

AALSO Exam Handbook

Introduction

This Exam Handbook is your guide to preparing for the AALSO Certification Exams.

AALSO members are the water quality and mechanical system professionals that move the water, design and maintain the systems, develop and distribute the products to manage the daily requirements for animals in our care at hundreds of facilities across the world. We care for the systems that make animal care possible. We are a 501(c)(6) non-profit organization focusing on the education and training of aquatic life support operators around the world. Formed in 1994, we are supported by the entire industry.

AALSO offers a multi-level competency acknowledgment program for life support operators and water quality technicians based on test scores received from exams administered by the AALSO certification committee. AALSO believes that the proficiency program's recognition criteria is based on practical, on-the-job applications and encourages Zoo and Aquarium institutions to incorporate this training into their employee development program.

Code of Ethics

AALSO expects high level of standards and professionalism from members and certificate holders that are fitting for institutions with live animals in their care and to instill confidence in the public that living collections are being cared for with competence and integrity. AALSO members and certificate holders are expected to follow all symposium testing rules, conduct themselves honestly, and not engage in any activities that could jeopardize the integrity of the certification exams.

Exam Rules and Security

In order to secure the integrity of the certification exams, all work and notes taken during the examination must be turned in with the exam. Test candidates are encouraged to use the examination itself to work out the problems, before filling out the answer sheet. Both the examination packet and the answer sheets must be returned to the certification committee members before leaving the testing site. You will be able to use the AALSO Field Guide, an AALSO approved calculator, and any notes taken during the study period at the symposium. Candidates who do not follow these rules may have their membership or certifications disqualified.

Exam Availability

Levels one, two and three exams for both life support operator and water quality technician are available at the annual symposium. To qualify for subsequent level exams, you must have successfully fulfilled the requirements and passed the supporting examination of the previous level(s). For each AALSO life support or water quality status level, you must have successfully fulfilled the requirements and scored a 70% or better on the corresponding examination in order to qualify for that level, as defined by AALSO. It is also possible to take the level one exams after attending one of AALSO's Education and Training (EaT) courses. These courses bring an AALSO instructor directly to a facility in order to train and certify operators and technicians who can not make it to the annual symposium.

Exam Eligibility

To qualify for level 2 and 3 of exam, you must be involved in the function or sales of life support operations, water quality, or be a student in an aquarium based program, and be an AALSO member in good standing.

Level one is available for industry members as well as for those looking to transition into roles from related industries or educational programs, and be an AALSO member in good standing. Associate Memberships are available

for individuals who are not currently employed in the aquatic animal care industry.

Levels two and three are awarded to any zoo or aquarium life support operator and/or water quality technician with relevant experience who successfully passed the corresponding exam covering set recognition criteria for that level.

The life support operator certification acknowledges general operator proficiency with tasks ranging from basic routine operations to advanced applications and theory, covering topics such as: sand filtration, biological filtration, chemical filtration, USDA regulations, cathodic protection, turbidity, safety, pump curves, trouble shooting, pool volume calculations, filter surface area calculations, and pool turnover rate calculations.

The water quality technician certification acknowledges general operator proficiency with task ranging from basic laboratory techniques to advanced applications and theory, covering topics such as: laboratory safety, laboratory equipment and measurements, quality assurance and assessment, nitrification, denitrification, basic microbiology monitoring, understanding stoichiometry and chemical reactions and dilutions.

Test Results Scoring

All tests are scored carefully by certification committee members. Committee members do not discuss the results with test candidates or other AALSO members. Test scores are kept confidential. A score of 70% or higher is considered passing for each level.

Test Results Notification

Certificates are handed out during the symposium's certification banquet and scores are posted privately to the member's accounts after the symposium.

Test Format

The Life Support exams are available in two formats: United States based exams with english units, or international versions with SI units. The water quality exams are universal and use SI units.

Life Support Operator Exam I

- 60 minutes for level I
- 25 Multiple Choice Questions
 - 15 Operational Questions
 - 5 Safety and Regulatory Questions
 - 5 Mathematical Calculations

Life Support Exam II

- 60 minutes for level II
- 25 Multiple Choice Questions
 - 14 Operational Questions
 - 4 Safety and Regulatory Questions
 - 7 Mathematical Calculations

Life Support Exam III

- 90 minutes for level III
- Approximately 25 Questions

Water Quality Exam I

- 60 minutes for level I
- 25 Multiple Choice Questions
 - 10 Water Quality Testing Theory Questions
 - 5 Safety and Regulatory Questions
 - 4 Analytical Equipment Questions
 - 5 Quality Control/Quality Assurance Questions
 - 1 Mathematical Calculation

Water Quality Exam II

- 60 minutes for level II
- 25 Multiple Choice Questions
 - 8 Water Quality Testing Questions

- 6 Chemistry Questions
- 4 Safety and Regulatory Questions
- 9 Mathematical Calculations

Water Quality Exam III

- 90 minutes for level III
- Approximately 25 Questions

Accommodations for Those with Physical or Learning Disabilities

In compliance with the Americans with Disabilities Act, reasonable accommodations can be provided for individuals who provide a physician's certificate documenting a physical or psychological disability that may affect the individual's ability to complete the certification examination. Written requests must be made no later than four weeks before the symposium.

Preparing for your Test

Individuals are responsible for preparing for their certification test. The AALSO Field Guide is a useful study tool and covers many of the topics that are on the examinations. The majority of content from the level I examinations can be found in the AALSO Field Guide. There is the potential for some content and knowledge to be acquired from on-the-job experience. The level II examinations also contain a majority of content from the field guide; however, more deductive reasoning, expanded calculations and deeper comprehension of the topics may be required. The level III examinations draw on theoretical and practical applications that may not be discussed fully in the field guide and require an advanced knowledge of the subject material. It may be necessary to consult additional, in-depth texts to ensure the mastery of life support and water quality needed to pass a level III exam.

Practice Examinations

AALSO Water Quality Technician Level 1 Practice Exam

1. Salinity is commonly measured using which unit?
 - A. CFU
 - B. NTU
 - C. mg/L
 - D. ppt

2. How would you prepare 100 mL of 0.0400 M KCl from 0.200 M KCl stock solution?
 - A. Withdraw 10.0 mL of 0.200 M KCl, place it in a partially filled 100 mL volumetric flask and add water until the final volume is 100 mL.
 - B. Withdraw 20.0 mL of 0.200 M KCl, place it in a partially filled 100 mL volumetric flask and add water until the final volume is 100 mL.
 - C. Withdraw 40.0 mL of 0.200 M KCl, place it in a partially filled 100 mL volumetric flask and add water until the final volume is 100 mL.
 - D. Withdraw 50.0 mL of 0.200 M KCl, place it in a partially filled 100 mL volumetric flask and add water until the final volume is 100 mL.

3. Which of the following is not considered Laboratory Personal Protective Equipment (PPE)?
 - A. Safety Glasses
 - B. Hair Tie
 - C. Face Shield
 - D. Lab Coat

4. Which of the following is a concern after a chemical spill?
 - A. Environmental release
 - B. Adequate engineering controls or PPE to protect staff during cleanup
 - C. Slip or Trip Hazard
 - D. All of the above

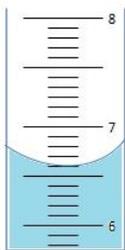
5. Where should flammable liquids be stored?
 - A. In a fume hood
 - B. In a locked cabinet
 - C. In the bed of a pickup truck
 - D. In an approved flammable liquid storage cabinet

6. If a water quality laboratory technician records data incorrectly, how should they respond?
 - A. Erase the misprint so it cannot be misinterpreted by husbandry staff
 - B. Draw a single line through the entry making sure that the inaccurate information is still legible. Initial and date the entry. State the reason for the error. Document the correct information.
 - C. Re-record the worksheet so the data is easy to read
 - D. Do not make any alterations to the record

7. Why should you never add water to acid?
 - A. The exothermic reaction could possibly splash the content (acid) out of the container.
 - B. The endothermic reaction could freeze the container causing it to shatter.
 - C. It would neutralize the acid too much to render it useless.
 - D. Nothing would happen. There is no difference if you add water to acid or acid to water.

8. Which of the following is not a disinfection byproduct of chlorine disinfection?
- A. Sodium hypochlorite
 - B. Trihalomethane compounds
 - C. Haloacetic acids
 - D. Chloroform
9. What is an alternative way to indirectly measure the amount of dissolved ozone in an aquarium?
- A. DPD test for chlorine or bromine
 - B. Specific Conductance
 - C. pH
 - D. Stray Voltage
10. Which of the following disinfection methods has a low potential for creating disinfection byproducts?
- A. Ozone
 - B. UV
 - C. Chlorine
 - D. Bromine
11. What is the best definition of alkalinity?
- A. The measurement of the amount of metals in water
 - B. The measurement of the amount of cations in water
 - C. The measurement of the pH buffering capacity in water
 - D. Any liquid with a pH greater than 7
12. A solution with a pH of 7 is considered to be:
- A. Acidic
 - B. Neutral
 - C. Basic
 - D. Strongly Acidic

13. List, in order of nitrification, the major compounds associated with the nitrogen cycle as it pertains to aquatic system health.
- A. Ammonium, Nitrate, Nitrite
 - B. Ammonia, Nitrate, Nitrite
 - C. Ammonium, Nitrite, Nitrate
 - D. Ammonia, Nitrite, Nitrate
14. Which of the following is true about $\text{NH}_3\text{-N}$?
- A. This form of ammonia is the unionized component
 - B. The measurement includes contributions from nitrite
 - C. The $\text{NH}_3\text{-N}$ form uses the molecular weight of only the nitrogen atoms
 - D. This formula expresses ammonium
15. Which of the following do not contribute to Conductivity/Salinity?
- A. Sulfates
 - B. Oxygen
 - C. Chlorides
 - D. Carbonates
16. What wavelength is considered part of the Visible Spectrum?
- A. 10 nm
 - B. 5000 nm
 - C. 500 nm
 - D. 200 nm
17. What is the volume of water in this graduated cylinder?

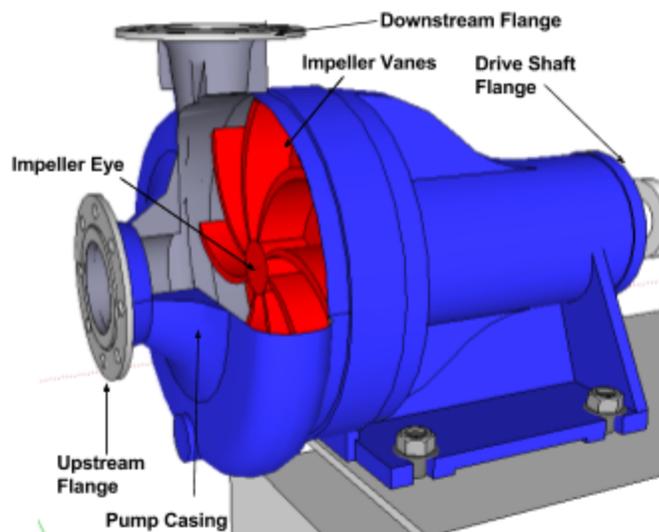


- A. 6.5 mL
 - B. 6.6 mL
 - C. 6.7 mL
 - D. 6.8 mL
18. When analyzing ammonia, a technician analyzed spiked a sample containing 0.05 ppm ammonia as N with a standard, adding 0.10 ppm ammonia as N. When she reads the value of her LFM on the spectrophotometer, she sees a result of 0.05 ppm. Her LFB was spiked with 0.10 ppm ammonia as N and her result was 0.09 ppm ammonia as N. What corrective action is appropriate
- A. Analyze another LFB
 - B. Re-prepare both LFM and LFB
 - C. Re-prepare LFM and if it still fails, consider using a different method
 - D. Discard secondary reference solution.
19. The veterinary staff indicated an elevated presence of goiters in your saltwater fish tank. He/she indicated that this is due to the reduced amount of iodine in the water. What could be the cause of the problem?
- A. Ozonation disinfection
 - B. Nitrogen Gas Saturation
 - C. pH and alkalinity
 - D. UV
20. When a measurement is repeatable and consistent it is said to have:
- A. High Precision
 - B. High Accuracy
 - C. High Significance
 - D. High Quality

21. Which of the following errors can be traced to defective equipment?
- A. Gross Errors
 - B. Systematic Errors
 - C. Random Errors
 - D. Significant Errors
22. A freshwater system with a carbon filter is tested weekly for chlorine, with a normal result of 1.0ppm pre-filter and n/d post-filter. A DPD test today shows a value of 0.8ppm post-filter. After performing a retest and getting a similar result, what is the next thing you should do?
- A. Check the date the carbon in the filter was last changed
 - B. Perform a total organic carbon analysis of the water
 - C. Test the alkalinity of the incoming water
 - D. Nothing, that value indicates no reason for further investigation
23. SDS is short for:
- A. Safest Defensive Strategy
 - B. Simple Dissolved Substance
 - C. Safety Data Sheet
 - D. Safe Data Set
24. What is the preferred glassware to use when doing a dilution?
- A. Erlenmeyer flask
 - B. Graduated Cylinder
 - C. Volumetric Flask
 - D. Beaker
25. What should be added to a sample taken from a chlorinated mammal pool for coliform testing?
- A. Sodium citrate
 - B. Sodium hypochlorite
 - C. Sodium thiosulfate
 - D. Sodium bicarbonate buffer

AALSO Life Support Operator Level 1 Practice Exam

1. A positive displacement pump that utilizes a set of rollers that compress and rotate across an elastomeric tube to pump a fluid is a:
 - A. Flexible impeller pump
 - B. Diaphragm pump
 - C. Centrifugal pump
 - D. Peristaltic pump



2. According to the above diagram, which part of the centrifugal pump does the motor connect to?
 - A. Pump casing
 - B. Impeller
 - C. Volute
 - D. Drive shaft flange

3. Which of the following life support system components could be categorized as mechanical filtration?

- A. Ultraviolet sterilizer
- B. Ozone contact tank
- C. Drum filter
- D. None of the above

4. Which of the following life support system components uses high flow rates and higher pressures to mechanically filter water?

- A. Ultraviolet sterilizer
- B. Carbon filter
- C. High pressure sand filter
- D. None of the above

5. A _____ valve uses the guillotine action of a solid wall to control the flow of water:

- A. Butterfly
- B. Ball
- C. Gate
- D. Globe

6. A globe valve uses _____ to control the flow of water:

- A. Wafer-like articulating disk
- B. Guillotine action of a solid wall
- C. Plug and baffle
- D. Spherical articulating disk

7. Which condition can decrease foam fractionator efficiency?
- A. Consistent flow rate through the fractionator
 - B. Large disruptive bubbles in the reaction column
 - C. Uniform bubble size in the reaction column
 - D. Higher salinity (such as full strength seawater)
8. Before entering a confined space, you should do all of the following EXCEPT:
- A. Lock out/tag out all mechanical equipment
 - B. Ensure adequate ventilation
 - C. Test oxygen levels and dangerous gases
 - D. Securely tie a rope around your waist to ensure rescue if necessary
9. Which of the following is a type of chemical filtration?
- A. Drum filter
 - B. Carbon filter
 - C. Sand filter
 - D. Bag filter
10. Channeling in a sand filter can be caused by
- A. Improper backwashing frequency
 - B. Broken lateral
 - C. Low filtering flow rates
 - D. Both A & B
11. What is the media flow rate range for a sand filter during normal operation?
- A. 5-10 Gal/min/ft²
 - B. 9-15 Gal/min/ft²
 - C. 15-18 Gal/min/ft²
 - D. 18-20 Gal/min/ft²

12. What is the appropriate way to dispose of burnt-out fluorescent bulbs that contain mercury?

- A. Recycle
- B. Compost
- C. Landfill
- D. Hazardous waste

13. An aquarium to be used as a sump tank is 6ft long, 2ft wide, and 2ft deep. While normally operating the sump will be 1/3 full. How many gallons will the sump hold when normally operating? (You may round answer to the nearest gallon)

- A. 120 gallons
- B. 24 gallons
- C. 179 gallons
- D. 60 gallons

14. OSHA requires SDS be in a central location that is readily accessible unless:

- A. They are secured in a locked office or file
- B. They are on or near the door to the room where the chemicals are used
- C. There are no exceptions
- D. The chemicals are only being stored, not used

15. You need to refill a tank, which contained 10,000 gallons of water before you removed 25% during a water exchange. You can fill at rate of 3,600 gph. How long will it take you to refill the tank?

- A. 41.66 minutes
- B. 31.66 minutes
- C. 60.66 minutes
- D. 66.66 minutes

16. A pump suction line pulls from a circular tank that sits 10 feet below the pump and discharges to the display aquarium 100 feet above on the fourth floor. What is the total static head at the pump?

- A. 110 ft
- B. 10 ft
- C. 90 ft
- D. 1,000 ft

17. Which condition decreases foam fractionator efficiency?

- A. Too little air injected into the foam fractionator.
- B. Dirty riser tube/chimney, and collection cup.
- C. Inconsistent flow rates and varying water level within the fractionator column.
- D. All of the above.

18. A 68,000 gallon Hippo exhibit has 4 recirculation pumps rated at 340 gpm each. What is the turnover time in minutes for this system?

- A. 90 minutes
- B. 50 minutes
- C. 39.5 minutes
- D. 200 minutes

19. If a pump is rated for 960 gpm, how many cubic feet per second (cfs) would that be?

- A. 1.92 cfs
- B. 128.34 cfs
- C. 2.14 cfs
- D. 16 cfs

20. Hazard(s) associated with UV bulbs

- A. Contain mercury
- B. Sharp when broken
- C. High voltage when operating
- D. All of the above

21. The effectiveness of disinfection of potentially pathogenic waterborne microorganisms through the use of the ozone is influenced the most by which of these factors?

- A. Temperature
- B. Concentration
- C. Salinity
- D. pH

22. What does LOTO stand for?

- A. Lock out, Tell operator
- B. Leave open, Take off
- C. Lock out, Tag out
- D. Your retirement plan

23. The tank material, HDPE is also known as.

- A. Hyper dense polyethylene
- B. High density proethane
- C. High density polyethylene
- D. Hyper dense proethane

24. Which of the following can change when powerheads are used?

- A. ORP increases
- B. ORP decreases
- C. Water temperature can increase
- D. Water temperature can decrease

25. What is a common cause of dead-heading a pump?
- A. Pump cavitation
 - B. The suction side of the pump is closed
 - C. The valve(s) directly downstream from the pump is(are) closed
 - D. Increasing water temperature

Answers for Water Quality Practice Exam:

- | | | |
|------|-------|-------|
| 1. D | 10. B | 19. A |
| 2. B | 11. C | 20. A |
| 3. B | 12. B | 21. B |
| 4. D | 13. D | 22. A |
| 5. D | 14. C | 23. C |
| 6. B | 15. B | 24. C |
| 7. A | 16. C | 25. C |
| 8. A | 17. B | |
| 9. A | 18. C | |

Answers for Life Support Practice Exam:

- | | | |
|------|-------|-------|
| 1. D | 10. D | 19. C |
| 2. D | 11. B | 20. D |
| 3. C | 12. D | 21. B |
| 4. C | 13. D | 22. C |
| 5. C | 14. C | 23. C |
| 6. C | 15. A | 24. C |
| 7. B | 16. A | 25. C |
| 8. D | 17. D | |
| 9. B | 18. B | |

For any additional questions, please email us at info@aalso.org.