Electrodialysis (ED) is a process in which ions are transferred through _____as a result of direct electric current applied to the solution.
A. Demineralizing compartments C. The solution
B. A membrane D. None of the above

Electrodialysis Reversal

398. Electrodialysis Reversal (EDR) is a process similar to_____, except that the polarity of the direct current is periodically reversed.
A. ED C. NF
B. UF D. None of the above

399. The reversal in polarity reverses the flow of ions _____compartments, which provides automatic flushing of scale-forming materials from the membrane surface.
A. Between demineralizing C. Direct electric current applied to the solution
B. In the UF D. None of the above

400. Which of the following _____and EDR have been used at only a few locations for drinking water treatment.
A. ED C. NF
B. UF D. None of the above