

2014 North Central Mine Rescue Contest Wilmington, IL

Written Test – Technician Team Competition

Biomarine SCBA, Biopak 240S

*Directions: Select the letter preceding the **BEST** answer to each of the following questions.
Choose only one answer per question.*

MSHA Publication 3027 - Module 2 Mine Gases MSHA Publication 3027 - Module 3 Ventilation Metal and Nonmetal National Mine Rescue Contest Rules 2014

1. The technician team competition may include which of the following test components:
 - A. Two self-contained breathing apparatus
 - B. Back board
 - C. First Aid Kit
 - D. All of the above

2. Soluble gases may be released into mine air from groundwater.
 - A. True
 - B. False

3. During mine rescue and recovery work the command center directly approves all:
 - A. Ventilation Tests
 - B. Ventilation Construction
 - C. Ventilation Alterations
 - D. B and C only

4. The purpose of mine ventilation is to provide a velocity of air sufficient to remove harmful gases, dust, smoke and fumes.
 - A. True
 - B. False

BioPak 240S Closed-Circuit Breathing Apparatus

5. **Which of the following properties are associated with Hydrogen Sulfide gas:**
 - A. The gas is one of the most poisonous known.
 - B. The gas is not soluble in water.
 - C. The gas is yellowish, with an odor of rotten eggs.
 - D. All of the above.

6. **Line Brattice must be permanently installed for short duration ventilation applications.**
 - A. True
 - B. False

7. **Check Curtains or Run-Through Curtains are designed to:**
 - A. Close manually after you have passed through them.
 - B. Deflect the intake air current into a working area.
 - C. Fasten at the top and one side only.
 - D. All of the above.

8. **Which of the following properties are associated with Acetylene gas:**
 - A. The gas is highly flammable.
 - B. Found after methane explosions in air having a low oxygen content.
 - C. The gas is slightly toxic.
 - D. B and C only.

9. **If a mine ventilation system is badly damaged or is out completely, the distinction between intake and exhaust air on the mine map may not be valid.**
 - A. True
 - B. False

10. **Auxiliary fan tubing used to control and direct airflow to or from a mining area will be:**
 - A. Rigid tubing for forcing systems
 - B. Collapsible tubing for exhaust systems
 - C. Usually suspended from timbers or eye bolts
 - D. All of the above

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User Instruction Manual – Revision F

Benchman Instruction Manual – Revision L

MSDS – Germicidal Detergent No. 201N, 202N, 204N, 205N, 264N

- 11. The carbon dioxide scrubber canister may be used if:**
- A. The foam pad is $\geq 1/8$ inch thick over the absorbent area.
 - B. The Limepak keg is < 1 year from date of opening.
 - C. The scrubber canister is packed to the fill line.
 - D. The absorbent has been exposed to atmosphere for < 1 hour.
 - E. All of the above.
- 12. The maximum charging pressure of the Oxygen cylinder is 4000 psi:**
- A. True
 - B. False
- 13. Preparing the coolant canister includes all of the following except:**
- A. Place the GelPak in horizontal position in the freezer.
 - B. Freeze for a minimum of 6 hours at 20 °F.
 - C. Use clean, disinfected coolant gel packs.
 - D. Check “coolant canister in freezer” on turn around main tag.
 - E. None of the above (All are correct).
- 14. The remaining service life (in hours) for a pressure gauge reading of 1500 psi is:**
- A. 2 hours.
 - B. 3 hours.
 - C. 0.5 hours.
 - D. 1 hour.
 - E. None of the above
- 15. The apparatus must be cleaned and disinfected as soon as possible after each use with a 10% bleach solution:**
- A. True
 - B. False

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- 16. A BioPak 240S apparatus that has been placed into extended storage, under appropriate conditions, should have the long term maintenance procedures performed every:**
- A. Month.
 - B. 12 Months.
 - C. 3 Months.
 - D. 6 Months.
 - E. None of the above
- 17. When conducting a high pressure leak test – which of the following is incorrect:**
- A. Use Leak-Tec solution.
 - B. Wait 30 seconds after leak detection fluid is applied.
 - C. The presence of bubbles indicates a leak.
 - D. Install two tongue depressors in breathing chamber slots located 180° from each other.
 - E. None of the above (all answers are correct).
- 18. After cleaning and disinfecting a BioPak 240S apparatus allow the components to:**
- A. Air dry.
 - B. Dry through use of a hair drier on a warm/medium heat setting.
 - C. Dry through use of a hair drier set on hot/high heat setting.
 - D. Dry with a hair drier set on cool/low heat setting.
 - E. Both A and D are correct.
- 19. Anti-fog solution must be applied to the respirator lens immediately after each use:**
- A. True
 - B. False
- 20. If no “chirp” is heard when the oxygen cylinder valve is opened – the bypass valve may not have armed and may not function correctly.**
- A. True
 - B. False

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- 21. Proper lubrication of all O-ring seals will include:**
- A. Lubricate an O-ring within its seat.
 - B. Apply an even, heavy coating of lubricant.
 - C. Use extra lubricant to coat O-ring nicks and cuts.
 - D. Use Cristo-Lube or Dow-111 silicone lubricants exclusively.
 - E. All of the above.
- 22. When conducting a low pressure leak test – the test balloon is inflated to a 45° angle. Balloon droops at what angle are considered to be significant:**
- A. 15° Angle.
 - B. 90° Angle.
 - C. 0° Angle.
 - D. 35° Angle.
 - E. None of the above.
- 23. The alarm whistle provides a repeating 45-60 second indication of 30 minute service time remaining.**
- A. True
 - B. False
- 24. The Biopak 240S's oxygen cylinder:**
- A. Has no serviceable components.
 - B. May exhibit exposed fibers and/or cracks without risk.
 - C. Shall be hydrostatic tested every 6 years.
 - D. Shall have Cristo-Lube applied on threads to prevent rusting.
 - E. All of the above.
- 25. When a two-stage process is followed to fill the oxygen cylinder – which of the following actions are included in that process:**
- A. Cylinder is filled to the rated service pressure.
 - B. After filling the cylinder is allowed to cool to 70 °F.
 - C. Once cooled – a second fill stage to the rated service pressure is performed.
 - D. All of the above.

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26. **When conducting flow testing – which of the following is incorrect:**
- A. Slide a test flow meter over the demand valve housing.
 - B. Use an oxygen cylinder at 2000 psi.
 - C. Use two wooden tongue depressors to push the diaphragm away from the demand valve.
 - D. Verify a flow reading of at least 1.6 lpm.
 - E. None of the above (All are correct).
27. **If the carbon dioxide scrubber's foam pad is less than 1/8" thick over the absorbent coverage area it must be replaced.**
- A. True
 - B. False
28. **After five years of service the apparatus should receive additional inspection for the following:**
- A. Breathing Diaphragm.
 - B. Facepiece.
 - C. Breathing hoses.
 - D. O-ring seals.
 - E. All of the above.
29. **Scheduled component replacement specifies which of the following parts for replacement every 20 uses:**
- A. Oxygen cylinder sealing washer.
 - B. Carbon dioxide scrubber foam pad.
 - C. Breathing chamber ID O-ring seal.
 - D. Coolant canister end cap O-ring seal.
 - E. All of the above.
30. **Reduction in apparatus service time could be caused by:**
- A. Temperatures down to +20 °F.
 - B. Use in oxygen deficient atmospheres.
 - C. Poor respirator facepiece seal.
 - D. Failure to coat the facepiece lens with anti-fog agent.
 - E. All of the above.

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ANSWER SOURCE KEY

MSHA Publication 3027 - Module 2 Mine Gases
MSHA Publication 3027 - Module 3 Ventilation
Metal and Nonmetal National Mine Rescue Contest Rules 2014

Question	Answer	Source
1	A	2014 Metal and Nonmetal Mine Rescue Contest Rules, Technician Team Competition, Page 61, General Rule 1 <i>Comments:</i> Back board removed 2014, First aid kit removed 2014, Gas detector and Communications system must also be included.
2	A	Mine Gases, Module 2, Page(s) 2-7, Solubility <i>Comments:</i> True
3	D	Mine Ventilation, Module 3, Page(s) 3-21 – Building Ventilation Controls Mine Ventilation, Module 3, Page 3-3 – Introduction <i>Comments:</i> Ventilation testing is not under command center control as it will not alter mine conditions
4	B	Mine Ventilation, Module 3, Page(s) 3-4 <i>Comments:</i> Volume not velocity, Also must provide adequate oxygen
5	A	Mine Gases, Module 2, Page(s) 2-19 and 20 <i>Comments:</i> It is water soluble, It is colorless
6	B	Mine Ventilation, Module 3, Page(s) 3-24 – Line Brattice <i>Comments:</i> Can be held in place by team members
7	B	Mine Ventilation, Module 3, Page(s) 3-9 – Check Curtains <i>Comments:</i> Close automatically, Fasten at the top only
8	D	Mine Gases, Module 2, Page(s) 2-24 <i>Comments:</i> It is combustible, but it will not support combustion.
9	A	Mine Ventilation, Module 3, Page(s) 3-6 – Note to Trainer <i>Comments:</i> Normal production conditions may no longer be valid
10	C	Mine Ventilation, Module 3, Page(s) 3-10 – Auxiliary Fans and Tubing <i>Comments:</i> Flexible for forcing, Rigid for exhaust

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Question	Answer	Source
11	E	Benchman Instruction Manual, pg. 17, Turn Around Maintenance Procedure, H, Carbon Dioxide Absorbent Charging and Installation. <i>Comments:</i> Specified in manual
12	B	Benchman Manual, pg 10, Turn Around Maintenance Procedure, 1.3, Cleaning / Disinfection <i>Comments:</i> Specified in manual
13	B	Benchman Instruction Manual, pg. 15, Turn Around Maintenance Procedure, E, Coolant Canister Charging <i>Comments:</i> The minimum time is 8 hours at 15 °F
14	A	User Instruction Manual, pg. 9, Operating Instructions, 4, Chest Mounted Pressure Gauge. Benchman Instruction Manual, pg. 11, Theory of Biopak Operation, C, High Pressure Plumbing. <i>Comments:</i> Specified in manual
15	B	Benchman Instruction Manual, pg. 13, Turn Around Maintenance Procedure, C, Washing and Disinfection – Caution Statement. <i>Comments:</i> Specified in manual, Only Biomarine cleaners/disinfectants are approved for use.
16	C	Benchman Instruction Manual, pg. 19, Periodic Long-Term Maintenance <i>Comments:</i> Specified in Manual.
17	B	Benchman Instruction Manual, pg. 19, Periodic Long-Term Maintenance, B-6, High Pressure Leak Testing. <i>Comments:</i> The wait time is 60 seconds minimum.
18	E	Benchman Instruction Manual, pg. 14, Turn Around Maintenance, C - 6, Washing and Disinfection. <i>Comments:</i> Specified in manual.
19	B	User Instruction Manual, pg 7, Preparing for Use, 6. Benchman Instruction Manual, pg. 18, Turn-Around Maintenance Procedure, I – 4, Facepiece Concerns. <i>Comments:</i> It is applied before use, It is also applied after facepiece cleaning (not use).

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Question	Answer	Source
20	B	User Instruction Manual, pg. 8, Preparing for Use, 13, Warning Statement <i>Comments:</i> The alarm valve is activated not the bypass valve.
21	D	Benchman Instruction Manual, pg. 23, General Services Procedure, B, System Lubrication <i>Comments:</i> Never lubricate O-rings in the seat, Never apply a heavy coating, Replace O-rings with nicks and/or cuts
22	C	Benchman Instruction Manual, pg. 20, Periodic Long-Term Maintenance, C-6, Low Pressure Leak Testing <i>Comments:</i> Only droops to 0° are considered to be significant, 35° angle is considered to be acceptable.
23	B	User Instruction Manual, pg 10, Operation Instructions, 5, Alarm Whistle – Warning Statement. <i>Comments:</i> It is a one-time warning, Time remaining is 1 hour.
24	A	Benchman Instruction Manual, pg. 24, General Service Procedures, C, Oxygen Cylinder. Benchman Instruction Manual, pg.23, General Service Procedures, B, System Lubrication – Warning Statement. <i>Comments:</i> Exposed fibers and/or cracks requires cylinder removal from service, Hydro-static testing is a 5 year cycle, Lube is not to be used on the O ₂ cylinder.
25	D	User Benchman Instruction Manual, pg. 15, Turn-Around Maintenance Procedure, D-2-j, Oxygen Cylinder Charging. <i>Comments:</i> Specified in manual
26	B	Benchman Instruction Manual, pg. 20, Periodic Long-Term Maintenance, D, Flow Testing. <i>Comments:</i> Manual specifies a fully charged oxygen cylinder at 3000 psi.
27	A	Benchman Instruction Manual, pg. 17, Turn-Around Maintenance Procedure, H-5, Carbon Dioxide Absorbent Charging and Installation. <i>Comments:</i> Specified in Manual.

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Question	Answer	Source
28	E	Benchman Instruction Manual, pg. 22, General Service Procedure, A, Scheduled Component Replacement. <i>Comments:</i> Specified in Manual.
29	B	Benchman Instruction Manual, pg. 22, General Service Procedures, A, Scheduled Component Replacement <i>Comments:</i> Specified in manual, All others listed are replaced every 50 uses.
30	C	User Instruction Manual, pg. 5, Special or Critical User's Instructions <i>Comments:</i> Specified in manual, 15 °F is approved temperature limit, Approved for use in oxygen deficient atmospheres, Anti-fog agent has no impact on apparatus service time