Registration form

Disinfection Principles CEU Training Course

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. _____

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Wastewater Treatment_____ Other _____

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You can obtain a printed version of the course from TLC for an additional $169.95 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.

All downloads are tracked and monitored for security purposes.

CERTIFICATION OF COURSE PROCTOR

Technical Learning College requires that our students who takes a correspondence or home study program course must pass a proctored course reading, quiz and final examination. The proctor must complete and provide to the school a certification form approved by the commission for each examination administered by the proctor.

Instructions. When a student completes the course work, fill out the blanks in this section and provide the form to the proctor with the examination.

Name of Course:_____

Name of Licensee:_____

Instructions to Proctor. After an examination is administered, complete and return this certification and examination to the school in a sealed exam packet or in pdf format.

I certify that:

1. I am a disinterested third party in the administration of this examination. I am not related by blood, marriage or any other relationship to the licensee which would influence me from properly administering the examination.
2. The licensee showed me positive photo identification prior to completing the examination.
3. The enclosed examination was administered under my supervision on _____. The licensee received no assistance and had no access to books, notes or reference material.
4. I have not permitted the examination to be compromised, copied, or recorded in any way or by any method.
5. Provide an estimate of the amount of time the student took to complete the assignment.

Time to complete the entire course and final exam. _____

Notation of any problem or concerns:

Name and Telephone of Proctor (please print):

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Signature of Proctor

Disinfection Principles CEU Course Answer Key

Name _____ Telephone # _____

Method of Course acceptance confirmation. Please fill this section

It is your sole responsibly to ensure this course is accepted for credit in your State. No refunds. Did you check with your State agency to ensure this course is accepted for credit?

Website __ Telephone Call___ Email____ Spoke to_____

Did you receive the approval number, if applicable? _____

Select the version of the exam 1 2 3 4 5

Please circle, underline, bold or X only one correct answer

Please Circle, Bold, Underline or X, one answer per question. A **felt tipped pen** works best.

Amount of Time for Course Completion – How many hours have you spent on course?

Chapter 1- Hazard Communication Section			
1. A B C D	**5.** A B C D	**9.** A B C D	**13.** A B C D
2. A B C D	**6.** A B C D	**10.** A B C D	**14.** A B C D
3. A B C D	**7.** A B C D	**11.** A B C D	**15.** A B C D
4. A B C D	**8.** A B C D	**12.** A B C D	
Chapter 2- Waterborne Pathogens Section			
1. A B C D	**5.** A B C D	**9.** A B C D	**13.** A B C D
2. A B C D	**6.** A B C D	**10.** A B C D	**14.** A B C D
3. A B C D	**7.** A B C D	**11.** A B C D	**15.** A B C D
4. A B C D	**8.** A B C D	**12.** A B C D	
Chapter 3- Disinfection Rules			
1. A B C D	**5.** A B C D	**9.** A B C D	**13.** A B C D
2. A B C D	**6.** A B C D	**10.** A B C D	**14.** A B C D
3. A B C D	**7.** A B C D	**11.** A B C D	**15.** A B C D
4. A B C D	**8.** A B C D	**12.** A B C D	

Chapter 4- Water Chemistry Section			
1. A B C D	**5.** A B C D	**9.** A B C D	**13.** A B C D
2. A B C D	**6.** A B C D	**10.** A B C D	**14.** A B C D
3. A B C D	**7.** A B C D	**11.** A B C D	**15.** A B C D
4. A B C D	**8.** A B C D	**12.** A B C D	
Chapter 5- Chlorine Section			
1. A B C D	**5.** A B C D	**9.** A B C D	**13.** A B C D
2. A B C D	**6.** A B C D	**10.** A B C D	**14.** A B C D
3. A B C D	**7.** A B C D	**11.** A B C D	**15.** A B C D
4. A B C D	**8.** A B C D	**12.** A B C D	
Chapter 6- Hypochlorites and Chlorimines Section			
1. A B C D	**5.** A B C D	**9.** A B C D	**13.** A B C D
2. A B C D	**6.** A B C D	**10.** A B C D	**14.** A B C D
3. A B C D	**7.** A B C D	**11.** A B C D	**15.** A B C D
4. A B C D	**8.** A B C D	**12.** A B C D	
Chapter 7- Safety and Chlorination Section			
1. A B C D	**5.** A B C D	**9.** A B C D	**13.** A B C D
2. A B C D	**6.** A B C D	**10.** A B C D	**14.** A B C D
3. A B C D	**7.** A B C D	**11.** A B C D	**15.** A B C D
4. A B C D	**8.** A B C D	**12.** A B C D	
Chapter 8- Alternative Disinfectants Section			
1. A B C D	**5.** A B C D	**9.** A B C D	**13.** A B C D
2. A B C D	**6.** A B C D	**10.** A B C D	**14.** A B C D
3. A B C D	**7.** A B C D	**11.** A B C D	**15.** A B C D
4. A B C D	**8.** A B C D	**12.** A B C D	
Chapter 9- Respiratory Protection Section			
1. A B C D	**5.** A B C D	**9.** A B C D	**13.** A B C D
2. A B C D	**6.** A B C D	**10.** A B C D	**14.** A B C D
3. A B C D	**7.** A B C D	**11.** A B C D	**15.** A B C D
4. A B C D	**8.** A B C D	**12.** A B C D	
Chapter 10- Lab Analyst Section			
1. A B C D	**5.** A B C D	**9.** A B C D	**13.** A B C D
2. A B C D	**6.** A B C D	**10.** A B C D	**14.** A B C D
3. A B C D	**7.** A B C D	**11.** A B C D	**15.** A B C D
4. A B C D	**8.** A B C D	**12.** A B C D	

Must match State Hour Requirement _____ (Hours)

I understand that I am 100 percent responsible to ensure that TLC receives the Assignment and Registration Key. I will not hold TLC liable for any errors or damages and will abide with rules on page 2. I understand that TLC has a zero tolerance towards not following their rules, cheating or hostility towards staff or instructors. I need to complete the entire assignment for credit. There is no credit for partial assignment completion. My exam was proctored.

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Signature

When Finished with Your Assignment

REQUIRED DOCUMENTS
Please scan the **Registration Page, Answer Key, Survey and Driver's License** and email it to info@TLCH2O.com.

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FAX
If you are unable to scan and email, please fax these to TLC, if you fax, call to confirm that we received your paperwork. **(928) 468-0675**

Please write down any questions you were not able to find the answers or that have errors

INSTRUCTIONS

1. We will require all students to fax or e-mail a copy of their driver's license with the registration form.
2. You will need to pick one of the following four assignments to complete. This selection process is based upon your last name.

Assignment for Last Names

If your last name…

A-G Assignment #1 - Pages 11 - 30
H-M Assignment #2 - Pages 31 - 49
N-S Assignment #3 - Pages 51 - 68
T-Z Assignment #4 - Pages 69 - 88
Alternative Assignment #5 for **repeat students** - Pages 89 - 106

These exams are frequently rotated.
Complete all topics before submitting the answers key.

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.

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

DISINFECTION PRINCIPLES CEU TRAINING COURSE
CUSTOMER SERVICE RESPONSE CARD

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E-MAIL_____PHONE_____

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

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

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

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

How did you hear about this Course? _____

What would you do to improve the Course?

_____

_____

Any other concerns or comments.

_____

_____

This course contains general EPA's SDWA federal rule requirements. Please be aware that each state implements water / sampling procedures/safety/ environmental / building regulations that may be more stringent than EPA's regulations. Check with your state environmental/health agency for more information. These rules change frequently and are often difficult to interpret and follow. Be careful to not be in non-compliance and do not follow this course for proper compliance.

Disinfection Principles CEU Course Assignment - Number 1

The Disinfection Principles CEU Assignment is available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e-mail it back to TLC.

You will have 90 days from 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. 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 manual and make copy for yourself.

Multiple Choice, please select only one answer per question. There are no intentional trick questions.

Hazard Communication Section

1. The Hazard Communication Standard in 1983 gave the workers the_____ but the new Globally Harmonized System gives workers the 'right to understand.'
A. Right to understand C. Right to know
B. Hazard information D. None of the above

2. OSHA's HazCom rule has significant new requirements that will require employers to train their employees how to read and interpret the?
A. New SDS C. Hazards of chemicals
B. Hazard information D. None of the above

More on the Revised Hazard Communication Standard
3. Which of the following will provide a common and coherent approach to classifying chemicals and communicating hazard information on labels and safety data sheets?
A. SDS/MSDS C. Hazard Communication Standard (HCS)
B. Safety data sheets and labels D. None of the above

Rationale
4. In order to ensure _____ in the workplace, information about the identities and hazards of the chemicals must be available and understandable to workers.
A. Chemical safety C. Hazardous chemicals
B. Hazard information D. None of the above

5. Chemical manufacturers and importers are required to evaluate the_____ they produce or import, and prepare labels and safety data sheets to convey the hazard information to their downstream customers.
A. Specific criteria C. Hazard communication elements
B. Hazards of the chemicals D. None of the above

Major changes to the Hazard Communication Standard

6. Which of the following provides specific criteria for classification of health and physical hazards, as well as classification of mixtures?

A. Hazard classification
B. Safety data sheets and labels
C. Hazard communication elements
D. None of the above

7. Labels: Chemical manufacturers and importers will be required to provide a label that includes a harmonized signal word, pictogram, and hazard statement for each?

A. Specific, detailed criteria
B. Standardized label elements
C. Hazard class and category
D. None of the above

What is the Globally Harmonized System?

8. The result of this negotiation process is the United Nations' document entitled "Globally Harmonized System of Classification and Labeling of Chemicals," commonly referred to as?

A. Revised HCS
B. Model regulation
C. The Purple Book
D. None of the above

What Hazard Communication Standard provisions are unchanged in the revised HCS?

9. Which of the following has been changed to "hazard classification" and "material safety data sheet" was changed to "safety data sheet?"

A. Revised HCS
B. Model regulation
C. Hazard determination
D. None of the above

1.1 What is the GHS?

10. The GHS is a system for _____ the classification and labeling of chemicals. It is a logical and comprehensive approach to: Defining health, physical and environmental hazards of chemicals;

A. Multiple safety data sheets
B. Hazards to human health
C. Standardizing and harmonizing
D. None of the above

11. The GHS Document thus provides countries with the regulatory building blocks to develop or modify existing national programs that address classification of hazards and transmittal of information about those hazards and associated protective measures. This helps to ensure the safe use of chemicals as they move through the _____ from "cradle to grave."

A. Product life cycle
B. Hazards to human health
C. Hazardous properties of chemicals
D. None of the above

1.7 What are the benefits?

12. The basic goal of _____ - is to ensure that employers, employees and the public are provided with adequate, practical, reliable and comprehensible information.

A. Achieve a global approach
B. Hazard communication
C. Preventive and protective measures
D. None of the above

3.0 What is Classification?

13. For several hazards _____- are semi-quantitative or qualitative. Expert judgment may be required to interpret these data.

A. The global approaches
B. The regulatory changes
C. The GHS criteria
D. None of the above

Hazard Classification

14. Which of the following is used to indicate that only the intrinsic hazardous properties of substances and mixtures are considered?

A. Self-classification C. GHS labels and/or Safety Data Sheets
B. Hazard classification D. None of the above

15. Tests that determine hazardous properties conducted according to internationally recognized scientific principles can be used for purposes of?

A. Hazard classification C. Existing hazard communication regulatory schemes
B. Safety Data Sheets D. None of the above

(S) Means the answer can be plural or singular in nature

Chapter 2- Waterborne Pathogens Section

Protozoan Caused Diseases

1. Which of the following bugs is larger than bacteria and viruses but still microscopic; they invade and inhabit the gastrointestinal tract?

A. Hepatitis A C. Protozoan pathogens
B. E.coli D. None of the above

2. Some of the parasites enter the environment in a dormant form, with a protective cell wall, called a?

A. Lamblia C. Cyst
B. Shell D. None of the above

Giardia lamblia

3. Which of the following bugs has been responsible for more community-wide outbreaks of disease in the U.S. than any other, and drug treatment are not 100% effective?

A. Giardia lamblia C. Giardiasis
B. Cryptosporidiosis D. None of the above

4. All of these diseases, with the exception of _____, have one symptom in common: diarrhea. They also have the same mode of transmission, fecal-oral, whether through person-to-person or animal-to-person contact.

A. HIV infection C. Hepatitis A
B. Giardiasis D. None of the above

Primary Waterborne Diseases Section

5. Legionnaire's disease, which causes a severe pneumonia, and the second, _____, which is a non-pneumonia illness; it's typically an influenza-like illness, and it's less severe.

A. Pontiac fever C. Typhoid fever
B. Yellow fever D. None of the above

6. Legionella, prevention. Legionella in water systems. Hot water in tanks should be maintained between _____degrees Centigrade.

A. 81 to 100 C. 71 and 77
B. 110 to 210 D. None of the above

7. Which of the following is typically associated with soil and water?
A. Pseudomonas C. Hepatitis A virus
B. Legionella D. None of the above

8. Humans are the reservoir for the Salmonella typhi pathogen, which causes diarrheal illness, and also known as?
A. Campylobacter C. Shigella dysenteriae
B. Typhoid fever D. None of the above

9. Shigella species, in the United States two-thirds of the shigellosis in the U.S. is caused by Shigella dysenteriae and the remaining one-third is caused by Shigella Campylobacter.
A. True B. False

10. Campylobacter, the basics. It's a bacterium. It causes diarrheal illness.
A. True B. False

11. Campylobacter is primarily associated with poultry, animals, and humans.
A. True B. False

12. Vibrio cholerae, the basics. It's a virus. It causes diarrheal illness, also known as cholera. It is typically associated with aquatic environments, shell stocks, and human. Vibrio cholerae has also been associated with ship ballast water.
A. True B. False

Dangerous Waterborne Microbes
13. Which of the following are Gram-negative, non-spore-forming, facultatively anaerobic, non-motile bacteria.
A. Fecal coliform bacteria C. Shigellae
B. Cryptosporidium D. None of the above

Bacteriological Monitoring Introduction
14. Which of the following are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media?
A. Indicator bacteria C. Viruses
B. Amoebas D. None of the above

Bacteria Sampling
15. Water samples for _____must always be collected in a sterile container.
A. Amoebas C. Viruses
B. Bacteria tests D. None of the above

(S) Means the answer can be plural or singular in nature

Chapter 3- Disinfection Rule Section

Chlorine DDBP

1. Chloramines are formed by reactions with?

A. Acid and Cl_2 C. Folic Acid and Cl2
B. Ammonia and Cl_2 D. None of the above

2. These term means that chlorine is present as Cl, HOCl, and OCl^- is called _____, and that which is bound but still effective is _____.

A. Free available chlorine and Total
B. Free and Residual
C. Free available chlorine and Combined Chlorine
D. None of the above

Microbial Regulations

3. Which rule specifies treatment criteria to assure that these performance requirements are met; they include turbidity limits, disinfectant residual, and disinfectant contact time conditions?

A. Long Term 1 Enhanced Surface Water Treatment Rule
B. Interim Enhanced Surface Water Treatment Rule
C. Surface Water Treatment Rule
D. None of the above

4. Which rule was established to maintain control of pathogens while systems lower disinfection byproduct levels to comply with the Stage 1 Disinfectants/Disinfection Byproducts Rule and to control Cryptosporidium?

A. Long Term 1 Enhanced Surface Water Treatment Rule
B. Interim Enhanced Surface Water Treatment Rule
C. Surface Water Treatment Rule
D. None of the above

5. The EPA established a MCL of 0.0010 for all public water systems and a 99% removal requirement for Cryptosporidium in filtered public water systems that serve at least 100,000 people. The new rule will tighten turbidity standards by December 2001.

A. True B. False

EPA's Drinking Water Regulations for Disinfectants

6. Using chlorine as a drinking water disinfectant has prevented millions of water borne diseases, such as typhoid, cholera, dysentery, and diarrhea. Most states require community water systems to use chlorination.

A. True B. False

7. All disinfectants form DBPs in one of two reactions: Chorine and chlorine-based compounds (halogens) react with organics in water causing the _____to substitute other atoms resulting in halogenated by-products.

A. Chlorine atom C. Carbon atom
B. Hydrogen atom D. None of the above

Public Health Concerns

8. Which of the following rules along with the Disinfection Byproducts Rule applies to all community and nontransient non-community water systems that treat their water with a chemical disinfectant?

A. Groundwater Rule (GWR) C. Long Term 2 Enhanced Surface Water Treatment Rule
B. The Stage 1 Disinfectants D. None of the above

Stage 2 DBP Rule Federal Register Notices

9. Which of the following rules is one part of the Microbial and Disinfection Byproducts Rules, which are a set of interrelated regulations that address risks from microbial pathogens and disinfectants/disinfection byproducts?

A. Groundwater Rule (GWR) C. Long Term 2 Enhanced Surface Water Treatment Rule (LT2)
B. The Stage 2 DBP rule D. None of the above

10. Stage 2 Disinfection Byproducts Rule strengthens public health protection for customers by tightening _____for two groups of DBPs, trihalomethanes and haloacetic acids.

A. Primary or residual disinfectant C. Compliance monitoring requirements
B. Major public health advances D. None of the above

Are THMs and HAAs the only disinfection byproducts?

11. The presence of _____is representative of the occurrence of many other chlorination DBPs; thus, a reduction in the TTHM and HAA5 generally indicates a reduction of DBPs from chlorination.

A. Chlorine and chloramine C. TTHM and HAA5
B. Classes of DBPs D. None of the above

Chlorine By-Products

12. The most common chlorination by-products found in U.S. drinking water supplies are?

A. Chlorate and Chlorite C. Ammonia and THMS
B. Trihalomethanes (THMs) D. None of the above

The Principal Trihalomethanes are:

13. THM levels are also low when wells or large lakes are used as the drinking water source, because organic matter concentrations are generally low in these sources. The opposite — high organic matter concentrations and high THM levels — is true when rivers or other surface waters are used as the source of the drinking water.

A. True B. False

Health Effects

14. The available studies on health effects do not provide conclusive proof of a relationship between exposure to THMs and cancer or reproductive effects, but indicate the need for further research to confirm their results and to assess the potential health effects of chlorination by-products other than THMs.

A. True B. False

Risks and Benefits of Chlorine

15. It is extremely important that water treatment plants ensure that methods used to control chlorination by-products do not compromise the effectiveness of water disinfection.

A. True B. False

Chapter 4- Water Chemistry Section

pH Testing Section

1. When an atom loses _____and thus has more protons than electrons, the atom is a positively-charged ion or cation.
A. A proton C. An electron
B. Charge D. None of the above

2. Pure water has a pH very close to?
A. 7 C. 7.7
B. 7.5 D. None of the above

3. _____ are determined using a concentration cell with transference, by measuring the potential difference between a hydrogen electrode and a standard electrode such as the silver chloride electrode.
A. Primary pH standard values C. pH measurement(s)
B. Alkalinity D. None of the above

4. Mathematically, pH is the negative logarithm of the activity of the (solvated) hydronium ion, more often expressed as the measure of the?
A. Electron concentration C. Hydronium ion concentration
B. Alkalinity concentration D. None of the above

5. pH 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. Acid-base behavior D. None of the above

6. Which of the following terms may be used to measure pH, by making use of the fact that their color changes with pH?
A. Indicators C. A set of non-linear simultaneous equations
B. Spectrophotometer D. None of the above

7. Measurement of pH for aqueous solutions can be done with a glass electrode and a pH meter, or using indicators like strip test paper.
A. True B. False

8. In chemistry, pH is a measure of the acidity or basicity of an aqueous solution. Solutions with a pH greater than 7 are said to be acidic and solutions with a pH less than 7 are basic or alkaline.
A. True B. False

9. Because the alkalinity of many surface waters is primarily a function of carbonate, bicarbonate, and hydroxide content, it is taken as an indication of the concentration of these constituents.
A. True B. False

10. The calculation of the pH of a solution containing acids and/or bases is an example of a chemical speciation calculation, that is, a mathematical procedure for calculating the concentrations of all chemical species that are present in the solution. The complexity of the procedure depends on the?
A. Nature of the solution C. Alkaline earth metal concentrations
B. pH D. None of the above

11. Under normal circumstances 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 pH D. None of the above

Halogens- Halides
12. What is the negative ion often referred to as?
A. A halide proton C. Diatomic Compound
B. A halide ion D. None of the above

Chlorine
13. The only halogen is needed in relatively large amounts (as chloride ions) by humans?
A. Chlorine C. Fluoride
B. Iodine D. None of the above

14. This halogen is needed only in very small amounts for the production of thyroid hormones such as thyroxine?
A. Chlorine C. Fluoride
B. Iodine D. None of the above

15. On the other hand, neither fluorine nor bromine are believed to be really essential for humans, although small amounts of _____can make tooth enamel resistant to decay.
A. Chlorine C. Fluoride
B. Iodine D. None of the above

Chapter 5 -Chlorine Section
Chlorine Gas Appearance and Odor

Reactivity
1. Cylinders of chlorine may burst when exposed to elevated temperatures. When there is Chlorine in solution, this forms?
A. Hydrogen sulfide C. A corrosive material
B. Oxomonosilane D. None of the above

2. What is formed when chlorine is in contact with combustible substances (such as gasoline and petroleum products, hydrocarbons, turpentine, alcohols, acetylene, hydrogen, ammonia, and sulfur), reducing agents, and finely divided metals?
A. Fires and explosions C. Moisture, steam, and water
B. Odor thresholds D. None of the above

3. Chlorine reacts with hydrogen sulfide and water to form which substance?
A. Hydrogen sulfide C. Chlorinates
B. Hydrochloric acid D. None of the above

4. Chlorine is also incompatible with?
A. Plastic C. Moisture, steam, and water
B. Palladium D. None of the above

Flammability

5. When there is a fire that involves chlorine, the firefight should be fought downwind from the minimum distance possible.
A. True B. False

6. Keep unnecessary people away; isolate the hazard area and deny entry. For a massive fire in a cargo area, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from the area and let the fire burn. Emergency personnel should stay out of low areas and Ventilate closed spaces before entering.
A. True B. False

Chlorine Exposure Limits

7. Chlorine's Physical and chemical properties: A yellowish green, nonflammable and liquefied gas with an unpleasant and irritating smell.
A. True B. False

8. 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

9. Solid chlorine is about _____ times heavier than water and gaseous chlorine is about 2.5 times heavier than air.
A. 1.5 C. 2.5
B. 0.5 D. None of the above

10. Cl_2 fatal exposure limit is?
A. 10 PPM C. 1,000 PPM
B. 0.1 PPM D. None of the above

Disinfectant Qualities

11. Chlorine is so important in poultry processing that the US Department of Agriculture requires an almost constant chlorine rinse for much of the cutting equipment. In fact, no proven economical alternative to chlorine disinfection exists for use in meat and poultry processing facilities.
A. True B. False

Properties

12. Inorganic disinfectants have great usage of removing a wide variety of disease-causing germs from drinking water and wastewater as well as from hospital and food production surfaces.
A. True B. False

Chlorine Gas Introduction

13. When chlorine is added into the water stream, chlorine hydrolyzes into?

A. HCL C. Hypochlorous acid (HOCl), and hydrochloric acid (HCl)
B. Bromoform D. None of the above

Chlorine Gas
Pathophysiology

14. As far as chlorine safety and respiratory protection, the intermediate _____of chlorine accounts for its effect on the upper airway and the lower respiratory tract.

A. Effects of Hydrochloric acid C. Water solubility
B. Vapor from Chlorine gas D. None of the Above

Solubility Effects

15. Which of the following is highly soluble in water?

A. Hydrochloric acid C. Hypochlorous base
B. H_2SO_4 D. None of the above

Chapter 6- Hypochlorites and Chloramines

Sodium Hypochlorite Exposure
Routes of Exposure
Inhalation

1. Chlorine is lighter than air and may cause asphyxiation in poorly ventilated, enclosed, or high-lying areas.

A. True B. False

Ingestion

2. Metabolic acidosis is rare, but has been reported following the ingestion of?

A. Hypochlorous Acid (HOCl) C. Sodium and calcium
B. Household bleach D. None of the above

Sources/Uses

3. Which compounds are manufactured by the chlorination of sodium hydroxide or lime?

A. Sodium hypochlorite C. Hypochlorite solutions, powder, or concentrated vapor
B. Sodium and calcium hypochlorite D. None of the above

Calcium Hypochlorite Section

4. Which of the following substances comes in two forms: powder and tablets?

A. Calcium hypochlorite C. Sodium hypochlorite
B. Hypochlorous Acid (HOCl) D. None of the above

Description

5. Solid chlorine stands alone as the safest form of chlorine disinfection.

A. True B. False

6. Sodium hypochlorite is generally available as a white powder, pellets, or flat plates. It decomposes readily in water or when heated, releasing oxygen and chlorine. It has a strong chlorine odor, but odor may not provide an adequate warning of hazardous concentrations.

A. True B. False

Accuracy

7. Which compound's strengths vary so widely and are mostly unknown (the container usually says "less than 5%") that it is impossible to make up accurate in-use solutions without access to laboratory equipment?

A. Liquid chlorine C. Calcium hypochlorite
B. Solid chlorine D. None of the above

Effectiveness

8. Liquid Sodium hypochlorite and chlorine tablets produce Hypochlorous acid (HOCl) and?

A. Calcium hypochlorite C. Hypochlorite ion (OCl-) in solution
B. Oxygen D. None of the above

Comparison

9. Hypochlorite powder, solutions, and vapors are irritating and corrosive to the eyes, skin, and respiratory tract.

A. True B. False

Sodium Hypochlorite Solutions

10. Sodium hypochlorite solutions liberate the Toxic gases chlorine or chloramine if mixed with acid or ammonia (this can occur when bleach is mixed with another cleaning product). Thus, exposure to hypochlorite may involve exposure to these gases.

A. True B. False

Chloramine Section

11. _____: $NH_3 + HOCl \rightarrow NH_2Cl + H_2O$

A. Free chlorine C. Monochloramine
B. Dichloramine D. None of the above

12. Free chlorine reacts with the chloramine to produce hydrogen ion, water, and _____which will come out of solution. In the case of the monochloramine, the following reaction occurs: $2NH_2Cl + HOCl \rightarrow N_2 + 6HCl + H_2O$

A. Nitrogen gas C. Ammonia
B. Hydrogen D. None of the above

Understanding Water Disinfection

Wastewater Disinfection

13. There are several chemicals and processes that will_____, but none are universally applicable as with chlorine.

A. Limit the effects of organic material C. Disinfect wastewater
B. Limit the travel of pathogens D. None of the above

Water Disinfection

14. Disinfection is usually the final stage in the water treatment process in order to limit the effects of organic material, suspended solids and_____.

A. Organic material C. Residual level of disinfection
B. Other contaminants D. None of the above

Emergency Procedures
15. Emergency procedures in the case of a large uncontrolled chlorine leak: Notify local emergency response team, warn and evacuate people in adjacent areas, be sure that no one enters the leak area without adequate self-contained breathing equipment.
A. True B. False

Chapter 7- Safety and Chlorination Equipment Section

1. Which of the following, which is the mechanical gas proportioning equipment, may or may not be located inside the chlorine room?
A. Gas vacuum line C. The chlorinator
B. Compound loop D. None of the above

Capacity
2. Which of the following shall have the capacity to dose enough chlorine to overcome the demand and maintain the required concentration of the "free" or "combined" chlorine?
A. The chlorinator C. Constant pre-established dosage
B. Automatic proportional control D. None of the above

Methods of Control
3. Which of the following shall be automatic proportional controlled, automatic residual controlled, or compound loop controlled?
A. A chlorine feed system C. Constant pre-established dosage
B. Constant flow rate(s) D. None of the above

Standby Provision
4. As a safeguard against_____ , standby chlorination equipment having the capacity to replace the largest unit shall be provided.
A. Uninterrupted chlorination C. Malfunction and/or shut-down
B. Constant flow rate(s) D. None of the above

Chlorine Room Design Requirements
5. Where gas chlorination is practiced, the gas cylinders and/or the ton containers up to the vacuum regulators shall be housed in a gas-tight, well illuminated, corrosion resistant and _____ventilated enclosure.
A. Mechanically C. Automatic chlorine leak detection
B. Securely positioned D. None of the above

6. _____ should be outside the room at all entrance or viewing points and a clear wire-reinforced glass window shall be installed in such a manner as to allow the operator to inspect from the outside of the room.
A. Separate switches for fans and lights C. Automatic chlorine leak detection
B. Chlorine room ventilation system D. None of the above

Storage of Chlorine Cylinders
7. Which chlorine safety related equipment term shall have provision for ventilation at thirty air changes per hour?
A. Cylinders or containers access C. The chlorine gas storage room
B. Scrubber(s) D. None of the above

Scrubbers

8. Facilities located within residential or densely populated areas, consideration shall be given to provide _____ for the chlorine room.

A. Plan of attack
B. Scrubber(s)
C. Chlorine dozing plan
D. None of the above

Chlorine Health Hazard Section

9. Which term expresses low levels of chlorine results in eye, nose, and throat irritation, sneezing, excessive salivation, general excitement, and restlessness?

A. Rambling
B. Acute exposure
C. Chronic exposure
D. None of the above

Inhalation

10. The nose and throat may become irritated; a stinging and burning sensation may be experienced. Immediate fatalities can occur as a result of suffocation. Delayed fatalities can occur as a result of pulmonary edema (fluid in the lungs). For this reason, rest and immediate attention after inhalation is important.

A. True B. False

11. If breathing has stopped, give artificial respiration; if breathing is difficult, give oxygen if equipment and trained personnel are available. If exposed person is breathing, place in a comfortable position and keep person warm and at rest until medical assistance becomes available.

A. True B. False

Pre-hospital Management

12. Rescue personnel are at low risk of noncardiogenic pulmonary edema contamination from victims who have been exposed only to gases released from hypochlorite solutions. However, clothing or skin soaked with industrial-strength bleach or similar solutions may be corrosive to rescuers and may release harmful gases.

A. True B. False

13. Ingestion of hydrochlorite solutions rarely causes pain in the mouth or throat, dysphagia, stridor, drooling, odynophagia, and vomiting.

A. True B. False

14. Chronic exposure to gases released from ammonia solutions can cause coughing, eye and nose irritation, lacrimation, and a burning sensation in the chest.

A. True B. False

Rescuer Protection

15. Hypochlorite is irritating to the skin and eyes and in some cases may release toxic gases.

A. True B. False

Chapter 8- Alternative Disinfection Section

Chlorine Dioxide Section

1. Which compound is pumped into the stream and allowed to react in a generating column to produce ClO_2?

A. Hypochlorous acid C. Sodium chlorite
B. Chlorine dioxide D. None of the above

2. The effects of _____on hypochlorous acid and its reactivity with a variety of compounds both combine to vastly diminish its effectiveness in contaminated, high-pH cooling water systems.

A. THM precursor(s) C. pH
B. Chlorine dioxide D. None of the above

Ultraviolet Disinfection

3. The microorganisms spend maximum time and contact with the outside of the quartz tube and the source of the?

A. UV rays C. Electromagnetic energy
B. Radiation D. None of the above

4. Because of the great electrical consumption of this system, combined with the cost of routine replacement of _____, should be considered against other systems.

A. UV capacitor C. Ballasts and shields
B. UV Flux D. None of the above

5. Which term represents the transfer of electromagnetic energy from a mercury arc lamp to a pathogen's DNA material, thus affecting its ability to replicate itself?

A. Transfer C. Electromagnetic energy
B. UV disinfection D. None of the above

Strongest Oxidizing Agent

6. Liquid Ozone is very unstable and can readily explode. As a result, it is not shipped and must be manufactured on-site.

A. True B. False

7. Ozone is a very effective disinfectant for both Giardia and viruses

A. True B. False

8. Ozone has a _____similar to that sometimes noticed during and after heavy electrical storms. In use, ozone breaks down into oxygen and nascent oxygen.

A. Self-policing pungent odor C. Pleasant odor of rain
B. H_2S odor D. None of the above

9. Ozone does not provide a system residual and should be used as a primary disinfectant only in conjunction with?

A. Dry sodium chlorite C. Free and/or combined chlorine
B. Chlorine dioxide D. None of the above

Alternate Disinfectants Section Summary
Chloramines
10. It is recommended that Chloramine be used in conjunction with a stronger disinfectant. It is best utilized as a?
A. Chloramine C. Stable distribution system disinfectant
B. T10 value disinfectant D. None of the above

Chlorine Dioxide
11. Which term provides good Giardia and virus protection but its use is limited by the restriction on the maximum residual of 0.5 mg/L ClO_2/chlorite/chlorate allowed in finished water?
A. Chlorinated byproducts C. Ammonia residual(s)
B. Chlorine dioxide D. None of the above

12. If chlorine dioxide is being used as an oxidant, the preferred method of generation is to entrain this term or substance into a packed reaction chamber with a 25% aqueous solution of sodium chlorite ($NaClO_2$).
A. Chloramine C. Chlorine dioxide
B. Chlorine gas D. None of the above

Ozone
13. Which term must be determined for the ozone basin alone; an accurate T10 value must be obtained for the contact chamber, residual levels measured through the chamber and an average ozone residual calculated?
A. Ozone CT (Contact time) C. Free and/or combined chlorine
B. Residual levels D. None of the above

14. Ozone does not provide a system residual and should be used as a primary disinfectant only in conjunction with free and/or combined chlorine.
A. True B. False

15. Ozone may also be used as _____for removal of taste and odor, or may be applied as a pre-disinfectant.
A. An oxidant C. System residual
B. Reducer D. None of the above

Chapter 9- Respiratory Protection Chapter

Types of Respirators- Commonly Used Respirators (Air Purifying)
1. Dust masks cannot be fit tested, are generally single use, are not recognized as proper respiratory protection, and may not be worn if a _____exists.
A. Proper respirator C. Potential for overexposure
B. Maximum concentration D. None of the above

2. _____ have interchangeable filter cartridges and can protect the respiratory system from hazardous dusts, fumes, mists, etc.
A. Air-Line Respirators C. Half-Face Respirators
B. Full-Face Respirators D. None of the above

Less Commonly Used Types Respirators (Air Supplying)

3. _____ supply clean air to the wearer through a small diameter hose from a compressor or compressed air cylinders. Because the wearer must be attached to the hose at all times, mobility is limited.

A. Air-Line Respirators
B. Full-Face Respirators
C. Disposable Dust masks
D. None of the above

Who Cannot Wear a Respirator?

4. Respirators cannot be worn when a person wears _____ that interferes with the seal of the face piece.

A. Clothing
B. Other equipment
C. Glasses or personal protective equipment
D. None of the above

Staying Prepared for Respirator Use

5. Getting used to respirators takes practice. Possible problems with wearing respirators may include heat exhaustion or heat stroke.

A. True B. False

Using up the air supply

6. When using a _____, keep checking the gauges and listening for alarms. Be ready to leave the area immediately if there is a problem.

A. Gas meter
B. SCBA
C. Dust mask
D. None of the above

Panic

7. Air monitoring is important when working in a hot, stressful, or awkward situation.

A. True B. False

Cleaning Respirators

8. Respirators stored for emergency use must be inspected _____ when not in use, and also after each use.

A. Monthly
B. Weekly
C. Annually
D. None of the above

Operating Procedures

9. _____ must be accurate and must be written in easily understood language. Technical jargon should be avoided. Translations must be supplied if necessary.

A. Permits
B. Performance reviews
C. Operating procedures
D. None of the above

Contractor Employees

10. According to the text, process safety training and _____ are also required for contractors who work on-site.

A. Logs
B. Safety performance
C. Safety programs
D. None of the above

The Contractor has Responsibilities, too

11. The Contractor must document that employees are trained to _____ and to follow safe work practices on the job.

A. Recognize hazards C. Follow orders
B. Work efficiently D. None of the above

Written Respiratory Protection Program

12. The respirator protection program must be administered by _____.

A. Attendants C. A suitably trained program administrator
B. Entrants D. None of the above

Gas and Vapor Contaminants

13. According to the text, gas and vapor contaminants can be classified according to their _____.

A. Chemical characteristics C. Toxic level
B. Hazard risk D. None of the above

14. Alkaline gases such as ammonia and phosphine exist as alkalis or _____.

A. Metals attached to organic groups C. Produce alkalis by reaction with water
B. Pollutants D. None of the above

Hazard Assessment

15. The first important step to protection is _____.

A. Research C. Proper assessment of the hazard
B. An atmosphere's oxygen content D. None of the above

Chapter 10- Lab Analyst Section

1. Turbidity is measured to evaluate the performance of _____.

A. Water treatment plant(s) C. Colloidal to coarse dispersions
B. An aesthetic point D. None of the above

2. Turbidity is caused by wide variety of suspended matter that range in size from colloidal to coarse dispersions, depending upon the_____, and ranges from pure inorganic substances to those that are highly organic in nature.

A. Water treatment plant(s) C. Degree of turbulence
B. An aesthetic point D. None of the above

3. Turbid waters are undesirable from _____ of view in drinking water supplies.

A. Water treatment plant(s) C. Colloidal to coarse dispersions
B. An aesthetic point D. None of the above

Surface Water (SW) System Compliance

4. Sample the _____ at the clear well

A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

5. 0.34 NTU in _____, never to exceed 1.0 NTU spike

A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

6. Sample turbidity at each _____
A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

Disinfection Key
7. 99.9% or 3 log inactivation of _____
A. Crypto C. Giardia lamblia cysts
B. Enteric viruses D. None of the above

Turbidity Key
8. Turbidity is normally measured in mg/L and its size is measured in multimeters.
A. True B. False

9. Turbidity can be particles in the water consisting of finely divided solids, larger than bacteria, visible by the naked eye; ranging in size from 10 to 150mm.
A. True B. False

Cloudy Water
10. In order to have gravity affect these particles, we must somehow make them larger, somehow have them come together (agglomerate); in other words, somehow make them "stick" together, thereby increasing their size and mass.
A. True B. False

Method 1623 - Cryptosporidium and Giardia Analysis
11. Special sterilization procedures are needed for equipment used in the collection of samples for?
A. Total Organisms C. Indicator bugs
B. Cryptosporidium and Giardia D. None of the above

Laboratory Analysis
QA/QC Activities and Measures
12. QA/QC activities and measures to take to reduce contamination.
Use a sterilization indicator, such as autoclave tape, in preparing viral plaques and other equipment for collection of microbiological samples to determine whether adequate temperatures and pressures have been attained during autoclaving.
A. True B. False

13. Prepare a separate set of E. coli host cultures for microbiological sampling at each site.
A. True B. False

Field personnel should do the following:
14 Prepare _____, a 50- to 100-mL aliquot of sterile buffered water plated before the sample—for every sample by field personnel for total coliform, E. coli, and enterococci analyses to determine the sterility of equipment and supplies.
A. Reagent water quality C. An MF equipment blank
B. An environmental sample D. None of the above

Quality Assurance and Quality Control in the Laboratory

15. According to the text, microbiology laboratories must follow good laboratory practices—cleanliness, safety practices, procedures for_____, specifications for reagent water quality—as set forth by American Public Health Association.

A. Reagent water quality
B. Microbiological sampling
C. Media preparation
D. None of the above

Disinfection Principles CEU Course Assignment- Number 2

The Disinfection Principles CEU Assignment is available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e-mail it back to TLC.

You will have 90 days from 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. 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 manual and make copy for yourself.

Multiple Choice, please select only one answer per question. There are no intentional trick questions.

Hazard Communication Section

1. Chemical manufacturers and importers are required to evaluate the hazards of the chemicals they produce or import, and prepare labels and safety data sheets to convey the hazard information to their downstream customers;
A. True B. False

2. OSHA's HazCom rule has significant new requirements that will require employers to train their employees how to read and interpret the?
A. New SDS C. Hazards of chemicals
B. Hazard information D. None of the above

More on the Revised Hazard Communication Standard

3. Which of the following will provide a common and coherent approach to classifying chemicals and communicating hazard information on labels and safety data sheets?
A. SDS/MSDS C. Hazard Communication Standard (HCS)
B. Safety data sheets and labels D. None of the above

Rationale

4. In order to ensure _____ in the workplace, information about the identities and hazards of the chemicals must be available and understandable to workers.
A. Chemical safety C. Hazardous chemicals
B. Hazard information D. None of the above

5. Chemical manufacturers and importers are required to evaluate the_____ they produce or import, and prepare labels and safety data sheets to convey the hazard information to their downstream customers.
A. Specific criteria C. Hazard communication elements
B. Hazards of the chemicals D. None of the above

Major changes to the Hazard Communication Standard

6. Which of the following provides specific criteria for classification of health and physical hazards, as well as classification of mixtures?
A. Hazard classification C. Hazard communication elements
B. Safety data sheets and labels D. None of the above

7. Labels: Chemical manufacturers and importers will be required to provide a label that includes a harmonized signal word, pictogram, and hazard statement for each?
A. Specific, detailed criteria C. Hazard class and category
B. Standardized label elements D. None of the above

What is the Globally Harmonized System?
8. The result of this negotiation process is the United Nations' document entitled "Globally Harmonized System of Classification and Labeling of Chemicals," commonly referred to as?
A. Revised HCS C. The Purple Book
B. Model regulation D. None of the above

What Hazard Communication Standard provisions are unchanged in the revised HCS?
9. Which of the following has been changed to "hazard classification" and "material safety data sheet" was changed to "safety data sheet?"
A. Revised HCS C. Hazard determination
B. Model regulation D. None of the above

1.1 What is the GHS?
10. The GHS is a system for _____ the classification and labeling of chemicals. It is a logical and comprehensive approach to: Defining health, physical and environmental hazards of chemicals;
A. Multiple safety data sheets C. Standardizing and harmonizing
B. Hazards to human health D. None of the above

11. The GHS Document thus provides countries with the regulatory building blocks to develop or modify existing national programs that address classification of hazards and transmittal of information about those hazards and associated protective measures. This helps to ensure the safe use of chemicals as they move through the _____ from "cradle to grave."
A. Product life cycle C. Hazardous properties of chemicals
B. Hazards to human health D. None of the above

1.7 What are the benefits?
12. The basic goal of _____ - is to ensure that employers, employees and the public are provided with adequate, practical, reliable and comprehensible information.
A. Achieve a global approach C. Preventive and protective measures
B. Hazard communication D. None of the above

3.0 What is Classification?
13. For several hazards _____- are semi-quantitative or qualitative. Expert judgment may be required to interpret these data.
A. The global approaches C. The GHS criteria
B. The regulatory changes D. None of the above

Hazard Classification
14. Tests that determine hazardous properties conducted according to internationally recognized scientific principles can be used for purposes of?
A. Hazard classification C. Existing hazard communication regulatory schemes
B. Safety Data Sheets D. None of the above

15. Which of the following is used to indicate that only the intrinsic hazardous properties of substances and mixtures are considered?
A. Self-classification C. GHS labels and/or Safety Data Sheets
B. Hazard classification D. None of the above

(S) Means the answer can be plural or singular in nature

Chapter 2- Waterborne Pathogens Section

Primary Waterborne Diseases Section
1. Legionnaire's disease, which causes a severe pneumonia, and the second, _____, which is a non-pneumonia illness; it's typically an influenza-like illness, and it's less severe.
A. Pontiac fever C. Typhoid fever
B. Yellow fever D. None of the above

2. Cryptosporidium, prevention. Prevention strategies for this pathogen include source protection. A CT value of 50 is required when dealing with fecally accidents. CT equals a concentration, in parts per million, while time equals a contact time in minutes.
A. True B. False

3. Schistosomatidae prevention strategies for this pathogen include placing boric acid on berms or interrupting the life cycle of the parasite by treating birds with a lead.
A. True B. False

Waterborne Bacterial Diseases
4. Campylobacteriosis is the most common diarrheal illness caused by bacteria. Other symptoms include abdominal pain, malaise, fever, nausea and vomiting; and begin three to five days after exposure. The illness is frequently over within two to five days and usually lasts no more than 10 days.
A. True B. False

Dangerous Waterborne Microbes
5. Which of the following are Gram-negative, non-spore-forming, facultatively anaerobic, non-motile bacteria.
A. Fecal coliform bacteria C. Shigellae
B. Cryptosporidium D. None of the above

6. Which of the following are microscopic organisms that live in the intestines of warm-blooded animals? They also live in the waste material, or feces, excreted from the intestinal tract. When fecal coliform bacteria are present in high numbers in a water sample, it means that the water has received fecal matter from one source or another.
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

7. Which of the following is a parasite that enters lakes and rivers through sewage and animal waste. It causes cryptosporidiosis, a mild gastrointestinal disease. The disease can be severe or fatal for people with severely weakened immune systems.
A. Coliform Bacteria C. Giardia lamblia
B. Cryptosporidium D. None of the above

8. Which of the following are not necessarily agents of disease may indicate the presence of disease-carrying organisms?
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

9. Which of the following is a parasite that enters lakes and rivers through sewage and animal waste. It causes gastrointestinal illness (e.g. diarrhea, vomiting, and cramps)?
A. Coliform Bacteria C. Protozoa
B. Cryptosporidium D. None of the above

10. Which of the following is a species of the rod-shaped bacterial genus Shigella?
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

11. Which of the following can cause bacillary dysentery?
A. Fecal coliform bacteria C. Shigella
B. Cryptosporidium D. None of the above

12. Which of the following are common in the environment and are generally not harmful? However, the presence of these bacteria in drinking water are usually a result of a problem with the treatment system or the pipes which distribute water, and indicates that the water may be contaminated with germs that can cause disease.
A. Coliform Bacteria C. Giardia lamblia
B. Cryptosporidium D. None of the above

13. Which of the following are bacteria whose presence indicates that the water may be contaminated with human or animal wastes? Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms.
A. Fecal Coliform and E. coli C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

Bacteriological Monitoring Introduction
14. Which of the following are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media?
A. Indicator bacteria C. Viruses
B. Amoebas D. None of the above

15. Indicators in common use today for routine monitoring of drinking water include total coliforms, fecal coliforms, and?
A. Cryptosporidium C. Escherichia coli (E. coli)
B. Protozoa D. None of the above

(S) Means the answer can be plural or singular in nature

Chapter 3- Disinfection Rule Section

EPA's Drinking Water Regulations for Disinfectants

1. Oxidation reactions are where chlorine _____compounds present in water.

A. Reduces C. Oxidizes
B. Forms D. None of the above

Public Health Concerns

2. Which of the following rules and Disinfection Byproduct Rule updates and supersedes the 1979 regulations for total trihalomethanes?

A. DBPs C. The Stage 1 Disinfectant
B. The LT2 requirements D. None of the above

Stage 2 DBP Rule Federal Register Notices

3. There are specific microbial pathogens, such as_____, which can cause illness, and are highly resistant to traditional disinfection practices.

A. Enteric virus(es) C. C. perfringens
B. Cryptosporidium D. None of the above

4. The Stage 1 Disinfectants and Disinfection Byproducts Rule and_____, promulgated in December 1998.

A. The Stage 2 DBPR C. Interim Enhanced Surface Water Treatment Rule
B. SDWA D. None of the above

5. The Stage 2 Disinfectants and Disinfection Byproducts Rule builds upon the _____to address higher risk public water systems for protection measures beyond those required for existing regulations.

A. Stage 2 DBPR C. Long Term 2 Enhanced Surface Water Treatment Rule
B. Stage 1 DBPR D. None of the above

6. Which of the following rules and the Long Term 2 Enhanced Surface Water Treatment Rule are the second phase of rules required by Congress?

A. The Stage 2 DBPR C. Primary or residual disinfectant
B. This final rule D. None of the above

7. Stage 2 Disinfection Byproducts Rule strengthens public health protection for customers by tightening _____for two groups of DBPs, trihalomethanes and haloacetic acids.

A. Primary or residual disinfectant C. Compliance monitoring requirements
B. Major public health advances D. None of the above

Are THMs and HAAs the only disinfection byproducts?

8. The presence of _____is representative of the occurrence of many other chlorination DBPs; thus, a reduction in the TTHM and HAA5 generally indicates a reduction of DBPs from chlorination.

A. Chlorine and chloramine C. TTHM and HAA5
B. Classes of DBPs D. None of the above

Chlorine By-Products

9. The most common chlorination by-products found in U.S. drinking water supplies are?

A. Chlorate and Chlorite
B. Trihalomethanes (THMs)
C. Ammonia and THMS
D. None of the above

The Principal Trihalomethanes are:

10. THM levels are also low when wells or large lakes are used as the drinking water source, because organic matter concentrations are generally low in these sources. The opposite — high organic matter concentrations and high THM levels — is true when rivers or other surface waters are used as the source of the drinking water.

A. True B. False

Health Effects

11. The available studies on health effects do not provide conclusive proof of a relationship between exposure to THMs and cancer or reproductive effects, but indicate the need for further research to confirm their results and to assess the potential health effects of chlorination by-products other than THMs.

A. True B. False

Risks and Benefits of Chlorine

12. _____ is a highly effective disinfectant, it breaks down quickly, so that small amounts of _____ or other disinfectants must be added to the water to ensure continued disinfection as the water is piped to the consumer's tap.

A. Ozone, Chlorine
B. Chlorite, Chlorine
C. Chlorine Dioxide, Chlorine
D. None of the above

13. Modifying water treatment facilities to use _____ can be expensive, and _____ treatment can create other undesirable by-products that may be harmful to health if they are not controlled (e.g., bromate).

A. Ozone, Chlorine
B. Chlorite, Chlorine
C. Ozone, Ozone
D. None of the above

14. Which term is a weaker disinfectant than chlorine, especially against viruses and protozoa; however, they are very persistent and, as such, can be useful for preventing re-growth of microbial pathogens in drinking water distribution systems?

A. UV
B. Chlorite
C. Chloramines
D. None of the above

15. Chlorine dioxide can be an effective disinfectant, but it forms?

A. Chlorate and Chlorite
B. THMS
C. Chloramines
D. None of the above

Chapter 4- Water Chemistry Section

pH Testing Section

1. Pure water has a pH very close to?
A. 7 C. 7.7
B. 7.5 D. None of the above

2. When an atom loses _____and thus has more protons than electrons, the atom is a positively-charged ion or cation.
A. A proton C. An electron
B. Charge D. None of the above

3. _____ are determined using a concentration cell with transference, by measuring the potential difference between a hydrogen electrode and a standard electrode such as the silver chloride electrode.
A. Primary pH standard values C. pH measurement(s)
B. Alkalinity D. None of the above

4. Mathematically, pH is the negative logarithm of the activity of the (solvated) hydronium ion, more often expressed as the measure of the?
A. Electron concentration C. Hydronium ion concentration
B. Alkalinity concentration D. None of the above

5. pH 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. Acid-base behavior D. None of the above

6. Which of the following terms may be used to measure pH, by making use of the fact that their color changes with pH?
A. Indicators C. A set of non-linear simultaneous equations
B. Spectrophotometer D. None of the above

7. Measurement of pH for aqueous solutions can be done with a glass electrode and a pH meter, or using indicators like strip test paper.
A. True B. False

8. The calculation of the pH of a solution containing acids and/or bases is an example of a chemical speciation calculation, that is, a mathematical procedure for calculating the concentrations of all chemical species that are present in the solution. The complexity of the procedure depends on the?
A. Nature of the solution C. Alkaline earth metal concentrations
B. pH D. None of the above

9. Alkalinity of water is its acid-neutralizing capacity. It is the sum of all the titratable bases. The measured value may vary significantly with the?
A. End-point pH C. pH measurement(s)
B. Alkalinity D. None of the above

10. 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. The pH of a solution containing a weak base may require the?
A. Solution of a cubic equation C. Excess of alkaline earth metal concentrations
B. Non-linear simultaneous equations D. None of the above

11. Since pH is a logarithmic scale, a difference of one pH unit is equivalent to _____ fold difference in hydrogen ion concentration
A. 1 C. 10
B. .1 D. None of the above

Halogens- Halides
12. What is the negative ion often referred to as?
A. A halide proton C. Diatomic Compound
B. A halide ion D. None of the above

13. Which of the following terms contains ions known as halides?
A. Salts C. Hydrastatic acid
B. Organic halides D. None of the above

14. Halide ions combined with single hydrogen atoms form the hydrohalic acids (i.e., HF, HCl, HBr, HI), a series of particularly strong acids, one being?
A. Salts C. Hydrastatic acid
B. Organic halides D. None of the above

15. Many synthetic organic compounds such as plastic polymers, and a few natural ones, contain halogen atoms; these are known as halogenated compounds or?
A. Salts C. Hydrastatic acid
B. Organic halides D. None of the above

Chapter 5 -Chlorine Section

Chlorine Gas Appearance and Odor
1. Chlorine is a greenish-yellow gas it will condense to an amber liquid at about _____F or at high pressures.
A. 32 degrees C. 29 degrees
B. -29.2 degrees D. None of the above

Reactivity
2. Cylinders of chlorine may burst when exposed to elevated temperatures. When there is Chlorine in solution, this forms?
A. Hydrogen sulfide C. A corrosive material
B. Oxomonosilane D. None of the above

Flammability
3. When there is a fire that involves chlorine, the firefight should be fought downwind from the minimum distance possible.
A. True B. False

What Happens to Chlorine When it Enters the Environment?

4. When chlorine is released to soil, chlorine will react with moisture forming free unstable oxygen radicals.

A. True B. False

Chlorine Exposure Limits

5. Chlorine's Physical and chemical properties: A yellowish green, nonflammable and liquefied gas with an unpleasant and irritating smell.

A. True B. False

6. OSHA PEL is?

A. 10 PPM C. 1,000 PPM
B. 1 PPM D. None of the above

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

A. 1.5 C. 2.5
B. 0.5 D. None of the above

8. Cl_2 IDLH is?

A. 10 PPM C. 1,000 PPM
B. 0.1 PPM D. None of the above

Properties

9. Because it is highly reactive, chlorine is usually found in nature bound with other elements like sodium, potassium, and magnesium.

A. True B. False

10. Various states of chlorine includes when chlorine is isolated as a free element, chlorine is a greenish yellow gas, which is_____. It turns to a liquid state at -34°C (-29°F), and it becomes a yellowish crystalline solid at -103°C (-153°F).

A. 2.5 times heavier than water C. 2.5 times heavier than air
B. 2.5 times lighter than air D. None of the above

Chlorine Gas Introduction

11. When chlorine is added into the water stream, chlorine hydrolyzes into?

A. HCL C. Hypochlorous acid (HOCl), and hydrochloric acid (HCl)
B. Bromoform D. None of the above

12. Chlorine can be non-selective, making it very sensitive to contamination from either cooling water makeup or from in-plant process leaks._____, organic acids and organic compounds, sulfides, iron and manganese all easily react with HOCl.

A. Ammonia C. Chlorine gas
B. Sodium hypochlorite D. None of the above

Chlorine Gas- Pathophysiology

13. As far as chlorine safety and respiratory protection, the intermediate _____of chlorine accounts for its effect on the upper airway and the lower respiratory tract.

A. Effects of Hydrochloric acid C. Water solubility
B. Vapor from Chlorine gas D. None of the Above

Early Response to Chlorine Gas
14. If you mix ammonia with chlorine gas, this compound reacts to form_____.
A. Chloramine gas C. Sulfuric gas
B. Chlorine gas D. None of the Above

Chlorine's Effectiveness
15. The effectiveness of chlorination depends on the _____ of the water, the concentration of the chlorine solution added, the time that chlorine is in contact with the organism, and water quality.
A. Chlorine residual C. Breakpoint
B. Chlorine demand D. None of the above

Chapter 6- Hypochlorites and Chloramines

Hypochlorites
1. Hypochlorites are calcium or sodium salts of hypochlorous acid and are supplied either dry or in liquid form (as, for instance, in commercial bleach). The same residuals are obtained as with gas chlorine, but the effect on the _____of the treated water is different.
A. Temperature C. Negative charge
B. pH D. None of the above

2. Hypochlorite compounds contain an excess of _____and tend to raise the pH of the water.
A. Acid C. Hypochlorite compounds
B. Alkali D. None of the above

3. _____is the only liquid hypochlorite disinfectant in current use. There are several grades and proprietary forms available.
A. High-test calcium hypochlorite(s) C. Sodium hypochlorite
B. Calcium hypochlorite tablets D. None of the above

Emergency Procedures
4. Emergency procedures in the case of a large uncontrolled chlorine leak: Notify local emergency response team, warn and evacuate people in adjacent areas, be sure that no one enters the leak area without adequate self-contained breathing equipment.
A. True B. False

5. Safety precautions when using chlorine gas: In addition to protective clothing and goggles, chlorine gas should be used only in a well-ventilated area so that any leaking gas cannot concentrate.
A. True B. False

6. 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

7. Monochloramine, Dichloramine, and trichloramine are known as _____. $Cl_2 + NH_4$.
A. Hydrochlorous acid C. Combined Available Chlorine
B. Hypochlorous acid D. None of the above

Summary

Disinfection Byproducts

8. Which term represents when disinfectants used in water treatment plants react with bromide and/or natural organic matter present in the source water?

A. Disinfection byproducts
B. Naturally occurring bromide
C. Occurring organic and inorganic matter in water
D. None of the above

9. Which term represents which regulations have been established have been identified in drinking water, including trihalomethanes, haloacetic acids, bromate, and chlorite?

A. Chlorine dioxide
B. HAA5
C. Disinfection byproducts
D. None of the above

Trihalomethanes (THM)

10. Which term represents are chloroform, bromodichloromethane, dibromochloromethane, and bromoform?

A. Chloroform
B. HAA5
C. Trihalomethanes
D. None of the above

Haloacetic Acids (HAA5)

11. Which term represents substances in drinking water react with naturally occurring organic and inorganic matter in water?

A. Disinfection byproducts
B. Microbial contaminants
C. Occurring organic and inorganic matter in water
D. None of the above

12. Which term represents monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid?

A. Chlorine dioxide
B. HAA5
C. Chlorite
D. None of the above

Chloroform

13. Chloroform is typically the most prevalent _____ measured in chlorinated water, is probably the most thoroughly studied disinfection byproduct.

A. HAA5
B. THM
C. Folic Acid
D. None of the above

Sodium Chlorate

14. Sodium Chlorate can also be synthesized by passing _____into a hot sodium hydroxide solution. It is then purified by crystallization.

A. Chlorate
B. Oxygen
C. Chlorine gas
D. None of the above

Chloramines

15. What are chemical compounds formed by combining a specific ratio of chlorine and ammonia in water?

A. Disinfection byproducts
B. Chloramines
C. Trihalomethanes, haloacetic acids, bromate, and chlorite
D. None of the above

Chapter 7- Safety and Chorination Section

Chlorination Equipment Requirements

1. Which of the following shall also be located inside the chlorine room?

A. Gas vacuum line
B. Vacuum regulators
C. Mechanical gas proportioning equipment
D. None of the above

2. Which of the following shall have positive shutdown in the event of a break in the downstream vacuum lines?

A. Gas vacuum line
B. The vacuum regulating valve(s)
C. A gas pressure relief system
D. None of the above

Methods of Control

3. Which piece of chlorination equipment adjusts the chlorine feed rate automatically in accordance with the flow changes to provide a constant pre-established dosage for all rates of flow?

A. Manual chlorine feed valve
B. Constant flow rate(s)
C. Automatic proportional control
D. None of the above

Standby Provision

4. Which of the following chlorine alarm equipment shall be installed at all water treatment plants using chlorine gas?

A. Caustic soda solution reaction alarms
B. Corrosion detection
C. Automatic chlorine leak detection
D. None of the above

Chlorine Room Design Requirements

5. Where gas chlorination is practiced, the gas cylinders and/or the ton containers up to the vacuum regulators shall be housed in a gas-tight, well illuminated, corrosion resistant and _____ventilated enclosure.

A. Mechanically
B. Securely positioned
C. Automatic chlorine leak detection
D. None of the above

6. _____ shall be protected to ensure that the chlorine maintains its gaseous state when entering the chlorinator.

A. Cylinders or containers
B. Panic system
C. Equipment
D. None of the above

Storage of Chlorine Cylinders

7. Which chlorine safety related equipment term shall have provision for ventilation at thirty air changes per hour?

A. Cylinders or containers access
B. Scrubber(s)
C. The chlorine gas storage room
D. None of the above

Scrubbers

8. Chlorine combines with a wide variety of materials. These side reactions complicate the use of chlorine for disinfecting purposes, their _____must be satisfied before chlorine becomes available to accomplish disinfection.

A. Combined residual
B. Free chlorine residual
C. Demand for chlorine
D. None of the above

Chlorine Health Hazard Section

9. Which term expresses low levels of chlorine gas can result in a dermatitis known as chloracne, tooth enamel corrosion, coughing, sore throat, hemoptysis and increased susceptibility to tuberculosis?

A. Rambling C. Chronic exposure
B. Acute exposure D. None of the above

Inhalation

10. The nose and throat may become irritated; a stinging and burning sensation may be experienced. Immediate fatalities can occur as a result of suffocation. Delayed fatalities can occur as a result of pulmonary edema (fluid in the lungs). For this reason, rest and immediate attention after inhalation is important.

A. True B. False

11. Liquid and concentrated gas will produce severe burns and injury on contact.

A. True B. False

Pre-hospital Management

12. Rescue personnel are at low risk of noncardiogenic pulmonary edema contamination from victims who have been exposed only to gases released from hypochlorite solutions. However, clothing or skin soaked with industrial-strength bleach or similar solutions may be corrosive to rescuers and may release harmful gases.

A. True B. False

13. Ingestion of hydrochlorite solutions rarely causes pain in the mouth or throat, dysphagia, stridor, drooling, odynophagia, and vomiting.

A. True B. False

Rescuer Protection

14. Positive-pressure, self-contained breathing apparatus (SCBA) is recommended in response to situations that involve exposure to potentially unsafe levels of Chlorine gas.

A. True B. False

15. Chemical-protective clothing is not necessary for direct contact with solid hypochlorite or concentrated solutions.

A. True B. False

Chapter 8- Alternative Disinfection Section

Chlorine Dioxide Section

1. ClO_2 generation uses _____ and chlorine gas.
A. Sodium chlorite ($NaClO_2$) C. Ozone
B. Hypochlorous acid D. None of the above

2. Chlorine gas is educted into a motive water stream in a ClO_2 generator forming?
A HOCl and HCl C. Sodium thiosulfate
B. Chlorine dioxide D. None of the above

3. Which of the following compound(s) under efficient generation, THMs are not formed and THM precursor(s) are reduced. In one application, THM formation was reduced from 34 m g/l to 1 m g/l?
A. ClO_2 C. Sodium chlorate ($NaClO_3$) and sulfuric acid
B. $NaClO_2$ D. None of the above

4. Which of the following compound(s) is formed from the dissolution of chlorine gas or sodium hypochlorite in water, has satisfactorily controlled microorganisms in cooling water systems?
A. Hydrochlorous acid C. Hypochlorous Acid
B. Chlorine gas D. None of the above

5. Which of the following compound(s) remains a gas in water, it does not have the corrosive tendencies of chlorine gas?
A. Sodium chlorite ($NaClO_2$) C. Sodium chlorate ($NaClO_3$)
B. Chlorine dioxide or ClO_2 D. None of the above

6. Which of the following compound(s) tends to be much less, if not totally non-reactive, with many organic and inorganic compounds.
A. ClO_2 C. Sodium chlorite ($NaClO_2$)
B. Hypochlorous acid D. None of the above

7. Which of the following compound(s) is much less aggressive to traditional corrosion inhibitors?
A. Chlorine gas C. NaOCl and HCl
B. Chlorine dioxide or ClO_2 D. None of the above

8. Which compound is a yellow-green gas with an irritating odor not unlike Chlorine?
A. Chlorine C. Ozone
B. Chlorine dioxide D. None of the above

Ultraviolet Disinfection

9. The microorganisms spend maximum time and contact with the outside of the quartz tube and the source of the?
A. UV rays C. Electromagnetic energy
B. Radiation D. None of the above

10. Which term represents the transfer of electromagnetic energy from a mercury arc lamp to a pathogen's DNA material, thus affecting its ability to replicate itself?
A. Transfer C. Electromagnetic energy
B. UV disinfection D. None of the above

Strongest Oxidizing Agent

11. Liquid Ozone is very unstable and can readily explode. As a result, it is not shipped and must be manufactured on-site.

A. True B. False

12. Ozone is a _____ gas at room temperature.

A. Reddish C. Light blue
B. Yellowish D. None of the above

Alternate Disinfectants Section Summary

Chloramines

13. In the production of _____, the ammonia residuals in the finished water, when fed in excess of stoichiometric amount needed, should be limited to inhibit growth of nitrifying bacteria.

A. Dry sodium chlorite C. Ammonia residual(s)
B. Chloramines D. None of the above

Chlorine Dioxide

14. Chlorine dioxide may be used for either taste or odor control or as a?

A. Chloramine C. Gas
B. Pre-disinfectant D. None of the above

Ozone

15. Which term must be determined for the ozone basin alone; an accurate T10 value must be obtained for the contact chamber, residual levels measured through the chamber and an average ozone residual calculated?

A. Ozone CT (Contact time) C. Free and/or combined chlorine
B. Residual levels D. None of the above

Chapter 9- Respiratory Protection Chapter

Types of Respirators- Commonly Used Respirators (Air Purifying)

1. _____ is a type of respirator worn over the nose and mouth to protect the respiratory system from certain nuisance dusts, mists, etc.

A. An Air-Line Respirator C. A Disposable Dust Mask
B. A Full-Face Respirator D. None of the above

2. _____ are similar to the half-face type, but they offer a better face piece fit and also protect the wearer's eyes from particularly irritating gases and vapors.

A. Air-Line Respirators C. Half-Face Respirators
B. Full-Face Respirators D. None of the Above

3. Full-face, helmet or hood type powered air purifying respirators (PAPRs) operate under positive pressure inside the face piece. A battery operated motor blower assembly forces air through a filter cartridge into the _____.

A. Wearer's breathing zone C. Proper respiratory protection
B. Maximum concentration D. None of the above

Less Commonly Used Types Respirators (Air Supplying)

4. Self-Contained Breathing Apparatus (SCBA) respirators supply clean air from a compressed air tank carried on the wearer's back. SCBA respirators are highly mobile and are used primarily for _____.

A. Proper respiratory protection
B. Maximum concentration
C. Emergency response or rescue work
D. None of the above

Respirator Filters/Cartridges

5. The cartridges used for _____ must be either equipped with an end-of-service life indicator (ESLI) or a cartridge change schedule has to be established.

A. Air-purifying respirators
B. Full-Face Respirators
C. Air-line Respirators
D. None of the above

Protection Factors

6. The protection factor of a respirator is based on the ratio of two concentrations: the _____ outside the respirator to the contaminant concentration inside the respirator.

A. Atmosphere
B. Oxygen
C. Contaminant concentration
D. None of the above

Who Cannot Wear a Respirator?

7. Respirators cannot be worn when a person wears _____ that interferes with the seal of the face piece.

A. Clothing
B. Other equipment
C. Glasses or personal protective equipment
D. None of the above

Staying Prepared for Respirator Use

8. Getting used to respirators takes practice. Possible problems with wearing respirators may include heat exhaustion or heat stroke.

A. True B. False

Using up the air supply

9. When using a _____, keep checking the gauges and listening for alarms. Be ready to leave the area immediately if there is a problem.

A. Gas meter
B. SCBA
C. Dust mask
D. None of the above

Panic

10. Air monitoring is important when working in a hot, stressful, or awkward situation.

A. True B. False

Cleaning Respirators

11. Respirators should be cleaned and disinfected once a year. Check the respirator for damage before wearing it.

A. True B. False

Operating Procedures
12. _____ must be accurate and must be written in easily understood language. Technical jargon should be avoided. Translations must be supplied if necessary.
A. Permits C. Operating procedures
B. Performance reviews D. None of the above

Contractor Employees
13. To further ensure contractor safety, managers must also evaluate the _____ to make sure they're living up to their safety obligations set by the OSHA standard,
A. Work progress C. Required training
B. Contractor's performance D. None of the above

The Contractor has Responsibilities, too
14. Contractors must make sure that their employees understand _____, are trained to work safely, and follow the safety rules of the facility in which they're working.
A. Time schedules C. The scope of the work
B. Potential job-related hazards D. None of the above

Written Respiratory Protection Program
15. The employer is required to develop and implement a written respiratory protection program with _____ and elements for required respirator use.
A. Gas and vapor contaminant limits C. Required worksite-specific procedures
B. Safety performance D. None of the above

Chapter 10- Lab Analyst Section

1. Turbidity is measured to evaluate the performance of _____.
A. Water treatment plant(s) C. Colloidal to coarse dispersions
B. An aesthetic point D. None of the above

2. Turbidity is caused by wide variety of suspended matter that range in size from colloidal to coarse dispersions, depending upon the_____, and ranges from pure inorganic substances to those that are highly organic in nature.
A. Water treatment plant(s) C. Degree of turbulence
B. An aesthetic point D. None of the above

3. Turbid waters are undesirable from _____ of view in drinking water supplies.
A. Water treatment plant(s) C. Colloidal to coarse dispersions
B. An aesthetic point D. None of the above

Surface Water (SW) System Compliance
4. Sample the _____ at the clear well
A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

5. 0.34 NTU in _____, never to exceed 1.0 NTU spike
A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

6. Sample turbidity at each _____
A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

Disinfection Key
7. 99% or 2 log inactivation of _____
A. Crypto C. Giardia lamblia cysts
B. Enteric viruses D. None of the above

8. The chlorine residual leaving the plant must be = or _____ mg/L and measurable throughout the system.
A. > 0.2 C. < 0.2
B. ≤ 0.2 D. None of the above

Turbidity Key
9. Turbidity can be particles in the water consisting of finely divided solids, larger than bacteria, visible by the naked eye; ranging in size from 10 to 150mm.
A. True B. False

10. In order to have gravity affect these particles, we must somehow make them larger, somehow have them come together (agglomerate); in other words, somehow make them "stick" together, thereby increasing their size and mass.
A. True B. False

Method 1623 - Cryptosporidium and Giardia Analysis
11. Washing the equipment free of residual sodium hypochlorite solution with three rinses of filter-sterilized water; do not de-chlorinate the equipment using?
A. Sodium thiosulfate C. Sodium hypochlorite solution
B. Sulfuric acid D. None of the above

Laboratory Analysis- QA/QC Activities and Measures
12. QA/QC activities and measures to take to reduce contamination.
Use a sterilization indicator, such as autoclave tape, in preparing viral plaques and other equipment for collection of microbiological samples to determine whether adequate temperatures and pressures have been attained during autoclaving.
A. True B. False

13. Prepare a separate set of E. coli host cultures for microbiological sampling at each site.
A. True B. False

Field personnel should do the following:
14 Prepare _____, a 50- to 100-mL aliquot of sterile buffered water plated before the sample—for every sample by field personnel for total coliform, E. coli, and enterococci analyses to determine the sterility of equipment and supplies.
A. Reagent water quality C. An MF equipment blank
B. An environmental sample D. None of the above

Quality Assurance and Quality Control in the Laboratory

15. According to the text, microbiology laboratories must follow good laboratory practices—cleanliness, safety practices, procedures for_____, specifications for reagent water quality—as set forth by American Public Health Association.

A. Reagent water quality
B. Microbiological sampling
C. Media preparation
D. None of the above

Disinfection Principles CEU Course Assignment - Number 3

The Disinfection Principles CEU Assignment is available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e-mail it back to TLC.

You will have 90 days from 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. 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 manual and make copy for yourself.

Multiple Choice, please select only one answer per question. There are no intentional trick questions.

Hazard Communication Section

1. All employers with hazardous chemicals in their workplaces must have labels and safety data sheets for their exposed workers, and train them to handle the chemicals appropriately.
A. True B. False

2. The Hazard Communication Standard in 1983 gave the workers the_____ but the new Globally Harmonized System gives workers the 'right to understand.'
A. Right to understand C. Right to know
B. Hazard information D. None of the above

More on the Revised Hazard Communication Standard
3. Which of the following will provide a common and coherent approach to classifying chemicals and communicating hazard information on labels and safety data sheets?
A. SDS/MSDS C. Hazard Communication Standard (HCS)
B. Safety data sheets and labels D. None of the above

Rationale
4. In order to ensure _____ in the workplace, information about the identities and hazards of the chemicals must be available and understandable to workers.
A. Chemical safety C. Hazardous chemicals
B. Hazard information D. None of the above

5. Chemical manufacturers and importers are required to evaluate the_____ they produce or import, and prepare labels and safety data sheets to convey the hazard information to their downstream customers.
A. Specific criteria C. Hazard communication elements
B. Hazards of the chemicals D. None of the above

Major changes to the Hazard Communication Standard
6. Which of the following provides specific criteria for classification of health and physical hazards, as well as classification of mixtures?
A. Hazard classification C. Hazard communication elements
B. Safety data sheets and labels D. None of the above

7. Labels: Chemical manufacturers and importers will be required to provide a label that includes a harmonized signal word, pictogram, and hazard statement for each?
A. Specific, detailed criteria C. Hazard class and category
B. Standardized label elements D. None of the above

What is the Globally Harmonized System?
8. The result of this negotiation process is the United Nations' document entitled "Globally Harmonized System of Classification and Labeling of Chemicals," commonly referred to as?
A. Revised HCS C. The Purple Book
B. Model regulation D. None of the above

What Hazard Communication Standard provisions are unchanged in the revised HCS?
9. Which of the following has been changed to "hazard classification" and "material safety data sheet" was changed to "safety data sheet?"
A. Revised HCS C. Hazard determination
B. Model regulation D. None of the above

1.1 What is the GHS?
10. The GHS is a system for _____ the classification and labeling of chemicals. It is a logical and comprehensive approach to: Defining health, physical and environmental hazards of chemicals;
A. Multiple safety data sheets C. Standardizing and harmonizing
B. Hazards to human health D. None of the above

11. The GHS Document thus provides countries with the regulatory building blocks to develop or modify existing national programs that address classification of hazards and transmittal of information about those hazards and associated protective measures. This helps to ensure the safe use of chemicals as they move through the _____ from "cradle to grave."
A. Product life cycle C. Hazardous properties of chemicals
B. Hazards to human health D. None of the above

1.7 What are the benefits?
12. The basic goal of _____ - is to ensure that employers, employees and the public are provided with adequate, practical, reliable and comprehensible information.
A. Achieve a global approach C. Preventive and protective measures
B. Hazard communication D. None of the above

3.0 What is Classification?
13. For several hazards _____- are semi-quantitative or qualitative. Expert judgment may be required to interpret these data.
A. The global approaches C. The GHS criteria
B. The regulatory changes D. None of the above

Hazard Classification
14. Which of the following is used to indicate that only the intrinsic hazardous properties of substances and mixtures are considered?
A. Self-classification C. GHS labels and/or Safety Data Sheets
B. Hazard classification D. None of the above

15. Tests that determine hazardous properties conducted according to internationally recognized scientific principles can be used for purposes of?
A. Hazard classification C. Existing hazard communication regulatory schemes
B. Safety Data Sheets D. None of the above

(S) Means the answer can be plural or singular in nature

Chapter 2- Waterborne Pathogens Section

Protozoan Caused Diseases
1. Which of the following bugs is larger than bacteria and viruses but still microscopic; they invade and inhabit the gastrointestinal tract?
A. Hepatitis A C. Protozoan pathogens
B. E.coli D. None of the above

2. Some of the parasites enter the environment in a dormant form, with a protective cell wall, called a?
A. Lamblia C. Cyst
B. Shell D. None of the above

Giardia lamblia
3. Which of the following bugs has been responsible for more community-wide outbreaks of disease in the U.S. than any other, and drug treatment are not 100% effective?
A. Giardia lamblia C. Giardiasis
B. Cryptosporidiosis D. None of the above

4. All of these diseases, with the exception of _____, have one symptom in common: diarrhea. They also have the same mode of transmission, fecal-oral, whether through person-to-person or animal-to-person contact.
A. HIV infection C. Hepatitis A
B. Giardiasis D. None of the above

Primary Waterborne Diseases Section
5. Legionnaire's disease, which causes a severe pneumonia, and the second, _____, which is a non-pneumonia illness; it's typically an influenza-like illness, and it's less severe.
A. Pontiac fever C. Typhoid fever
B. Yellow fever D. None of the above

6. Legionella, prevention. Legionella in water systems. Hot water in tanks should be maintained between _____degrees Centigrade.
A. 81 to 100 C. 71 and 77
B. 110 to 210 D. None of the above

7. Shigella species, in the United States two-thirds of the shigellosis in the U.S. is caused by Shigella dysenteriae and the remaining one-third is caused by Shigella Campylobacter.
A. True B. False

8. Hepatitis A virus is resistant to combined chlorines, so it is important to have an adequate free chlorine residual. Fecal matter can shield Hepatitis A virus from chlorine.
A. True B. False

9. Schistosomatidae prevention strategies for this pathogen include placing boric acid on berms or interrupting the life cycle of the parasite by treating birds with a lead.
A. True B. False

Dangerous Waterborne Microbes
10. Which of the following are Gram-negative, non-spore-forming, facultatively anaerobic, non-motile bacteria.
A. Fecal coliform bacteria C. Shigellae
B. Cryptosporidium D. None of the above

11. Which of the following are microscopic organisms that live in the intestines of warm-blooded animals? They also live in the waste material, or feces, excreted from the intestinal tract. When fecal coliform bacteria are present in high numbers in a water sample, it means that the water has received fecal matter from one source or another.
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

12. Which of the following is a species of the rod-shaped bacterial genus Shigella?
A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

13. Which of the following can cause bacillary dysentery?
A. Fecal coliform bacteria C. Shigella
B. Cryptosporidium D. None of the above

Bacteriological Monitoring Introduction
14. Which of the following are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media?
A. Indicator bacteria C. Viruses
B. Amoebas D. None of the above

15. Indicators in common use today for routine monitoring of drinking water include total coliforms, fecal coliforms, and?
A. Cryptosporidium C. Escherichia coli (E. coli)
B. Protozoa D. None of the above

Chapter 3- Disinfection Rule Section

Microbial Regulations
1. Which rule was established to maintain control of pathogens while systems lower disinfection byproduct levels to comply with the Stage 1 Disinfectants/Disinfection Byproducts Rule and to control Cryptosporidium?
A. Long Term 1 Enhanced Surface Water Treatment Rule
B. Interim Enhanced Surface Water Treatment Rule
C. Surface Water Treatment Rule
D. None of the above

EPA's Drinking Water Regulations for Disinfectants
2. Chlorine is the most widely used water disinfectant due to its effectiveness and cost.
A. True B. False

3. _____are also formed when multiple disinfectants are used.
A. Secondary by-products C. Chorine and chlorine-based compounds (halogens)
B. Primary by-products D. None of the above

4. Which of the following rules requires systems using public water supplies from either surface water or groundwater under the direct influence of surface water to disinfect?
A. TTHM and HAA5 Rule C. Surface Water Treatment Rule (SWTR)
B. DBP MCLs Rule D. None of the above

Public Health Concerns
5. Which of the following rules along with the Disinfection Byproducts Rule applies to all community and nontransient non-community water systems that treat their water with a chemical disinfectant?
A. Groundwater Rule (GWR) C. Long Term 2 Enhanced Surface Water Treatment Rule
B. The Stage 1 Disinfectants D. None of the above

6. Which of the following rules and Disinfection Byproduct Rule updates and supersedes the 1979 regulations for total trihalomethanes?
A. DBPs C. The Stage 1 Disinfectant
B. The LT2 requirements D. None of the above

Stage 2 DBP Rule Federal Register Notices
7. Which of the following rules is one part of the Microbial and Disinfection Byproducts Rules, which are a set of interrelated regulations that address risks from microbial pathogens and disinfectants/disinfection byproducts?
A. Groundwater Rule (GWR) C. Long Term 2 Enhanced Surface Water Treatment Rule (LT2)
B. The Stage 2 DBP rule D. None of the above

Are THMs and HAAs the only disinfection byproducts?
8. The presence of _____is representative of the occurrence of many other chlorination DBPs; thus, a reduction in the TTHM and HAA5 generally indicates a reduction of DBPs from chlorination.
A. Chlorine and chloramine C. TTHM and HAA5
B. Classes of DBPs D. None of the above

Chlorine By-Products
9. The most common chlorination by-products found in U.S. drinking water supplies are?
A. Chlorate and Chlorite C. Ammonia and THMS
B. Trihalomethanes (THMs) D. None of the above

The Principal Trihalomethanes are:
10. Chloroform, bromodichloromethane, chlorodibromomethane, and bromoform. Other less common chlorination by-products include the haloacetic acids and haloacetonitriles. The amount of THMs formed in drinking water can be influenced by a number of factors, including the season and the source of the water.
A. True B. False

Health Effects

11. The available studies on health effects do not provide conclusive proof of a relationship between exposure to THMs and cancer or reproductive effects, but indicate the need for further research to confirm their results and to assess the potential health effects of chlorination by-products other than THMs.

A. True B. False

Risks and Benefits of Chlorine

12. _____ is a highly effective disinfectant, it breaks down quickly, so that small amounts of _____ or other disinfectants must be added to the water to ensure continued disinfection as the water is piped to the consumer's tap.

A. Ozone, Chlorine C. Chlorine Dioxide, Chlorine
B. Chlorite, Chlorine D. None of the above

13. Modifying water treatment facilities to use _____ can be expensive, and _____ treatment can create other undesirable by-products that may be harmful to health if they are not controlled (e.g., bromate).

A. Ozone, Chlorine C. Ozone, Ozone
B. Chlorite, Chlorine D. None of the above

14. Which term is a weaker disinfectant than chlorine, especially against viruses and protozoa; however, they are very persistent and, as such, can be useful for preventing re-growth of microbial pathogens in drinking water distribution systems?

A. UV C. Chloramines
B. Chlorite D. None of the above

15. Chlorine dioxide can be an effective disinfectant, but it forms?

A. Chlorate and Chlorite C. Chloramines
B. THMS D. None of the above

Chapter 4- Water Chemistry Section

pH Testing Section

1. When an atom loses _____and thus has more protons than electrons, the atom is a positively-charged ion or cation.

A. A proton C. An electron
B. Charge D. None of the above

2. Pure water has a pH very close to?

A. 7 C. 7.7
B. 7.5 D. None of the above

3. _____ are determined using a concentration cell with transference, by measuring the potential difference between a hydrogen electrode and a standard electrode such as the silver chloride electrode.

A. Primary pH standard values C. pH measurement(s)
B. Alkalinity D. None of the above

4. Mathematically, pH is the negative logarithm of the activity of the (solvated) hydronium ion, more often expressed as the measure of the?
A. Electron concentration C. Hydronium ion concentration
B. Alkalinity concentration D. None of the above

5. pH 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. Acid-base behavior D. None of the above

6. Which of the following terms may be used to measure pH, by making use of the fact that their color changes with pH?
A. Indicators C. A set of non-linear simultaneous equations
B. Spectrophotometer D. None of the above

7. Measurement of pH for aqueous solutions can be done with a glass electrode and a pH meter, or using indicators like strip test paper.
A. True B. False

8. In chemistry, pH is a measure of the acidity or basicity of an aqueous solution. Solutions with a pH greater than 7 are said to be acidic and solutions with a pH less than 7 are basic or alkaline.
A. True B. False

9. Because the alkalinity of many surface waters is primarily a function of carbonate, bicarbonate, and hydroxide content, it is taken as an indication of the concentration of these constituents.
A. True B. False

10. The calculation of the pH of a solution containing acids and/or bases is an example of a chemical speciation calculation, that is, a mathematical procedure for calculating the concentrations of all chemical species that are present in the solution. The complexity of the procedure depends on the?
A. Nature of the solution C. Alkaline earth metal concentrations
B. pH D. None of the above

11. Under normal circumstances 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 pH D. None of the above

12. Since pH is a logarithmic scale, a difference of one pH unit is equivalent to _____ difference in hydrogen ion concentration
A. 1 C. 10
B. .1 D. None of the above

Halogens- Halides
13. What is the negative ion often referred to as?
A. A halide proton C. Diatomic Compound
B. A halide ion D. None of the above

14. Halide ions combined with single hydrogen atoms form the hydrohalic acids (i.e., HF, HCl, HBr, HI), a series of particularly strong acids, one being?
A. Salts C. Hydrastatic acid
B. Organic halides D. None of the above

15. Many synthetic organic compounds such as plastic polymers, and a few natural ones, contain halogen atoms; these are known as halogenated compounds or?
A. Salts C. Hydrastatic acid
B. Organic halides D. None of the above

Chapter 5 -Chlorine Section

Chlorine Gas Appearance and Odor
1. Chlorine is a greenish-yellow gas it will condense to an amber liquid at about _____F or at high pressures.
A. 32 degrees C. 29 degrees
B. -29.2 degrees D. None of the above

Reactivity
2. What is formed when chlorine is in contact with combustible substances (such as gasoline and petroleum products, hydrocarbons, turpentine, alcohols, acetylene, hydrogen, ammonia, and sulfur), reducing agents, and finely divided metals?
A. Fires and explosions C. Moisture, steam, and water
B. Odor thresholds D. None of the above

Flammability
3. When there is a fire that involves chlorine, the firefight should be fought downwind from the minimum distance possible.
A. True B. False

4. Keep unnecessary people away; isolate the hazard area and deny entry. For a massive fire in a cargo area, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from the area and let the fire burn. Emergency personnel should stay out of low areas and Ventilate closed spaces before entering.
A. True B. False

What Happens to Chlorine When it Enters the Environment?
5. When chlorine is released to soil, chlorine will react with moisture forming free unstable oxygen radicals.
A. True B. False

Chlorine Exposure Limits
6. Chlorine's Physical and chemical properties: A yellowish green, nonflammable and liquefied gas with an unpleasant and irritating smell.
A. True B. False

7. 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

8. OSHA PEL is?
A. 10 PPM C. 1,000 PPM
B. 1 PPM D. None of the above

9. Cl_2 fatal exposure limit is?
A. 10 PPM C. 1,000 PPM
B. 0.1 PPM D. None of the above

Chlorine Gas Introduction
10. When chlorine is added into the water stream, chlorine hydrolyzes into?
A. HCL C. Hypochlorous acid (HOCl), and hydrochloric acid (HCl)
B. Bromoform D. None of the above

Chlorine Gas
Pathophysiology
11. As far as chlorine safety and respiratory protection, the intermediate _____of chlorine accounts for its effect on the upper airway and the lower respiratory tract.
A. Effects of Hydrochloric acid C. Water solubility
B. Vapor from Chlorine gas D. None of the Above

Mechanism of Activity
12. The mechanisms of cellular injury are believed to result from the oxidation of functional groups in cell components, from reactions with tissue water to form_____, and from the generation of free oxygen radicals.
A. Generation of free oxygen radicals C. Hypochlorous and hydrochloric acid
B. Chlorine acid D. None of the above

Solubility Effects
13. Which of the following is highly soluble in water?
A. Hydrochloric acid C. Hypochlorous base
B. H_2SO_4 D. None of the above

Early Response to Chlorine Gas
14. If you mix ammonia with chlorine gas, this compound reacts to form_____.
A. Chloramine gas C. Sulfuric gas
B. Chlorine gas D. None of the Above

Chlorine's Effectiveness
15. The effectiveness of chlorination depends on the _____ of the water, the concentration of the chlorine solution added, the time that chlorine is in contact with the organism, and water quality.
A. Chlorine residual C. Breakpoint
B. Chlorine demand D. None of the above

Chapter 6- Hypochlorites and Chloramines

Chlorine-Based Disinfectants Chloramines
Chloramine Disadvantages

1. Which residual in tap water can pass through membranes in dialysis machines and directly induce oxidant damage to red blood cells?

A. Chloramine C. Ammonia and chlorine compounds
B. Dichloramine D. None of the above

Chloride Ion

2. The salts of _____ contain chloride ions and are also be called chlorides.

A. Hydrochloric acid C. Hypochlorous acid
B. H_2SO_4 D. None of the above

Chlorite Ion

3. The chlorite ion is?

A. ClO_2- C. ClO_3-,
B. ClO_4 D. None of the above

Chlorine Dioxide

4. Chlorine dioxide is a chemical compound with which formula?

A. $CaCl_2$ C. ClO_2
B. ClO D. None of the above

Haloacetic Acids

5. What type of substances are haloacetic acids in which a halogen atom takes the place of a hydrogen atom in acetic acid?

A. Calcemic acids C. Carboxylic acids
B. Hypochlorite acids D. None of the above

Contaminants in Drinking Water

6. Which of the following terms expresses an exposure to such substances in drinking water has been associated with a number of health outcomes by epidemiological studies, although the putative agent in such studies has not been identified?

A. Carboxylic acids C. Electronegative halogens
B. Disinfection by-products D. None of the above

Hypochlorites

7. Hypochlorite compounds contain an excess of _____and tend to raise the pH of the water.

A. Acid C. Hypochlorite compounds
B. Alkali D. None of the above

Emergency Procedures

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

A. True B. False

Summary

Disinfection Byproducts

9. Which term represents when disinfectants used in water treatment plants react with bromide and/or natural organic matter present in the source water?

A. Disinfection byproducts
B. Naturally occurring bromide
C. Occurring organic and inorganic matter in water
D. None of the above

Haloacetic Acids (HAA5)

10. Which term represents substances in drinking water react with naturally occurring organic and inorganic matter in water?

A. Disinfection byproducts
B. Microbial contaminants
C. Occurring organic and inorganic matter in water
D. None of the above

Chloroform

11. Chloroform is typically the most prevalent _____ measured in chlorinated water, is probably the most thoroughly studied disinfection byproduct.

A. HAA5
B. THM
C. Folic Acid
D. None of the above

Sodium Chlorate

12. Sodium Chlorate can also be synthesized by passing _____into a hot sodium hydroxide solution. It is then purified by crystallization.

A. Chlorate
B. Oxygen
C. Chlorine gas
D. None of the above

Chloramines

13. What are chemical compounds formed by combining a specific ratio of chlorine and ammonia in water?

A. Disinfection byproducts
B. Chloramines
C. Trihalomethanes, haloacetic acids, bromate, and chlorite
D. None of the above

Chlorine Dioxide

14. _____is also a strong disinfectant and a selective oxidant. While chlorine dioxide does produce a residual, it is only rarely used for this purpose.

A. Chlorine dioxide
B. Sodium hypochlorite
C. Carbon dioxide
D. None of the above

Factors in Chlorine Disinfection: Concentration and Contact Time

15. Breakpoint chlorination is the name of the process of adding chlorine to water until the chlorine demand has been satisfied.

A. True B. False

Chapter 7- Safety and Chlorination Equipment Section

Chlorination Equipment Requirements

1. Which of the following shall also be located inside the chlorine room?

A. Gas vacuum line
B. Vacuum regulators
C. Mechanical gas proportioning equipment
D. None of the above

Capacity

2. Which of the following shall have the capacity to dose enough chlorine to overcome the demand and maintain the required concentration of the "free" or "combined" chlorine?

A. The chlorinator
B. Automatic proportional control
C. Constant pre-established dosage
D. None of the above

Methods of Control

3. Which piece of chlorination equipment adjusts the chlorine feed rate automatically in accordance with the flow changes to provide a constant pre-established dosage for all rates of flow?

A. Manual chlorine feed valve
B. Constant flow rate(s)
C. Automatic proportional control
D. None of the above

Standby Provision

4. For uninterrupted chlorination, _____shall be equipped with an automatic changeover system. In addition, spare parts shall be available for all chlorinators.

A. Flow valves
B. Flow regulators
C. Gas chlorinators
D. None of the above

Chlorine Room Design Requirements

5. Where gas chlorination is practiced, the gas cylinders and/or the ton containers up to the vacuum regulators shall be housed in a gas-tight, well illuminated, corrosion resistant and _____ventilated enclosure.

A. Mechanically
B. Securely positioned
C. Automatic chlorine leak detection
D. None of the above

6. _____ may or may not be located inside the chlorine room.

A. The chlorinator
B. All chlorine cylinders
C. Chlorine leak detection equipment
D. None of the above

7. Which of the following shall have entirely separate exhaust ventilation systems capable of delivering one (1) complete air change per minute during periods of chlorine room occupancy only?

A. Shut off
B. The chlorine room
C. Automatic chlorine leak detection
D. None of the above

8. Chlorine rooms shall have_____, if a forced air system is used to heat the building.

A. Corrosion filters
B. Separate heating systems
C. Cooling system
D. None of the above

9. _____ shall be protected to ensure that the chlorine maintains its gaseous state when entering the chlorinator.

A. Cylinders or containers
B. Panic system
C. Equipment
D. None of the above

Storage of Chlorine Cylinders

10. Which chlorine safety related equipment term shall have provision for ventilation at thirty air changes per hour?

A. Cylinders or containers access
B. Scrubber(s)
C. The chlorine gas storage room
D. None of the above

11. In very large facilities, entry into the chlorine rooms may be through a_____.

A. Vestibule from inside
B. Chlorine gas storage room
C. Vestibule from outside
D. None of the above

Scrubbers

12. Which term means the amount of chlorine required to produce a residual of 0.1 mg/l after a contact time of fifteen minutes as measured by Iodometric method of a sample at a temperature of twenty degrees in conformance with Standard methods?

A. Combined residual
B. Free chlorine residual
C. Chlorine Demand
D. None of the above

Chlorine Health Hazard Section

13. Which term expresses low levels of chlorine gas can result in a dermatitis known as chloracne, tooth enamel corrosion, coughing, sore throat, hemoptysis and increased susceptibility to tuberculosis?

A. Rambling
B. Acute exposure
C. Chronic exposure
D. None of the above

Inhalation

14. The nose and throat may become irritated; a stinging and burning sensation may be experienced. Immediate fatalities can occur as a result of suffocation. Delayed fatalities can occur as a result of pulmonary edema (fluid in the lungs). For this reason, rest and immediate attention after inhalation is important.

A. True
B. False

Rescuer Protection

15. Positive-pressure, self-contained breathing apparatus (SCBA) is recommended in response to situations that involve exposure to potentially unsafe levels of Chlorine gas.

A. True
B. False

Chapter 8- Alternative Disinfection Section

Chlorine Dioxide Section

1. ClO_2 generation uses _____ and chlorine gas.

A. Sodium chlorite ($NaClO_2$)
B. Hypochlorous acid
C. Ozone
D. None of the above

2. Which compound is a yellow-green gas with an irritating odor not unlike Chlorine?

A. Chlorine
B. Chlorine dioxide
C. Ozone
D. None of the above

Ultraviolet Disinfection

3. The basic design flow of water of certain UV units is in the order of _____ for each inch of the lamp, the units are designed so that the contact or retention time of the water in the unit is not less than _____.

A. 20 gpm - 15 seconds
B. 2.0 gpm - 100 seconds
C. 2.0 gpm - 15 seconds
D. None of the above

4. The contact time for the wastewater with the UV source is the shortest of any of the disinfectant strategies, lasting no longer than 20 to 30 seconds.

A. True
B. False

Strongest Oxidizing Agent

5. Liquid Ozone is very unstable and can readily explode. As a result, it is not shipped and must be manufactured on-site.

A. True
B. False

6. Which compound is obtained by passing a flow of air or oxygen between two electrodes that are subjected to an alternating current in the order of 10,000 to 20,000 volts?

A. Liquid Ozone
B. Ozone
C. O_2
D. None of the above

7. When determining Ozone CT (contact time) values must be determined for the ozone basin alone; an accurate _____ must be obtained for the contact chamber, and residual levels.

A. Residual
B. T10 value
C. Contact time
D. None of the above

Alternate Disinfectants Section Summary

Chloramines

8. It is recommended that Chloramine be used in conjunction with a stronger disinfectant. It is best utilized as a?

A. Chloramine
B. T10 value disinfectant
C. Stable distribution system disinfectant
D. None of the above

9. In the production of _____, the ammonia residuals in the finished water, when fed in excess of stoichiometric amount needed, should be limited to inhibit growth of nitrifying bacteria.

A. Dry sodium chlorite
B. Chloramines
C. Ammonia residual(s)
D. None of the above

Chlorine Dioxide

10. Which term provides good Giardia and virus protection but its use is limited by the restriction on the maximum residual of 0.5 mg/L ClO_2/chlorite/chlorate allowed in finished water?

A. Chlorinated byproducts
B. Chlorine dioxide
C. Ammonia residual(s)
D. None of the above

11. If chlorine dioxide is being used as an oxidant, the preferred method of generation is to entrain this term or substance into a packed reaction chamber with a 25% aqueous solution of sodium chlorite ($NaClO_2$).

A. Chloramine
B. Chlorine gas
C. Chlorine dioxide
D. None of the above

12. According to the text, which chemical is explosive and can cause fires in feed equipment if leaking solutions or spills are allowed to dry out?
A. Dry sodium chlorite C. Ammonia
B. Chlorine dioxide D. None of the above

Ozone
13. Which term must be determined for the ozone basin alone; an accurate T10 value must be obtained for the contact chamber, residual levels measured through the chamber and an average ozone residual calculated?
A. Ozone CT (Contact time) C. Free and/or combined chlorine
B. Residual levels D. None of the above

14. Ozone does not provide a system residual and should be used as a primary disinfectant only in conjunction with free and/or combined chlorine.
A. True B. False

15. Ozone may also be used as _____for removal of taste and odor, or may be applied as a pre-disinfectant.
A. An oxidant C. System residual
B. Reducer D. None of the above

Chapter 9- Respiratory Protection Chapter

Types of Respirators- Commonly Used Respirators (Air Purifying)
1. _____ is a type of respirator worn over the nose and mouth to protect the respiratory system from certain nuisance dusts, mists, etc.
A. An Air-Line Respirator C. A Disposable Dust Mask
B. A Full-Face Respirator D. None of the above

2. Full-face, helmet or hood type powered air purifying respirators (PAPRs) operate under positive pressure inside the face piece. A battery operated motor blower assembly forces air through a filter cartridge into the _____.
A. Wearer's breathing zone C. Proper respiratory protection
B. Maximum concentration D. None of the above

Less Commonly Used Types Respirators (Air Supplying)
3. _____ supply clean air to the wearer through a small diameter hose from a compressor or compressed air cylinders. Because the wearer must be attached to the hose at all times, mobility is limited.
A. Air-Line Respirators C. Disposable Dust masks
B. Full-Face Respirators D. None of the above

4. Self-Contained Breathing Apparatus (SCBA) respirators supply clean air from a compressed air tank carried on the wearer's back. SCBA respirators are highly mobile and are used primarily for _____.
A. Proper respiratory protection C. Emergency response or rescue work
B. Maximum concentration D. None of the above

Respirator Filters/Cartridges

5. The cartridges used for _____ must be either equipped with an end-of-service life indicator (ESLI) or a cartridge change schedule has to be established.

A. Air-purifying respirators
B. Full-Face Respirators
C. Air-line Respirators
D. None of the above

Using up the air supply

6. When using a _____, keep checking the gauges and listening for alarms. Be ready to leave the area immediately if there is a problem.

A. Gas meter
B. SCBA
C. Dust mask
D. None of the above

Panic

7. Air monitoring is important when working in a hot, stressful, or awkward situation.

A. True
B. False

Cleaning Respirators

. Respirators should be cleaned and disinfected once a year. Check the respirator for damage before wearing it.

A. True
B. False

8. Respirators stored for emergency use must be inspected _____ when not in use, and also after each use.

A. Monthly
B. Weekly
C. Annually
D. None of the above

Operating Procedures

9. Operating procedures must include operating steps for initial startup, normal and temporary operations, emergency shutdown, _____, normal shutdown, and startup after a turnaround or an emergency shutdown.

A. Documenting work
B. Emergency operations
C. Gas and vapor detection
D. None of the above

Contractor Employees

10. According to the text, process safety training and _____ are also required for contractors who work on-site.

A. Logs
B. Safety performance
C. Safety programs
D. None of the above

11. To further ensure contractor safety, managers must also keep a log of _____ related to their work in process areas.

A. Gas and vapor contaminants
B. Safety performance
C. Contractor employees' injuries or illnesses
D. None of the above

The Contractor has Responsibilities, too

12. The Contractor must document that employees are trained to _____ and to follow safe work practices on the job.

A. Recognize hazards
B. Work efficiently
C. Follow orders
D. None of the above

Gas and Vapor Contaminants

13. According to the text, gas and vapor contaminants can be classified according to their _____.

A. Chemical characteristics
B. Hazard risk
C. Toxic level
D. None of the above

14. Alkaline gases such as ammonia and phosphine exist as alkalis or _____.

A. Metals attached to organic groups
B. Pollutants
C. Produce alkalis by reaction with water
D. None of the above

Hazard Assessment

15. The first important step to protection is _____.

A. Research
B. An atmosphere's oxygen content
C. Proper assessment of the hazard
D. None of the above

Chapter 10- Lab Analyst Section

1. Turbidity is measured to evaluate the performance of _____.

A. Water treatment plant(s)
B. An aesthetic point
C. Colloidal to coarse dispersions
D. None of the above

2. Turbidity is caused by wide variety of suspended matter that range in size from colloidal to coarse dispersions, depending upon the_____, and ranges from pure inorganic substances to those that are highly organic in nature.

A. Water treatment plant(s)
B. An aesthetic point
C. Degree of turbulence
D. None of the above

3. Turbid waters are undesirable from _____ of view in drinking water supplies.

A. Water treatment plant(s)
B. An aesthetic point
C. Colloidal to coarse dispersions
D. None of the above

Surface Water (SW) System Compliance

4. Sample the _____ at the clear well

A. Individual filter effluent
B. 95% of samples
C. Combined filter turbidity
D. None of the above

5. 0.34 NTU in _____, never to exceed 1.0 NTU spike

A. Individual filter effluent
B. 95% of samples
C. Combined filter turbidity
D. None of the above

6. Sample turbidity at each _____

A. Individual filter effluent
B. 95% of samples
C. Combined filter turbidity
D. None of the above

Disinfection Key

7. 99.99% or 4 log inactivation of _____

A. Crypto
B. Enteric viruses
C. Giardia lamblia cysts
D. None of the above

8. 99% or 2 log inactivation of _____
A. Crypto C. Giardia lamblia cysts
B. Enteric viruses D. None of the above

9. The chlorine residual leaving the plant must be = or _____ mg/L and measurable throughout the system.
A. > 0.2 C. < 0.2
B. ≤ 0.2 D. None of the above

Cloudy Water
10. In order to have gravity affect these particles, we must somehow make them larger, somehow have them come together (agglomerate); in other words, somehow make them "stick" together, thereby increasing their size and mass.
A. True B. False

Method 1623 - Cryptosporidium and Giardia Analysis
11. Washing the equipment free of residual sodium hypochlorite solution with three rinses of filter-sterilized water; do not de-chlorinate the equipment using?
A. Sodium thiosulfate C. Sodium hypochlorite solution
B. Sulfuric acid D. None of the above

Laboratory Analysis
QA/QC Activities and Measures
12. QA/QC activities and measures to take to reduce contamination.
Use a sterilization indicator, such as autoclave tape, in preparing viral plaques and other equipment for collection of microbiological samples to determine whether adequate temperatures and pressures have been attained during autoclaving.
A. True B. False

13. Prepare a separate set of E. coli host cultures for microbiological sampling at each site.
A. True B. False

Field personnel should do the following:
14 Prepare _____, a 50- to 100-mL aliquot of sterile buffered water plated before the sample—for every sample by field personnel for total coliform, E. coli, and enterococci analyses to determine the sterility of equipment and supplies.
A. Reagent water quality C. An MF equipment blank
B. An environmental sample D. None of the above

Quality Assurance and Quality Control in the Laboratory
15. According to the text, microbiology laboratories must follow good laboratory practices—cleanliness, safety practices, procedures for_____, specifications for reagent water quality—as set forth by American Public Health Association.
A. Reagent water quality C. Media preparation
B. Microbiological sampling D. None of the above

Disinfection Principles CEU Course Assignment- Number 4

The Disinfection Principles CEU Assignment is available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e-mail it back to TLC.

You will have 90 days from 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. 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 manual and make copy for yourself.

Multiple Choice, please select only one answer per question. There are no intentional trick questions.

Hazard Communication Section

1. All employers with hazardous chemicals in their workplaces must have labels and safety data sheets for their exposed workers, and train them to handle the chemicals appropriately.
A. True B. False

2. Chemical manufacturers and importers are required to evaluate the hazards of the chemicals they produce or import, and prepare labels and safety data sheets to convey the hazard information to their downstream customers;
A. True B. False

More on the Revised Hazard Communication Standard
3. Which of the following will provide a common and coherent approach to classifying chemicals and communicating hazard information on labels and safety data sheets?
A. SDS/MSDS C. Hazard Communication Standard (HCS)
B. Safety data sheets and labels D. None of the above

Rationale
4. In order to ensure _____ in the workplace, information about the identities and hazards of the chemicals must be available and understandable to workers.
A. Chemical safety C. Hazardous chemicals
B. Hazard information D. None of the above

5. Chemical manufacturers and importers are required to evaluate the_____ they produce or import, and prepare labels and safety data sheets to convey the hazard information to their downstream customers.
A. Specific criteria C. Hazard communication elements
B. Hazards of the chemicals D. None of the above

Major changes to the Hazard Communication Standard
6. Which of the following provides specific criteria for classification of health and physical hazards, as well as classification of mixtures?
A. Hazard classification C. Hazard communication elements
B. Safety data sheets and labels D. None of the above

7. Labels: Chemical manufacturers and importers will be required to provide a label that includes a harmonized signal word, pictogram, and hazard statement for each?
A. Specific, detailed criteria C. Hazard class and category
B. Standardized label elements D. None of the above

What is the Globally Harmonized System?
8. The result of this negotiation process is the United Nations' document entitled "Globally Harmonized System of Classification and Labeling of Chemicals," commonly referred to as?
A. Revised HCS C. The Purple Book
B. Model regulation D. None of the above

What Hazard Communication Standard provisions are unchanged in the revised HCS?
9. Which of the following has been changed to "hazard classification" and "material safety data sheet" was changed to "safety data sheet?"
A. Revised HCS C. Hazard determination
B. Model regulation D. None of the above

1.1 What is the GHS?
10. The GHS is a system for _____ the classification and labeling of chemicals. It is a logical and comprehensive approach to: Defining health, physical and environmental hazards of chemicals;
A. Multiple safety data sheets C. Standardizing and harmonizing
B. Hazards to human health D. None of the above

11. The GHS Document thus provides countries with the regulatory building blocks to develop or modify existing national programs that address classification of hazards and transmittal of information about those hazards and associated protective measures. This helps to ensure the safe use of chemicals as they move through the _____ from "cradle to grave."
A. Product life cycle C. Hazardous properties of chemicals
B. Hazards to human health D. None of the above

1.7 What are the benefits?
12. The basic goal of _____ - is to ensure that employers, employees and the public are provided with adequate, practical, reliable and comprehensible information.
A. Achieve a global approach C. Preventive and protective measures
B. Hazard communication D. None of the above

3.0 What is Classification?
13. For several hazards _____- are semi-quantitative or qualitative. Expert judgment may be required to interpret these data.
A. The global approaches C. The GHS criteria
B. The regulatory changes D. None of the above

Hazard Classification
14. Which of the following is used to indicate that only the intrinsic hazardous properties of substances and mixtures are considered?
A. Self-classification C. GHS labels and/or Safety Data Sheets
B. Hazard classification D. None of the above

15. Tests that determine hazardous properties conducted according to internationally recognized scientific principles can be used for purposes of?
A. Hazard classification C. Existing hazard communication regulatory schemes
B. Safety Data Sheets D. None of the above

(S) Means the answer can be plural or singular in nature

Chapter 2- Waterborne Pathogens Section

Protozoan Caused Diseases
1. Some of the parasites enter the environment in a dormant form, with a protective cell wall, called a?
A. Lamblia C. Cyst
B. Shell D. None of the above

Giardia lamblia
2. Which of the following bugs has been responsible for more community-wide outbreaks of disease in the U.S. than any other, and drug treatment are not 100% effective?
A. Giardia lamblia C. Giardiasis
B. Cryptosporidiosis D. None of the above

Primary Waterborne Diseases Section
3. Legionnaire's disease, which causes a severe pneumonia, and the second, _____, which is a non-pneumonia illness; it's typically an influenza-like illness, and it's less severe.
A. Pontiac fever C. Typhoid fever
B. Yellow fever D. None of the above

4. Legionella, prevention. Legionella in water systems. Hot water in tanks should be maintained between _____degrees Centigrade.
A. 81 to 100 C. 71 and 77
B. 110 to 210 D. None of the above

5. Vibrio cholerae, the basics. It's a virus. It causes diarrheal illness, also known as cholera. It is typically associated with aquatic environments, shell stocks, and human. Vibrio cholerae has also been associated with ship ballast water.
A. True B. False

6. Hepatitis A virus is resistant to combined chlorines, so it is important to have an adequate free chlorine residual. Fecal matter can shield Hepatitis A virus from chlorine.
A. True B. False

7. Cryptosporidium is typically associated with animals and humans, and it can be acquired through consuming fecally contaminated food, contact with fecally contaminated soil and water.
A. True B. False

8. Cryptosporidium, prevention. Prevention strategies for this pathogen include source protection. A CT value of 50 is required when dealing with fecally accidents. CT equals a concentration, in parts per million, while time equals a contact time in minutes.
A. True B. False

Waterborne Bacterial Diseases

9. Campylobacteriosis outbreaks have most often been associated with food, especially chicken and un-pasteurized milk, as well as un-chlorinated water. These organisms are also an important cause of “travelers’ diarrhea.” Medical treatment generally is not prescribed for campylobacteriosis because recovery is usually rapid.

A. True B. False

Dangerous Waterborne Microbes

10. Which of the following are Gram-negative, non-spore-forming, facultatively anaerobic, non-motile bacteria.

A. Fecal coliform bacteria C. Shigellae
B. Cryptosporidium D. None of the above

11. Which of the following are microscopic organisms that live in the intestines of warm-blooded animals? They also live in the waste material, or feces, excreted from the intestinal tract. When fecal coliform bacteria are present in high numbers in a water sample, it means that the water has received fecal matter from one source or another.

A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

Bacteriological Monitoring Introduction

12. Which of the following are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media?

A. Indicator bacteria C. Viruses
B. Amoebas D. None of the above

Bacteria Sampling

13. Water samples for _____must always be collected in a sterile container.

A. Amoebas C. Viruses
B. Bacteria tests D. None of the above

Positive or Coliform Present Results

14. If you are notified of a positive coliform test result you need to contact either the Drinking Water Program or your local county health department within 72 hours, or by the next business day after the MCL compliance violation

A. True B. False

Revised Total Coliform Rule (RTCR) Summary

15. EPA published the Revised Total Coliform Rule (RTCR) in the Federal Register (FR) on February 13, 2013 (78 FR 10269). It is the revision to the 1989 Total Coliform Rule (TCR).

A. True B. False

Chapter 3- Disinfection Rule Section

Chlorine DDBP

1. These term means that chlorine is present as Cl, HOCl, and OCl^- is called _____, and that which is bound but still effective is _____.

A. Free available chlorine and Total
B. Free and Residual
C. Free available chlorine and Combined Chlorine
D. None of the above

2. Chloramines are formed by reactions with?

A. Acid and Cl_2 C. Folic Acid and Cl2
B. Ammonia and Cl_2 D. None of the above

Microbial Regulations

3. Which rule specifies treatment criteria to assure that these performance requirements are met; they include turbidity limits, disinfectant residual, and disinfectant contact time conditions?

A. Long Term 1 Enhanced Surface Water Treatment Rule
B. Interim Enhanced Surface Water Treatment Rule
C. Surface Water Treatment Rule
D. None of the above

Are THMs and HAAs the only disinfection byproducts?

4. The presence of _____is representative of the occurrence of many other chlorination DBPs; thus, a reduction in the TTHM and HAA5 generally indicates a reduction of DBPs from chlorination.

A. Chlorine and chloramine C. TTHM and HAA5
B. Classes of DBPs D. None of the above

Chlorine By-Products

5. The most common chlorination by-products found in U.S. drinking water supplies are?

A. Chlorate and Chlorite C. Ammonia and THMS
B. Trihalomethanes (THMs) D. None of the above

The Principal Trihalomethanes are:

6. Chloroform, bromodichloromethane, chlorodibromomethane, and bromoform. Other less common chlorination by-products include the haloacetic acids and haloacetonitriles. The amount of THMs formed in drinking water can be influenced by a number of factors, including the season and the source of the water.

A. True B. False

7. THM concentrations are generally higher in winter than in summer, because concentrations of natural organic matter are greater and more chlorine is required to disinfect at colder temperatures.

A. True B. False

8. THM levels are also low when wells or large lakes are used as the drinking water source, because organic matter concentrations are generally low in these sources. The opposite — high organic matter concentrations and high THM levels — is true when rivers or other surface waters are used as the source of the drinking water.

A. True B. False

Health Effects

9. The available studies on health effects do not provide conclusive proof of a relationship between exposure to THMs and cancer or reproductive effects, but indicate the need for further research to confirm their results and to assess the potential health effects of chlorination by-products other than THMs.

A. True B. False

Risks and Benefits of Chlorine

10. It is extremely important that water treatment plants ensure that methods used to control chlorination by-products do not compromise the effectiveness of water disinfection.

A. True B. False

11. Many cities utilize the use ozone to disinfect their source water and to reduce formation of this parameter?

A. Chlorate and Chlorite C. Chloramines
B. Trihalomethanes (THMs) D. None of the above

12. _____ is a highly effective disinfectant, it breaks down quickly, so that small amounts of _____ or other disinfectants must be added to the water to ensure continued disinfection as the water is piped to the consumer's tap.

A. Ozone, Chlorine C. Chlorine Dioxide, Chlorine
B. Chlorite, Chlorine D. None of the above

13. Modifying water treatment facilities to use _____ can be expensive, and _____ treatment can create other undesirable by-products that may be harmful to health if they are not controlled (e.g., bromate).

A. Ozone, Chlorine C. Ozone, Ozone
B. Chlorite, Chlorine D. None of the above

14. Which term is a weaker disinfectant than chlorine, especially against viruses and protozoa; however, they are very persistent and, as such, can be useful for preventing re-growth of microbial pathogens in drinking water distribution systems?

A. UV C. Chloramines
B. Chlorite D. None of the above

15. Chlorine dioxide can be an effective disinfectant, but it forms?

A. Chlorate and Chlorite C. Chloramines
B. THMS D. None of the above

Chapter 4- Water Chemistry Section

pH Testing Section

1. Pure water has a pH very close to?
A. 7 C. 7.7
B. 7.5 D. None of the above

2. When an atom loses _____and thus has more protons than electrons, the atom is a positively-charged ion or cation.
A. A proton C. An electron
B. Charge D. None of the above

3. _____ are determined using a concentration cell with transference, by measuring the potential difference between a hydrogen electrode and a standard electrode such as the silver chloride electrode.
A. Primary pH standard values C. pH measurement(s)
B. Alkalinity D. None of the above

4. Mathematically, pH is the negative logarithm of the activity of the (solvated) hydronium ion, more often expressed as the measure of the?
A. Electron concentration C. Hydronium ion concentration
B. Alkalinity concentration D. None of the above

5. pH 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. Acid-base behavior D. None of the above

6. Which of the following terms may be used to measure pH, by making use of the fact that their color changes with pH?
A. Indicators C. A set of non-linear simultaneous equations
B. Spectrophotometer D. None of the above

7. Measurement of pH for aqueous solutions can be done with a glass electrode and a pH meter, or using indicators like strip test paper.
A. True B. False

8. In chemistry, pH is a measure of the acidity or basicity of an aqueous solution. Solutions with a pH greater than 7 are said to be acidic and solutions with a pH less than 7 are basic or alkaline.
A. True B. False

9. Because the alkalinity of many surface waters is primarily a function of carbonate, bicarbonate, and hydroxide content, it is taken as an indication of the concentration of these constituents.
A. True B. False

10. The calculation of the pH of a solution containing acids and/or bases is an example of a chemical speciation calculation, that is, a mathematical procedure for calculating the concentrations of all chemical species that are present in the solution. The complexity of the procedure depends on the?
A. Nature of the solution C. Alkaline earth metal concentrations
B. pH D. None of the above

11. Under normal circumstances 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 pH D. None of the above

12. Alkalinity of water is its acid-neutralizing capacity. It is the sum of all the titratable bases. The measured value may vary significantly with the?
A. End-point pH C. pH measurement(s)
B. Alkalinity D. None of the above

13. 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. The pH of a solution containing a weak base may require the?
A. Solution of a cubic equation C. Excess of alkaline earth metal concentrations
B. Non-linear simultaneous equations D. None of the above

Halogens- Halides
14. What is the negative ion often referred to as?
A. A halide proton C. Diatomic Compound
B. A halide ion D. None of the above

Chlorine
15. The only halogen is needed in relatively large amounts (as chloride ions) by humans?
A. Chlorine C. Fluoride
B. Iodine D. None of the above

Chapter 5 - Chlorine Section

Chlorine Gas Appearance and Odor
1. Chlorine is a greenish-yellow gas it will condense to an amber liquid at about _____F or at high pressures.
A. 32 degrees C. 29 degrees
B. -29.2 degrees D. None of the above

2. Lengthy exposures to chlorine gas may result in_____. Odor thresholds ranging from 0.08 to part per million (ppm) parts of air have been reported.
A. Exposure to chlorine C. Olfactory fatigue
B. Odor thresholds D. None of the above

Reactivity

3. Chlorine is also incompatible with?

A. Plastic C. Moisture, steam, and water
B. Palladium D. None of the above

Chlorine Exposure Limits

4. OSHA PEL is?

A. 10 PPM C. 1,000 PPM
B. 1 PPM D. None of the above

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

A. Combustible gas C. Noncombustible gas
B. Combustible liquid D. None of the above

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

A. 1.5 C. 2.5
B. 0.5 D. None of the above

Properties

7. In researching and synthesizing organic compounds some compounds that have at least one atom of the element carbon in their molecular structure. All living organisms, including humans, are composed of primarily of _____.

A. Organic compounds C. Inorganic compounds
B. Abundant chemical elements D. None of the above

Chlorine Gas Introduction

8. When chlorine is added into the water stream, chlorine hydrolyzes into?

A. HCL C. Hypochlorous acid (HOCl), and hydrochloric acid (HCl)
B. Bromoform D. None of the above

9. In alkaline conditions, _____becomes the predominant species and lacks the biocidal efficacy of the non-dissociated form.

A. HCl C. OCl-
B. HOCl D. None of the above

Chlorine Gas
Pathophysiology

10. As far as chlorine safety and respiratory protection, the intermediate _____of chlorine accounts for its effect on the upper airway and the lower respiratory tract.

A. Effects of Hydrochloric acid C. Water solubility
B. Vapor from Chlorine gas D. None of the Above

11. The odor threshold for chlorine gas is approximately?

A. 0.3-0.5 parts per million (ppm) C. 3-5 parts per million (ppm)
B. 3 parts per million (ppm) D. None of the Above

Solubility Effects
12. Which of the following is highly soluble in water?
A. Hydrochloric acid C. Hypochlorous base
B. H_2SO_4 D. None of the above

Early Response to Chlorine Gas
13. If you mix ammonia with chlorine gas, this compound reacts to form_____.
A. Chloramine gas C. Sulfuric gas
B. Chlorine gas D. None of the Above

Chlorine's Effectiveness
14. Chlorination is more effective as?
A. Water temperature increases C. Water cools down
B. Chlorine demand increases D. None of the above

Potent Germicide
15. One pound of elemental chlorine delivers approximately as much _____as one gallon of sodium hypochlorite (12.5% solution) or approximately 1.5 pounds of calcium hypochlorite (65% strength).
A. Free available chlorine C. Particular applications
B. Total chlorine D. None of the above

Chapter 6- Hypochlorites and Chloramines

Calcium Hypochlorite Section
1. Which of the following substances comes in two forms: powder and tablets?
A. Calcium hypochlorite C. Sodium hypochlorite
B. Hypochlorous Acid (HOCl) D. None of the above

Accuracy
2. Which compound's strengths vary so widely and are mostly unknown (the container usually says "less than 5%") that it is impossible to make up accurate in-use solutions without access to laboratory equipment?
A. Liquid chlorine C. Calcium hypochlorite
B. Solid chlorine D. None of the above

Effectiveness
3. Liquid Sodium hypochlorite and chlorine tablets produce Hypochlorous acid (HOCl) and?
A. Calcium hypochlorite C. Hypochlorite ion (OCl-) in solution
B. Oxygen D. None of the above

4. The ratio of Hypochlorous Acid to _____ increases with acidity.
A. Calcium hypochlorite C. Hypochlorite ion
B. Hypochlorous Acid (HOCl) D. None of the above

Comparison
5. Hypochlorite powder, solutions, and vapors are irritating and corrosive to the eyes, skin, and respiratory tract.
A. True B. False

Chlorine-Based Disinfectants Chloramines
Chloramine Disadvantages
6. Which residual in tap water can pass through membranes in dialysis machines and directly induce oxidant damage to red blood cells?
A. Chloramine C. Ammonia and chlorine compounds
B. Dichloramine D. None of the above

Chloramine Section
7. _____: $NH_3 + HOCl \rightarrow NH_2Cl + H_2O$
A. Free chlorine C. Monochloramine
B. Dichloramine D. None of the above

Chlorate Ion
8. Which of the following terms is predicted by VSEPR, about chlorate anions?
A. Acid/base balance C. Trigonal pyramidal structures
B. Stable perchlorates D. None of the above

9. _____were once widely used in pyrotechnics, though their use has fallen due to their instability.
A. Chlorates C. Chlorides
B. Perchlorates D. None of the above

Haloacetic Acids
10. What type of substances are haloacetic acids in which a halogen atom takes the place of a hydrogen atom in acetic acid?
A. Calcemic acids C. Carboxylic acids
B. Hypochlorite acids D. None of the above

Contaminants in Drinking Water
11. Which of the following terms expresses an exposure to such substances in drinking water has been associated with a number of health outcomes by epidemiological studies, although the putative agent in such studies has not been identified?
A. Carboxylic acids C. Electronegative halogens
B. Disinfection by-products D. None of the above

Emergency Procedures
12. When using chlorine gas: In addition to protective clothing and goggles, chlorine gas should be used only in a well-ventilated area so that any leaking gas cannot_____.
A. Concentrate C. Combust
B. Conflagrate D. None of the above

Summary
Disinfection Byproducts
13. Which term represents when disinfectants used in water treatment plants react with bromide and/or natural organic matter present in the source water?
A. Disinfection byproducts C. Occurring organic and inorganic matter in water
B. Naturally occurring bromide D. None of the above

Trihalomethanes (THM)

14. Which term represents are chloroform, bromodichloromethane, dibromochloromethane, and bromoform?

A. Chloroform C. Trihalomethanes
B. HAA5 D. None of the above

Haloacetic Acids (HAA5)

15. Which term represents substances in drinking water react with naturally occurring organic and inorganic matter in water?

A. Disinfection byproducts C. Occurring organic and inorganic matter in water
B. Microbial contaminants D. None of the above

Chapter 7- Safety and Chlorination Equipment Section

Chlorination Equipment Requirements

1. Which of the following shall also be located inside the chlorine room?

A. Gas vacuum line C. Mechanical gas proportioning equipment
B. Vacuum regulators D. None of the above

Capacity

2. Which of the following shall have the capacity to dose enough chlorine to overcome the demand and maintain the required concentration of the "free" or "combined" chlorine?

A. The chlorinator C. Constant pre-established dosage
B. Automatic proportional control D. None of the above

Methods of Control

3. Which piece if chlorination equipment is the feed rate of the chlorinator controlled by a flow proportional signal and a residual analyzer signal to maintain particular chlorine residual in the water?

A. Manual chlorine feed systems C. Mechanical gas proportioning equipment
B. Compound loop control system D. None of the above

Standby Provision

4. For uninterrupted chlorination, _____shall be equipped with an automatic changeover system. In addition, spare parts shall be available for all chlorinators.

A. Flow valves C. Gas chlorinators
B. Flow regulators D. None of the above

Chlorine Room Design Requirements

5. _____ may or may not be located inside the chlorine room.

A. The chlorinator C. Chlorine leak detection equipment
B. All chlorine cylinders D. None of the above

6. Chlorine rooms shall have_____, if a forced air system is used to heat the building.

A. Corrosion filters C. Cooling system
B. Separate heating systems D. None of the above

Storage of Chlorine Cylinders

7. Which chlorine safety related equipment term shall have provision for ventilation at thirty air changes per hour?

A. Cylinders or containers access C. The chlorine gas storage room
B. Scrubber(s) D. None of the above

Scrubbers

8. Chlorine combines with a wide variety of materials. These side reactions complicate the use of chlorine for disinfecting purposes, their _____must be satisfied before chlorine becomes available to accomplish disinfection.

A. Combined residual C. Demand for chlorine
B. Free chlorine residual D. None of the above

Chlorine Health Hazard Section

9. Which term expresses low levels of chlorine results in eye, nose, and throat irritation, sneezing, excessive salivation, general excitement, and restlessness?

A. Rambling C. Chronic exposure
B. Acute exposure D. None of the above

10. Which term expresses low levels of chlorine gas can result in a dermatitis known as chloracne, tooth enamel corrosion, coughing, sore throat, hemoptysis and increased susceptibility to tuberculosis?

A. Rambling C. Chronic exposure
B. Acute exposure D. None of the above

Inhalation

11. If breathing has stopped, give artificial respiration; if breathing is difficult, give oxygen if equipment and trained personnel are available. If exposed person is breathing, place in a comfortable position and keep person warm and at rest until medical assistance becomes available.

A. True B. False

Pre-hospital Management

12. Rescue personnel are at low risk of noncardiogenic pulmonary edema contamination from victims who have been exposed only to gases released from hypochlorite solutions. However, clothing or skin soaked with industrial-strength bleach or similar solutions may be corrosive to rescuers and may release harmful gases.

A. True B. False

13. Ingestion of hydrochlorite solutions rarely causes pain in the mouth or throat, dysphagia, stridor, drooling, odynophagia, and vomiting.

A. True B. False

14. Chronic exposure to gases released from ammonia solutions can cause coughing, eye and nose irritation, lacrimation, and a burning sensation in the chest.

A. True B. False

Rescuer Protection

15. Chemical-protective clothing is not necessary for direct contact with solid hypochlorite or concentrated solutions.

A. True B. False

Chapter 8- Alternative Disinfection Section

Chlorine Dioxide Section

1. ClO_2 generation uses _____ and chlorine gas.
A. Sodium chlorite ($NaClO_2$) C. Ozone
B. Hypochlorous acid D. None of the above

2. Which of the following compound(s) is formed from the dissolution of chlorine gas or sodium hypochlorite in water, has satisfactorily controlled microorganisms in cooling water systems?
A. Hydrochlorous acid C. Hypochlorous Acid
B. Chlorine gas D. None of the above

3. Which of the following compound(s) is much less aggressive to traditional corrosion inhibitors?
A. Chlorine gas C. NaOCl and HCl
B. Chlorine dioxide or ClO_2 D. None of the above

Ultraviolet Disinfection

4. A disinfection process involves exposing water to_____, which inactivates various microorganisms. The technique has enjoyed increased application in wastewater treatment but very limited application in potable water treatment.
A. Sterilizer C. Ultraviolet (UV) radiation
B. Electromagnetic energy D. None of the above

5. Heat is generated by the electric components of the UV system, adequate ventilation and cooling must be applied to the _____to reduce heat build-up, otherwise the ballasts could fail.
A. UV arrays C. UV reactor
B. Electromagnetic energy D. None of the above

Strongest Oxidizing Agent

6. Which compound is obtained by passing a flow of air or oxygen between two electrodes that are subjected to an alternating current in the order of 10,000 to 20,000 volts?
A. Liquid Ozone C. O_2
B. Ozone D. None of the above

7. Ozone is a _____ gas at room temperature.
A. Reddish C. Light blue
B. Yellowish D. None of the above

8. Ozone has a _____similar to that sometimes noticed during and after heavy electrical storms. In use, ozone breaks down into oxygen and nascent oxygen.
A. Self-policing pungent odor C. Pleasant odor of rain
B. H_2S odor D. None of the above

9. Ozone does not provide a system residual and should be used as a primary disinfectant only in conjunction with?
A. Dry sodium chlorite C. Free and/or combined chlorine
B. Chlorine dioxide D. None of the above

Alternate Disinfectants Section Summary
Chloramines
10. It is recommended that Chloramine be used in conjunction with a stronger disinfectant. It is best utilized as a?
A. Chloramine C. Stable distribution system disinfectant
B. T10 value disinfectant D. None of the above

Chlorine Dioxide
11. Which term provides good Giardia and virus protection but its use is limited by the restriction on the maximum residual of 0.5 mg/L ClO_2/chlorite/chlorate allowed in finished water?
A. Chlorinated byproducts C. Ammonia residual(s)
B. Chlorine dioxide D. None of the above

12. According to the text, which chemical is explosive and can cause fires in feed equipment if leaking solutions or spills are allowed to dry out?
A. Dry sodium chlorite C. Ammonia
B. Chlorine dioxide D. None of the above

Ozone
13. Which term must be determined for the ozone basin alone; an accurate T10 value must be obtained for the contact chamber, residual levels measured through the chamber and an average ozone residual calculated?
A. Ozone CT (Contact time) C. Free and/or combined chlorine
B. Residual levels D. None of the above

14. Ozone does not provide a system residual and should be used as a primary disinfectant only in conjunction with free and/or combined chlorine.
A. True B. False

15. Ozone may also be used as _____for removal of taste and odor, or may be applied as a pre-disinfectant.
A. An oxidant C. System residual
B. Reducer D. None of the above

Chapter 9- Respiratory Protection Chapter

Types of Respirators- Commonly Used Respirators (Air Purifying)
1. _____ is a type of respirator worn over the nose and mouth to protect the respiratory system from certain nuisance dusts, mists, etc.
A. An Air-Line Respirator C. A Disposable Dust Mask
B. A Full-Face Respirator D. None of the above

2. Dust masks cannot be fit tested, are generally single use, are not recognized as proper respiratory protection, and may not be worn if a _____exists.
A. Proper respirator C. Potential for overexposure
B. Maximum concentration D. None of the above

3. Half-Face Respirators generally operate under negative pressure within the respirator which is created by the wearer's breathing through the filter cartridges. Protection is only gained if there is a proper seal of the _____.

A. Proper respiratory protection
B. Mask
C. Respirator face piece
D. None of the above

Less Commonly Used Types Respirators (Air Supplying)

4. Self-Contained Breathing Apparatus (SCBA) respirators supply clean air from a compressed air tank carried on the wearer's back. SCBA respirators are highly mobile and are used primarily for _____.

A. Proper respiratory protection
B. Maximum concentration
C. Emergency response or rescue work
D. None of the above

Respirator Filters/Cartridges

5. The cartridges used for _____ must be either equipped with an end-of-service life indicator (ESLI) or a cartridge change schedule has to be established.

A. Air-purifying respirators
B. Full-Face Respirators
C. Air-line Respirators
D. None of the above

Protection Factors

6. The protection factor of a respirator is based on the ratio of two concentrations: the _____ outside the respirator to the contaminant concentration inside the respirator.

A. Atmosphere
B. Oxygen
C. Contaminant concentration
D. None of the above

Using up the air supply

7. When using a _____, keep checking the gauges and listening for alarms. Be ready to leave the area immediately if there is a problem.

A. Gas meter
B. SCBA
C. Dust mask
D. None of the above

Cleaning Respirators

8. Respirators stored for emergency use must be inspected _____ when not in use, and also after each use.

A. Monthly
B. Weekly
C. Annually
D. None of the above

Operating Procedures

9. Operating procedures must include operating steps for initial startup, normal and temporary operations, emergency shutdown, _____, normal shutdown, and startup after a turnaround or an emergency shutdown.

A. Documenting work
B. Emergency operations
C. Gas and vapor detection
D. None of the above

Contractor Employees

10. According to the text, process safety training and _____ are also required for contractors who work on-site.

A. Logs
B. Safety performance
C. Safety programs
D. None of the above

The Contractor has Responsibilities, too

11. Contractors must make sure that their employees understand _____, are trained to work safely, and follow the safety rules of the facility in which they're working.

A. Time schedules
B. Potential job-related hazards
C. The scope of the work
D. None of the above

Written Respiratory Protection Program

12. The employer is required to develop and implement a written respiratory protection program with _____ and elements for required respirator use.

A. Gas and vapor contaminant limits
B. Safety performance
C. Required worksite-specific procedures
D. None of the above

Gas and Vapor Contaminants

13. According to the text, gas and vapor contaminants can be classified according to their _____.

A. Chemical characteristics
B. Hazard risk
C. Toxic level
D. None of the above

14. Vaporous contaminants classified as organometallic compounds are generally comprised of _____. Tetraethyllead and organic phosphates are examples.

A. Inert gases
B. Pollutants
C. Metals attached to organic groups
D. None of the above

Hazard Assessment

15. Breathing zone sampling frequency should be sufficient to assess the _____ under the variable operating and exposure conditions.

A. Respirator requirements
B. Atmosphere's oxygen content
C. Average exposure
D. None of the above

Chapter 10- Lab Analyst Section

1. Turbidity is measured to evaluate the performance of _____.

A. Water treatment plant(s)
B. An aesthetic point
C. Colloidal to coarse dispersions
D. None of the above

2. Turbidity is caused by wide variety of suspended matter that range in size from colloidal to coarse dispersions, depending upon the_____, and ranges from pure inorganic substances to those that are highly organic in nature.

A. Water treatment plant(s)
B. An aesthetic point
C. Degree of turbulence
D. None of the above

3. Turbid waters are undesirable from _____ of view in drinking water supplies.

A. Water treatment plant(s)
B. An aesthetic point
C. Colloidal to coarse dispersions
D. None of the above

Surface Water (SW) System Compliance

4. Sample the _____ at the clear well

A. Individual filter effluent
B. 95% of samples
C. Combined filter turbidity
D. None of the above

5. 0.34 NTU in _____, never to exceed 1.0 NTU spike
A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

6. Sample turbidity at each _____
A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

Disinfection Key
7. 99.99% or 4 log inactivation of _____
A. Crypto C. Giardia lamblia cysts
B. Enteric viruses D. None of the above

8. 99% or 2 log inactivation of _____
A. Crypto C. Giardia lamblia cysts
B. Enteric viruses D. None of the above

Turbidity Key
9. Turbidity can be particles in the water consisting of finely divided solids, larger than bacteria, visible by the naked eye; ranging in size from 10 to 150mm.
A. True B. False

Cloudy Water
10. In order to have gravity affect these particles, we must somehow make them larger, somehow have them come together (agglomerate); in other words, somehow make them "stick" together, thereby increasing their size and mass.
A. True B. False

Method 1623 - Cryptosporidium and Giardia Analysis
11. Washing the equipment free of residual sodium hypochlorite solution with three rinses of filter-sterilized water; do not de-chlorinate the equipment using?
A. Sodium thiosulfate C. Sodium hypochlorite solution
B. Sulfuric acid D. None of the above

Laboratory Analysis- QA/QC Activities and Measures
12. QA/QC activities and measures to take to reduce contamination.
Use a sterilization indicator, such as autoclave tape, in preparing viral plaques and other equipment for collection of microbiological samples to determine whether adequate temperatures and pressures have been attained during autoclaving.
A. True B. False

13. Prepare a separate set of E. coli host cultures for microbiological sampling at each site.
A. True B. False

Field personnel should do the following:
14 Prepare _____, a 50- to 100-mL aliquot of sterile buffered water plated before the sample—for every sample by field personnel for total coliform, E. coli, and enterococci analyses to determine the sterility of equipment and supplies.
A. Reagent water quality C. An MF equipment blank
B. An environmental sample D. None of the above

Quality Assurance and Quality Control in the Laboratory

15. According to the text, microbiology laboratories must follow good laboratory practices—cleanliness, safety practices, procedures for_____, specifications for reagent water quality—as set forth by American Public Health Association.

A. Reagent water quality
B. Microbiological sampling
C. Media preparation
D. None of the above

Disinfection Principles CEU Course Assignment - Number 5

The Disinfection Principles CEU Assignment is available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e-mail it back to TLC.

You will have 90 days from 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. 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 manual and make copy for yourself.

Multiple Choice, please select only one answer per question. There are no intentional trick questions.

Hazard Communication Section

1. All employers with hazardous chemicals in their workplaces must have labels and safety data sheets for their exposed workers, and train them to handle the chemicals appropriately.
A. True B. False

2. The Hazard Communication Standard in 1983 gave the workers the_____ but the new Globally Harmonized System gives workers the 'right to understand.'
A. Right to understand C. Right to know
B. Hazard information D. None of the above

More on the Revised Hazard Communication Standard

3. Which of the following will provide a common and coherent approach to classifying chemicals and communicating hazard information on labels and safety data sheets?
A. SDS/MSDS C. Hazard Communication Standard (HCS)
B. Safety data sheets and labels D. None of the above

Rationale

4. In order to ensure _____ in the workplace, information about the identities and hazards of the chemicals must be available and understandable to workers.
A. Chemical safety C. Hazardous chemicals
B. Hazard information D. None of the above

5. Chemical manufacturers and importers are required to evaluate the_____ they produce or import, and prepare labels and safety data sheets to convey the hazard information to their downstream customers.
A. Specific criteria C. Hazard communication elements
B. Hazards of the chemicals D. None of the above

Major changes to the Hazard Communication Standard

6. Which of the following provides specific criteria for classification of health and physical hazards, as well as classification of mixtures?
A. Hazard classification C. Hazard communication elements
B. Safety data sheets and labels D. None of the above

7. Labels: Chemical manufacturers and importers will be required to provide a label that includes a harmonized signal word, pictogram, and hazard statement for each?
A. Specific, detailed criteria C. Hazard class and category
B. Standardized label elements D. None of the above

What is the Globally Harmonized System?
8. The result of this negotiation process is the United Nations' document entitled "Globally Harmonized System of Classification and Labeling of Chemicals," commonly referred to as?
A. Revised HCS C. The Purple Book
B. Model regulation D. None of the above

What Hazard Communication Standard provisions are unchanged in the revised HCS?
9. Which of the following has been changed to "hazard classification" and "material safety data sheet" was changed to "safety data sheet?"
A. Revised HCS C. Hazard determination
B. Model regulation D. None of the above

1.1 What is the GHS?
10. The GHS is a system for _____ the classification and labeling of chemicals. It is a logical and comprehensive approach to: Defining health, physical and environmental hazards of chemicals;
A. Multiple safety data sheets C. Standardizing and harmonizing
B. Hazards to human health D. None of the above

11. The GHS Document thus provides countries with the regulatory building blocks to develop or modify existing national programs that address classification of hazards and transmittal of information about those hazards and associated protective measures. This helps to ensure the safe use of chemicals as they move through the _____ from "cradle to grave."
A. Product life cycle C. Hazardous properties of chemicals
B. Hazards to human health D. None of the above

1.7 What are the benefits?
12. The basic goal of _____ - is to ensure that employers, employees and the public are provided with adequate, practical, reliable and comprehensible information.
A. Achieve a global approach C. Preventive and protective measures
B. Hazard communication D. None of the above

3.0 What is Classification?
13. For several hazards _____- are semi-quantitative or qualitative. Expert judgment may be required to interpret these data.
A. The global approaches C. The GHS criteria
B. The regulatory changes D. None of the above

Hazard Classification
14. Which of the following is used to indicate that only the intrinsic hazardous properties of substances and mixtures are considered?
A. Self-classification C. GHS labels and/or Safety Data Sheets
B. Hazard classification D. None of the above

15. Tests that determine hazardous properties conducted according to internationally recognized scientific principles can be used for purposes of?
A. Hazard classification C. Existing hazard communication regulatory schemes
B. Safety Data Sheets D. None of the above

(S) Means the answer can be plural or singular in nature

Chapter 2- Waterborne Pathogens Section

Protozoan Caused Diseases

1. Which of the following bugs is larger than bacteria and viruses but still microscopic; they invade and inhabit the gastrointestinal tract?
A. Hepatitis A C. Protozoan pathogens
B. E.coli D. None of the above

Giardia lamblia

2. Which of the following bugs has been responsible for more community-wide outbreaks of disease in the U.S. than any other, and drug treatment are not 100% effective?
A. Giardia lamblia C. Giardiasis
B. Cryptosporidiosis D. None of the above

Primary Waterborne Diseases Section

3. Legionnaire's disease, which causes a severe pneumonia, and the second, _____, which is a non-pneumonia illness; it's typically an influenza-like illness, and it's less severe.
A. Pontiac fever C. Typhoid fever
B. Yellow fever D. None of the above

4. Legionella, prevention. Legionella in water systems. Hot water in tanks should be maintained between _____degrees Centigrade.
A. 81 to 100 C. 71 and 77
B. 110 to 210 D. None of the above

Waterborne Bacterial Diseases

5. Campylobacteriosis outbreaks have most often been associated with food, especially chicken and un-pasteurized milk, as well as un-chlorinated water. These organisms are also an important cause of “travelers’ diarrhea.” Medical treatment generally is not prescribed for campylobacteriosis because recovery is usually rapid.
A. True B. False

6. Cholera, Legionellosis, salmonellosis, shigellosis, yersiniosis, are other bacterial diseases that can be transmitted through water. All bacteria in water are readily killed or inactivated with chlorine or other disinfectants.
A. True B. False

7. Campylobacteriosis is the most common diarrheal illness caused by bacteria. Other symptoms include abdominal pain, malaise, fever, nausea and vomiting; and begin three to five days after exposure. The illness is frequently over within two to five days and usually lasts no more than 10 days.
A. True B. False

Dangerous Waterborne Microbes

8. Which of the following are Gram-negative, non-spore-forming, facultatively anaerobic, non-motile bacteria.

A. Fecal coliform bacteria C. Shigellae
B. Cryptosporidium D. None of the above

9. Which of the following are microscopic organisms that live in the intestines of warm-blooded animals? They also live in the waste material, or feces, excreted from the intestinal tract. When fecal coliform bacteria are present in high numbers in a water sample, it means that the water has received fecal matter from one source or another.

A. Fecal coliform bacteria C. Shigella dysenteriae
B. Cryptosporidium D. None of the above

10. Which of the following are usually harmless, occur in high densities in their natural environment and are easily cultured in relatively simple bacteriological media?

A. Indicator bacteria C. Viruses
B. Amoebas D. None of the above

11. Indicators in common use today for routine monitoring of drinking water include total coliforms, fecal coliforms, and?

A. Cryptosporidium C. Escherichia coli (E. coli)
B. Protozoa D. None of the above

12. According to the text, the routine microbiological analysis of your water is for?

A. Contamination C. Coliform bacteria
B. Colloids D. None of the above

Bacteria Sampling

13. Water samples for _____must always be collected in a sterile container.

A. Amoebas C. Viruses
B. Bacteria tests D. None of the above

The three (3) types of samples are:

14. A PWS incurs an E. coli MCL violation.

A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

15. A PWS collecting at least 40 samples per month has greater than 5.0 percent of the routine/repeat samples in the same month that are TC+.

A. Trigger: Level 1 Assessment C. All of the above
B. Trigger: Level 2 Assessment D. None of the above

Chapter 3- Disinfection Rule Section

Chlorine DDBP

1. Chloramines are formed by reactions with?

A. Acid and Cl_2 C. Folic Acid and Cl2
B. Ammonia and Cl_2 D. None of the above

Microbial Regulations

2. Which rule specifies treatment criteria to assure that these performance requirements are met; they include turbidity limits, disinfectant residual, and disinfectant contact time conditions?

A. Long Term 1 Enhanced Surface Water Treatment Rule
B. Interim Enhanced Surface Water Treatment Rule
C. Surface Water Treatment Rule
D. None of the above

3. Which rule was established to maintain control of pathogens while systems lower disinfection byproduct levels to comply with the Stage 1 Disinfectants/Disinfection Byproducts Rule and to control Cryptosporidium?

A. Long Term 1 Enhanced Surface Water Treatment Rule
B. Interim Enhanced Surface Water Treatment Rule
C. Surface Water Treatment Rule
D. None of the above

EPA's Drinking Water Regulations for Disinfectants

4. All disinfectants form DBPs in one of two reactions: Chorine and chlorine-based compounds (halogens) react with organics in water causing the _____to substitute other atoms resulting in halogenated by-products.

A. Chlorine atom C. Carbon atom
B. Hydrogen atom D. None of the above

5. Oxidation reactions are where chlorine _____compounds present in water.

A. Reduces C. Oxidizes
B. Forms D. None of the above

6. _____are also formed when multiple disinfectants are used.

A. Secondary by-products C. Chorine and chlorine-based compounds (halogens)
B. Primary by-products D. None of the above

Public Health Concerns

7. Which of the following rules along with the Disinfection Byproducts Rule applies to all community and nontransient non-community water systems that treat their water with a chemical disinfectant?

A. Groundwater Rule (GWR) C. Long Term 2 Enhanced Surface Water Treatment Rule
B. The Stage 1 Disinfectants D. None of the above

Stage 2 DBP Rule Federal Register Notices

8. Which of the following rules is one part of the Microbial and Disinfection Byproducts Rules, which are a set of interrelated regulations that address risks from microbial pathogens and disinfectants/disinfection byproducts?

A. Groundwater Rule (GWR) C. Long Term 2 Enhanced Surface Water Treatment Rule (LT2)
B. The Stage 2 DBP rule D. None of the above

9. Which of the following rules focuses on public health protection by limiting exposure to DBPs, specifically total trihalomethanes and five haloacetic acids, which can form in water through disinfectants used to control microbial pathogens?

A. Stage 1 DBPR C. Long Term 2 Enhanced Surface Water Treatment Rule
B. The Stage 2 DBP rule D. None of the above

Are THMs and HAAs the only disinfection byproducts?

10. The presence of _____is representative of the occurrence of many other chlorination DBPs; thus, a reduction in the TTHM and HAA5 generally indicates a reduction of DBPs from chlorination.

A. Chlorine and chloramine C. TTHM and HAA5
B. Classes of DBPs D. None of the above

Chlorine By-Products

11. The most common chlorination by-products found in U.S. drinking water supplies are?

A. Chlorate and Chlorite C. Ammonia and THMS
B. Trihalomethanes (THMs) D. None of the above

Risks and Benefits of Chlorine

12. Many cities utilize the use ozone to disinfect their source water and to reduce formation of this parameter?

A. Chlorate and Chlorite C. Chloramines
B. Trihalomethanes (THMs) D. None of the above

13. _____ is a highly effective disinfectant, it breaks down quickly, so that small amounts of _____ or other disinfectants must be added to the water to ensure continued disinfection as the water is piped to the consumer's tap.

A. Ozone, Chlorine C. Chlorine Dioxide, Chlorine
B. Chlorite, Chlorine D. None of the above

14. Modifying water treatment facilities to use _____ can be expensive, and _____ treatment can create other undesirable by-products that may be harmful to health if they are not controlled (e.g., bromate).

A. Ozone, Chlorine C. Ozone, Ozone
B. Chlorite, Chlorine D. None of the above

15. Which term is a weaker disinfectant than chlorine, especially against viruses and protozoa; however, they are very persistent and, as such, can be useful for preventing re-growth of microbial pathogens in drinking water distribution systems?

A. UV C. Chloramines
B. Chlorite D. None of the above

Chapter 4- Water Chemistry Section

pH Testing Section

1. When an atom loses _____and thus has more protons than electrons, the atom is a positively-charged ion or cation.

A. A proton C. An electron
B. Charge D. None of the above

2. Pure water has a pH very close to?

A. 7 C. 7.7
B. 7.5 D. None of the above

3. _____ are determined using a concentration cell with transference, by measuring the potential difference between a hydrogen electrode and a standard electrode such as the silver chloride electrode.
A. Primary pH standard values C. pH measurement(s)
B. Alkalinity D. None of the above

4. Mathematically, pH is the negative logarithm of the activity of the (solvated) hydronium ion, more often expressed as the measure of the?
A. Electron concentration C. Hydronium ion concentration
B. Alkalinity concentration D. None of the above

5. pH 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. Acid-base behavior D. None of the above

6. Which of the following terms may be used to measure pH, by making use of the fact that their color changes with pH?
A. Indicators C. A set of non-linear simultaneous equations
B. Spectrophotometer D. None of the above

7. In chemistry, pH is a measure of the acidity or basicity of an aqueous solution. Solutions with a pH greater than 7 are said to be acidic and solutions with a pH less than 7 are basic or alkaline.
A. True B. False

8. Because the alkalinity of many surface waters is primarily a function of carbonate, bicarbonate, and hydroxide content, it is taken as an indication of the concentration of these constituents.
A. True B. False

9. Measurement of pH for aqueous solutions can be done with a glass electrode and a pH meter, or using indicators like strip test paper.
A. True B. False

10. The calculation of the pH of a solution containing acids and/or bases is an example of a chemical speciation calculation, that is, a mathematical procedure for calculating the concentrations of all chemical species that are present in the solution. The complexity of the procedure depends on the?
A. Nature of the solution C. Alkaline earth metal concentrations
B. pH D. None of the above

11. Under normal circumstances 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 pH D. None of the above

12. Alkalinity of water is its acid-neutralizing capacity. It is the sum of all the titratable bases. The measured value may vary significantly with the?
A. End-point pH C. pH measurement(s)
B. Alkalinity D. None of the above

Halogens- Halides

13. What is the negative ion often referred to as?

A. A halide proton C. Diatomic Compound
B. A halide ion D. None of the above

14. Many synthetic organic compounds such as plastic polymers, and a few natural ones, contain halogen atoms; these are known as halogenated compounds or?

A. Salts C. Hydrastatic acid
B. Organic halides D. None of the above

Chlorine

15. The only halogen is needed in relatively large amounts (as chloride ions) by humans?

A. Chlorine C. Fluoride
B. Iodine D. None of the above

Chapter 5 -Chlorine Section

Chlorine Gas Appearance and Odor

1. Lengthy exposures to chlorine gas may result in_____. Odor thresholds ranging from 0.08 to part per million (ppm) parts of air have been reported.

A. Exposure to chlorine C. Olfactory fatigue
B. Odor thresholds D. None of the above

Reactivity

2. What is formed when chlorine is in contact with combustible substances (such as gasoline and petroleum products, hydrocarbons, turpentine, alcohols, acetylene, hydrogen, ammonia, and sulfur), reducing agents, and finely divided metals?

A. Fires and explosions C. Moisture, steam, and water
B. Odor thresholds D. None of the above

Flammability

3. Keep unnecessary people away; isolate the hazard area and deny entry. For a massive fire in a cargo area, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from the area and let the fire burn. Emergency personnel should stay out of low areas and Ventilate closed spaces before entering.

A. True B. False

What Happens to Chlorine When it Enters the Environment?

4. When chlorine is released to soil, chlorine will react with moisture forming free unstable oxygen radicals.

A. True B. False

Chlorine Exposure Limits

5. OSHA PEL is?

A. 10 PPM C. 1,000 PPM
B. 1 PPM D. None of the above

6. Chlorine can be readily compressed into a clear, amber-colored liquid, a _____, and a strong oxidizer.
A. Combustible gas C. Noncombustible gas
B. Combustible liquid D. None of the above

Properties
7. In researching and synthesizing organic compounds some compounds that have at least one atom of the element carbon in their molecular structure. All living organisms, including humans, are composed of primarily of _____.
A. Organic compounds C. Inorganic compounds
B. Abundant chemical elements D. None of the above

Chlorine Gas Introduction
8. When chlorine is added into the water stream, chlorine hydrolyzes into?
A. HCL C. Hypochlorous acid (HOCl), and hydrochloric acid (HCl)
B. Bromoform D. None of the above

9. Which of the following removes alkalinity, pH depression and system corrosion could occur?
A. HCl C. pH of 7.0 than at pH 8.5
B. HOCl D. None of the above

Chlorine Gas
Pathophysiology
10. As far as chlorine safety and respiratory protection, the intermediate _____of chlorine accounts for its effect on the upper airway and the lower respiratory tract.
A. Effects of Hydrochloric acid C. Water solubility
B. Vapor from Chlorine gas D. None of the Above

11. The odor threshold for chlorine gas is approximately?
A. 0.3-0.5 parts per million (ppm) C. 3-5 parts per million (ppm)
B. 3 parts per million (ppm) D. None of the Above

Solubility Effects
12. Which of the following is highly soluble in water?
A. Hydrochloric acid C. Hypochlorous base
B. H_2SO_4 D. None of the above

Early Response to Chlorine Gas
13. If you mix ammonia with chlorine gas, this compound reacts to form_____.
A. Chloramine gas C. Sulfuric gas
B. Chlorine gas D. None of the Above

Chlorine's Effectiveness
14. The effectiveness of chlorination depends on the _____ of the water, the concentration of the chlorine solution added, the time that chlorine is in contact with the organism, and water quality.
A. Chlorine residual C. Breakpoint
B. Chlorine demand D. None of the above

15. Which term is used when disinfection decreases, as the concentration of the chlorine increases?
A. Breakpoint C. Required contact time
B. Chlorine level D. None of the above

Chapter 6- Hypochlorites and Chloramines

Sodium Hypochlorite Exposure - Routes of Exposure -Inhalation
1. Which of the following can liberate toxic gases such as chlorine?
A. Hypochlorite solutions C. Ammonia
B. Higher levels of O_2 D. None of the above

Sources/Uses
2. Which compounds are used primarily as oxidizing and bleaching agents or disinfectants? They are components of commercial bleaches, cleaning solutions, and disinfectants for drinking water and waste water purification systems and swimming pools.
A. Sodium hydroxide or lime C. Sodium and calcium hypochlorite
B. Hydrochloride solutions D. None of the above

Calcium Hypochlorite Section
3. Which of the following substances comes in two forms: powder and tablets?
A. Calcium hypochlorite C. Sodium hypochlorite
B. Hypochlorous Acid (HOCl) D. None of the above

Accuracy
4. Which compound's strengths vary so widely and are mostly unknown (the container usually says "less than 5%") that it is impossible to make up accurate in-use solutions without access to laboratory equipment?
A. Liquid chlorine C. Calcium hypochlorite
B. Solid chlorine D. None of the above

Effectiveness
5. Liquid Sodium hypochlorite and chlorine tablets produce Hypochlorous acid (HOCl) and?
A. Calcium hypochlorite C. Hypochlorite ion (OCl-) in solution
B. Oxygen D. None of the above

Chlorine-Based Disinfectants Chloramines
Chloramine Disadvantages
6. Which residual in tap water can pass through membranes in dialysis machines and directly induce oxidant damage to red blood cells?
A. Chloramine C. Ammonia and chlorine compounds
B. Dichloramine D. None of the above

Chloramine Section
7. _____: $NH_3 + HOCl \rightarrow NH_2Cl + H_2O$
A. Free chlorine C. Monochloramine
B. Dichloramine D. None of the above

8. _____: $NHCl2 + 3HOCl \rightarrow NHCl_3 + 3H_2O$
A. Trichloramine C. Ammonia and chlorine compounds
B. Dichloramine D. None of the above

Chlorate Ion

9. Which of the following terms is predicted by VSEPR, about chlorate anions?

A. Acid/base balance
C. Trigonal pyramidal structures
B. Stable perchlorates
D. None of the above

Chloride Ion

10. The salts of _____ contain chloride ions and are also be called chlorides.

A. Hydrochloric acid
C. Hypochlorous acid
B. H_2SO_4
D. None of the above

Chlorite Ion

11. The chlorite ion is?

A. ClO_2-
C. ClO_3-,
B. ClO_4
D. None of the above

Haloacetic Acids

12. What type of substances are haloacetic acids in which a halogen atom takes the place of a hydrogen atom in acetic acid?

A. Calcemic acids
C. Carboxylic acids
B. Hypochlorite acids
D. None of the above

Contaminants in Drinking Water

13. Which of the following terms expresses an exposure to such substances in drinking water has been associated with a number of health outcomes by epidemiological studies, although the putative agent in such studies has not been identified?

A. Carboxylic acids
C. Electronegative halogens
B. Disinfection by-products
D. None of the above

Hypochlorites

14. Hypochlorites are calcium or sodium salts of hypochlorous acid and are supplied either dry or in liquid form (as, for instance, in commercial bleach). The same residuals are obtained as with gas chlorine, but the effect on the _____of the treated water is different.

A. Temperature
C. Negative charge
B. pH
D. None of the above

Summary

Disinfection Byproducts

15. Which term represents when disinfectants used in water treatment plants react with bromide and/or natural organic matter present in the source water?

A. Disinfection byproducts
C. Occurring organic and inorganic matter in water
B. Naturally occurring bromide
D. None of the above

Chapter 7- Safety and Chlorination Equipment Section

Chlorination Equipment Requirements

1. Which of the following shall be included in the gas vacuum line between the vacuum regulator(s) and the chlorinator(s) to ensure that pressurized chlorine gas does not enter the gas vacuum lines leaving the chlorine room?

A. Gas vacuum line
B. A gas pressure relief system
C. Mechanical gas proportioning equipment
D. None of the above

Methods of Control

2. Which piece of chlorination equipment adjusts the chlorine feed rate automatically in accordance with the flow changes to provide a constant pre-established dosage for all rates of flow?

A. Manual chlorine feed valve
B. Constant flow rate(s)
C. Automatic proportional control
D. None of the above

Standby Provision

3. For uninterrupted chlorination, _____shall be equipped with an automatic changeover system. In addition, spare parts shall be available for all chlorinators.

A. Flow valves
B. Flow regulators
C. Gas chlorinators
D. None of the above

Chlorine Room Design Requirements

4. _____ should be outside the room at all entrance or viewing points and a clear wire-reinforced glass window shall be installed in such a manner as to allow the operator to inspect from the outside of the room.

A. Separate switches for fans and lights
B. Chlorine room ventilation system
C. Automatic chlorine leak detection
D. None of the above

Storage of Chlorine Cylinders

5. In very large facilities, entry into the chlorine rooms may be through a_____.

A. Vestibule from inside
B. Chlorine gas storage room
C. Vestibule from outside
D. None of the above

Scrubbers

6. Which term means the amount of chlorine required to produce a residual of 0.1 mg/l after a contact time of fifteen minutes as measured by Iodometric method of a sample at a temperature of twenty degrees in conformance with Standard methods?

A. Combined residual
B. Free chlorine residual
C. Chlorine Demand
D. None of the above

Chlorine Health Hazard Section

7. Which term expresses low levels of chlorine results in eye, nose, and throat irritation, sneezing, excessive salivation, general excitement, and restlessness?

A. Rambling
B. Acute exposure
C. Chronic exposure
D. None of the above

Inhalation

9. The nose and throat may become irritated; a stinging and burning sensation may be experienced. Immediate fatalities can occur as a result of suffocation. Delayed fatalities can occur as a result of pulmonary edema (fluid in the lungs). For this reason, rest and immediate attention after inhalation is important.

A. True B. False

10. If breathing has stopped, give artificial respiration; if breathing is difficult, give oxygen if equipment and trained personnel are available. If exposed person is breathing, place in a comfortable position and keep person warm and at rest until medical assistance becomes available.

A. True B. False

11. Liquid and concentrated gas will produce severe burns and injury on contact.

A. True B. False

Pre-hospital Management

12. Rescue personnel are at low risk of noncardiogenic pulmonary edema contamination from victims who have been exposed only to gases released from hypochlorite solutions. However, clothing or skin soaked with industrial-strength bleach or similar solutions may be corrosive to rescuers and may release harmful gases.

A. True B. False

Rescuer Protection

13. Hypochlorite is irritating to the skin and eyes and in some cases may release toxic gases.

A. True B. False

14. Positive-pressure, self-contained breathing apparatus (SCBA) is recommended in response to situations that involve exposure to potentially unsafe levels of Chlorine gas.

A. True B. False

15. Chemical-protective clothing is not necessary for direct contact with solid hypochlorite or concentrated solutions.

A. True B. False

Chapter 8- Alternative Disinfection Section

Chlorine Dioxide Section

1. ClO_2 generation uses _____ and chlorine gas.

A. Ozone
B. Hypochlorous acid
C. Sodium chlorite ($NaClO_2$)
D. None of the above

2. Chlorine gas is educted into a motive water stream in a ClO_2 generator forming?

A HOCl and HCl
B. Chlorine dioxide
C. Sodium thiosulfate
D. None of the above

3. Which of the following compound(s) under efficient generation, THMs are not formed and THM precursor(s) are reduced. In one application, THM formation was reduced from 34 m g/l to 1 m g/l?

A. ClO_2
B. $NaClO_2$
C. Sodium chlorate ($NaClO_3$) and sulfuric acid
D. None of the above

4. Which of the following compound(s) is formed from the dissolution of chlorine gas or sodium hypochlorite in water, has satisfactorily controlled microorganisms in cooling water systems?
A. Hydrochlorous acid C. Chlorine gas
B. Hypochlorous Acid D. None of the above

5. Which of the following compound(s) remains a gas in water, it does not have the corrosive tendencies of chlorine gas?
A. Sodium chlorite ($NaClO_2$) C. Chlorine dioxide or ClO_2
B. Sodium chlorate ($NaClO_3$) D. None of the above

6. Which of the following compound(s) tends to be much less, if not totally non-reactive, with many organic and inorganic compounds.
A. Sodium chlorite ($NaClO_2$) C. ClO_2
B. Hypochlorous acid D. None of the above

7. Which of the following compound(s) is much less aggressive to traditional corrosion inhibitors?
A. Chlorine gas C. NaOCl and HCl
B. Chlorine dioxide or ClO_2 D. None of the above

8. Which compound is a yellow-green gas with an irritating odor not unlike Chlorine?
A. Chlorine dioxide C. Ozone
B. Chlorine D. None of the above

Ultraviolet Disinfection
9. The microorganisms spend maximum time and contact with the outside of the quartz tube and the source of the?
A. UV rays C. Electromagnetic energy
B. Radiation D. None of the above

10. Which term represents the transfer of electromagnetic energy from a mercury arc lamp to a pathogen's DNA material, thus affecting its ability to replicate itself?
A. Transfer C. Electromagnetic energy
B. UV disinfection D. None of the above

Strongest Oxidizing Agent
11. Liquid Ozone is very unstable and can readily explode. As a result, it is not shipped and must be manufactured on-site.
A. True B. False

12. Ozone is a _____ gas at room temperature.
A. Reddish C. Light blue
B. Yellowish D. None of the above

Alternate Disinfectants Section Summary
Chloramines
13. In the production of _____, the ammonia residuals in the finished water, when fed in excess of stoichiometric amount needed, should be limited to inhibit growth of nitrifying bacteria.
A. Dry sodium chlorite C. Ammonia residual(s)
B. Chloramines D. None of the above

Chlorine Dioxide

14. Chlorine dioxide may be used for either taste or odor control or as a?

A. Chloramine C. Gas
B. Pre-disinfectant D. None of the above

Ozone

15. Which term must be determined for the ozone basin alone; an accurate T10 value must be obtained for the contact chamber, residual levels measured through the chamber and an average ozone residual calculated?

A. Ozone CT (Contact time) C. Free and/or combined chlorine
B. Residual levels D. None of the above

Chapter 9- Respiratory Protection Chapter

Types of Respirators- Commonly Used Respirators (Air Purifying)

1. _____ is a type of respirator worn over the nose and mouth to protect the respiratory system from certain nuisance dusts, mists, etc.

A. An Air-Line Respirator C. A Disposable Dust Mask
B. A Full-Face Respirator D. None of the above

2. _____ are similar to the half-face type, but they offer a better face piece fit and also protect the wearer's eyes from particularly irritating gases and vapors.

A. Air-Line Respirators C. Half-Face Respirators
B. Full-Face Respirators D. None of the Above

Less Commonly Used Types Respirators (Air Supplying)

3. _____ supply clean air to the wearer through a small diameter hose from a compressor or compressed air cylinders. Because the wearer must be attached to the hose at all times, mobility is limited.

A. Air-Line Respirators C. Disposable Dust masks
B. Full-Face Respirators D. None of the above

Protection Factors

4. The protection factor of a respirator is based on the ratio of two concentrations: the _____ outside the respirator to the contaminant concentration inside the respirator.

A. Atmosphere C. Contaminant concentration
B. Oxygen D. None of the above

Who Cannot Wear a Respirator?

5. Respirators cannot be worn when a person has _____ that comes between the sealing surface of the face piece and the face or interferes with valve function.

A. Clothing C. Facial hair
B. A damaged face piece D. None of the above

Using up the air supply

6. When using a _____, keep checking the gauges and listening for alarms. Be ready to leave the area immediately if there is a problem.

A. Gas meter C. Dust mask
B. SCBA D. None of the above

Operating Procedures

7. _____ must be accurate and must be written in easily understood language. Technical jargon should be avoided. Translations must be supplied if necessary.

A. Permits
B. Performance reviews
C. Operating procedures
D. None of the above

8. Operating procedures must include operating steps for initial startup, normal and temporary operations, emergency shutdown, _____, normal shutdown, and startup after a turnaround or an emergency shutdown.

A. Documenting work
B. Emergency operations
C. Gas and vapor detection
D. None of the above

9. Operating procedures must include _____, including what happens if workers don't conform to operating limits and how to avoid or correct such problems.

A. Permits
B. Performance reviews
C. Operating limits
D. None of the above

Written Respiratory Protection Program

10. The employer is required to develop and implement a written respiratory protection program with _____ and elements for required respirator use.

A. Gas and vapor contaminant limits
B. Safety performance
C. Required worksite-specific procedures
D. None of the above

11. The respirator protection program must be administered by _____.

A. Attendants
B. Entrants
C. A suitably trained program administrator
D. None of the above

Gas and Vapor Contaminants

12. According to the text, gas and vapor contaminants can be classified according to their _____.

A. Chemical characteristics
B. Hazard risk
C. Toxic level
D. None of the above

13. Substances that are liquids or solids at room temperature form _____ when they evaporate.

A. Chemical reactions
B. Vapors
C. Risks
D. None of the above

14. Alkaline gases such as ammonia and phosphine exist as alkalis or _____.

A. Metals attached to organic groups
B. Pollutants
C. Produce alkalis by reaction with water
D. None of the above

Hazard Assessment

15. Air samples must be taken with proper sampling instruments during all conditions of operation to determine an atmosphere's oxygen content or _____ and/or gaseous contaminants.

A. Respirator requirements
B. Concentration levels of particulate
C. Deficiency by displacement of air
D. None of the above

Chapter 10- Lab Analyst Section

1. Turbidity is measured to evaluate the performance of _____.
A. Water treatment plant(s) C. Colloidal to coarse dispersions
B. An aesthetic point D. None of the above

2. Turbidity is caused by wide variety of suspended matter that range in size from colloidal to coarse dispersions, depending upon the_____, and ranges from pure inorganic substances to those that are highly organic in nature.
A. Water treatment plant(s) C. Degree of turbulence
B. An aesthetic point D. None of the above

3. Turbid waters are undesirable from _____ of view in drinking water supplies.
A. Water treatment plant(s) C. Colloidal to coarse dispersions
B. An aesthetic point D. None of the above

Surface Water (SW) System Compliance
4. Sample the _____ at the clear well
A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

5. 0.34 NTU in _____, never to exceed 1.0 NTU spike
A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

6. Sample turbidity at each _____
A. Individual filter effluent C. Combined filter turbidity
B. 95% of samples D. None of the above

Disinfection Key
7. 99% or 2 log inactivation of _____
A. Crypto C. Giardia lamblia cysts
B. Enteric viruses D. None of the above

8. The chlorine residual leaving the plant must be = or _____ mg/L and measurable throughout the system.
A. > 0.2 C. < 0.2
B. ≤ 0.2 D. None of the above

Turbidity Key
9. Turbidity can be particles in the water consisting of finely divided solids, larger than bacteria, visible by the naked eye; ranging in size from 10 to 150mm.
A. True B. False

Cloudy Water
10. In order to have gravity affect these particles, we must somehow make them larger, somehow have them come together (agglomerate); in other words, somehow make them “stick” together, thereby increasing their size and mass.
A. True B. False

Method 1623 - Cryptosporidium and Giardia Analysis

11. Washing the equipment free of residual sodium hypochlorite solution with three rinses of filter-sterilized water; do not de-chlorinate the equipment using?

A. Sodium thiosulfate C. Sodium hypochlorite solution
B. Sulfuric acid D. None of the above

Laboratory Analysis
QA/QC Activities and Measures

12. QA/QC activities and measures to take to reduce contamination.
Use a sterilization indicator, such as autoclave tape, in preparing viral plaques and other equipment for collection of microbiological samples to determine whether adequate temperatures and pressures have been attained during autoclaving.

A. True B. False

13. Prepare a separate set of E. coli host cultures for microbiological sampling at each site.

A. True B. False

Field personnel should do the following:

14 Prepare _____, a 50- to 100-mL aliquot of sterile buffered water plated before the sample—for every sample by field personnel for total coliform, E. coli, and enterococci analyses to determine the sterility of equipment and supplies.

A. Reagent water quality C. An MF equipment blank
B. An environmental sample D. None of the above

Quality Assurance and Quality Control in the Laboratory

15. According to the text, microbiology laboratories must follow good laboratory practices—cleanliness, safety practices, procedures for_____, specifications for reagent water quality—as set forth by American Public Health Association.

A. Reagent water quality C. Media preparation
B. Microbiological sampling D. None of the above

When Finished with Your Assignment

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