

# 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 each Level 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.

Levels one, two or 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
- 25 Questions

### Water Quality Exam I

- 60 minutes for level I
- 25 Multiple Choice Questions
  - 10 Water Quality Testing Questions
  - 7 Safety and Regulatory Questions
  - 6 Analytical Equipment Questions
  - 2 Mathematical Calculations

### 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
- 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. How much Sodium Thiosulfate do you add to a bleached quarantine tank that is 375 gallons if the dose rate is 1 g/50 gallons?
  - A. 3.75 grams
  - B. 75 grams
  - C. 7.5 grams
  - D. 18.75 grams
2. Which of the following is wrong?
  - A. Calcium carbonate = Limestone
  - B. Calcium chloride = Lysine
  - C. Sodium hydroxide = Lye
  - D. Calcium hydroxide = Lime
3. Which of the following is not considered Laboratory Personal Protective Equipment (PPE)?
  - A. Face Shield
  - B. Safety Glasses
  - C. Leather Gloves
  - D. Lab Coat
4. Which is the preferred glassware to use when performing a dilution?
  - A. Erlenmeyer flask
  - B. Beaker
  - C. Graduated Cylinder
  - D. Volumetric Flask
5. Which of the following chemicals is not a regulated carcinogen?
  - A. Formalin/Formaldehyde
  - B. Ethanol
  - C. Asbestos
  - D. Cadmium

6. 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
7. What wavelength is considered part of the visible spectrum?
- A. 10 nm
  - B. 5,000 nm
  - C. 200 nm
  - D. 500 nm
8. What is the purpose of the blank used in a colorimeter?
- A. The blank zeroes the wavelength set on the colorimeter
  - B. The blank takes into account light being absorbed by the solvent and by the walls of the sample cell or cuvette
  - C. The blank has 0% transmittance and is used to account for background scattering of light
  - D. The blank ensures that your glassware is not contaminated with the target analyte
9. Which type of bacteria does USDA require to be monitored in enclosures with marine mammals?
- A. Enterics
  - B. E. coli
  - C. Coliforms
  - D. Vibrio
10. What should be added to a sample bottle collected from a chlorinated mammal pool for coliform testing?
- A. Sodium bicarbonate buffer
  - B. Sodium citrate
  - C. Sodium hypochlorite

D. Sodium thiosulfate

11. Which of the following buffer combinations is correct?
- A. pH 4 = yellow, pH 7 = pink, pH 10 = blue
  - B. pH 4 = pink, pH 7 = yellow, pH 10 = blue
  - C. pH 4 = pink, pH 7 = yellow, pH 10 = green
  - D. pH 4 = purple, pH 7 = pink, pH 10 = green
12. Which of the following do not contribute to conductivity/salinity?
- A. Sulfides
  - B. Chlorides
  - C. Oxygen
  - D. Carbonates
13. Which of the following is not a possible side effect from copper concentrations above therapeutic levels?
- A. Suppression of immune system
  - B. Mortality in certain species
  - C. Bubble Trauma
  - D. Damage to gills
14. Which of the following is not a byproduct of chlorine disinfection?
- A. Chloroform
  - B. Sodium hypochlorite
  - C. Trihalomethane compounds
  - D. Haloacetic acids
15. What is the best definition of alkalinity?
- A. The measurement of the amount of metals in water
  - B. The measurement of the pH buffering capacity in water
  - C. The measurement of the amount of cations in water
  - D. Any liquid with a pH greater than 7

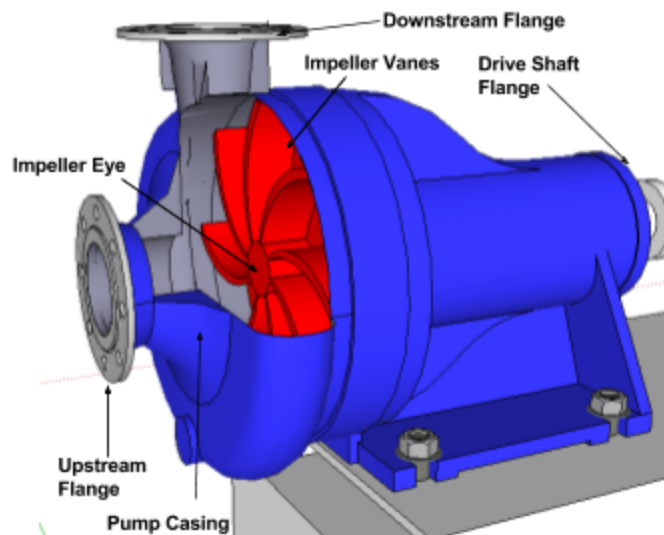


16. Where should flammable liquids be stored?
- A. In a fume hood
  - B. In a locked cabinet
  - C. In an approved flammable liquid storage cabinet
  - D. In the bed of a pickup truck
17. Which statement is false regarding the use of laboratory chemical hoods for ventilation in a laboratory setting?
- A. It is okay to put your head into a hood while in operation to check on an experiment
  - B. Always learn how the hood operates prior to use
  - C. Keep reactions and hazardous chemicals at least 6 inches behind the sash, farther if possible
  - D. Keep the chemical hood clean and clear
18. According to ANSI standards, how long must a safety eyewash run with continuous flow?
- A. 5 minutes
  - B. 10 minutes
  - C. 20 Minutes
  - D. 15 minutes
19. If you increase the temperature of the water in an aquarium, you \_\_\_\_\_ its ability to hold dissolved oxygen (DO).
- A. water temperature has no effect on DO
  - B. decrease
  - C. stabilize
  - D. increase
20. Salinity is commonly measured using which unit?
- A. ppt
  - B. CFU
  - C. NTU
  - D. mg/L

21. A solution with a pH of 7 is considered to be:
- A. Acidic
  - B. Basic
  - C. Neutral
  - D. Strongly Acidic
22. Nitrate in a water system is a product of:
- A. Denitrification
  - B. Low water temperature combined with high ORP
  - C. Dissolved minerals in the water
  - D. Biological filtration
23. A rectangular pool is 5 yards long, 10 feet wide and 4 foot 9 inches deep. How many gallons will it hold when full?
- A. 5,497.8 gallons
  - B. 5,329.5 gallons
  - C. 6,283.2 gallons
  - D. 1,776.5 gallons
24. SDS is short for:
- A. Simple Dissolved Substance
  - B. Safety Data Sheet
  - C. Safest Defensive Strategy
  - D. Safe Data Set
25. List, in order of nitrification, the major compounds associated with the nitrogen cycle as it pertains to aquatic system health.
- A. Nitrate, Nitrite, Ammonia
  - B. Nitrite, Nitrate, Ammonia
  - C. Ammonia, Nitrite, Nitrate
  - D. Ammonia, Nitrate, Nitrite

## 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/ft<sup>2</sup>
- B. 9-15 Gal/min/ft<sup>2</sup>
- C. 15-18 Gal/min/ft<sup>2</sup>
- D. 18-20 Gal/min/ft<sup>2</sup>

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. C | 9. C  | 17. A |
| 2. B | 10. D | 18. D |
| 3. C | 11. B | 19. B |
| 4. D | 12. C | 20. A |
| 5. B | 13. B | 21. C |
| 6. D | 14. B | 22. D |
| 7. D | 15. B | 23. B |
| 8. B | 16. C | 24. B |
|      |       | 25. 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](mailto:info@aalso.org).