**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.**

1. True
2. 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

**BioPak 240S Closed-Circuit Breathing Apparatus**

**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 ≥ 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 < I 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

**BioPak 240S Closed-Circuit Breathing Apparatus**

**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

**BioPak 240S Closed-Circuit Breathing Apparatus**

**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 45º angle. Balloon droops at what angle are considered to be significant:**

A. 15º Angle.

B. 90º Angle.

C. 0º Angle.

D. 35º 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.

**BioPak 240S Closed-Circuit Breathing Apparatus**

**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 GasesMSHA Publication 3027 - Module 3 VentilationMetal 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**  *Comments*: 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**  *Comments*: True |
| **3** | **D** | **Mine Ventilation, Module 3, Page(s) 3-21 – Building Ventilation Controls**  **Mine Ventilation, Module 3, Page 3-3 – Introduction**  *Comments*: 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**  *Comments*: Volume not velocity, Also must provide adequate oxygen |
| **5** | **A** | **Mine Gases, Module 2, Page(s) 2-19 and 20**  *Comments*: It is water soluble, It is colorless |
| **6** | **B** | **Mine Ventilation, Module 3, Page(s) 3-24 – Line Brattice**  *Comments*: Can be held in place by team members |
| **7** | **B** | **Mine Ventilation, Module 3, Page(s) 3-9 – Check Curtains**  *Comments*: Close automatically, Fasten at the top only |
| **8** | **D** | **Mine Gases, Module 2, Page(s) 2-24**  *Comments*: It is combustible, but it will not support combustion. |
| **9** | **A** | **Mine Ventilation, Module 3, Page(s) 3-6 – Note to Trainer**  *Comments*: Normal production conditions may no longer be valid |
| **10** | **C** | **Mine Ventilation, Module 3, Page(s) 3-10 – Auxiliary Fans and Tubing**  *Comments*: Flexible for forcing, Rigid for exhaust |

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| **ANSWER SOURCE KEY** | | |
| **User Instruction Manual – Revision F**  **Benchman Instruction Manual – Revision L**  **MSDS – Germicidal Detergent No. 201N, 202N, 204N, 205N, 264N** | | |
| **Question** | **Answer** | **Source** |
| **11** | **E** | **Benchman Instruction Manual, pg. 17, Turn Around Maintenance Procedure, H, Carbon Dioxide Absorbent Charging and Installation.**  *Comments*: Specified in manual |
| **12** | **B** | **Benchman Manual, pg 10, Turn Around Maintenance Procedure, 1.3, Cleaning / Disinfection**  *Comments*: Specified in manual |
| **13** | **B** | **Benchman Instruction Manual, pg. 15, Turn Around Maintenance Procedure, E, Coolant Canister Charging**  *Comments*: 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.**  *Comments*: Specified in manual |
| **15** | **B** | **Benchman Instruction Manual, pg. 13, Turn Around Maintenance Procedure, C, Washing and Disinfection – Caution Statement.**  *Comments*: Specified in manual, Only Biomarine cleaners/disinfectants are approved for use. |
| **16** | **C** | **Benchman Instruction Manual, pg. 19, Periodic Long-Term Maintenance**  *Comments*: Specified in Manual. |
| **17** | **B** | **Benchman Instruction Manual, pg. 19, Periodic Long-Term Maintenance, B-6, High Pressure Leak Testing.**  *Comments*: The wait time is 60 seconds minimum. |
| **18** | **E** | **Benchman Instruction Manual, pg. 14, Turn Around Maintenance, C - 6, Washing and Disinfection.**  *Comments*: 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.**  *Comments*: It is applied before use, It is also applied after facepiece cleaning (not use). |

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| **User Instruction Manual – Revision F**  **Benchman Instruction Manual – Revision L**  **MSDS – Germicidal Detergent No. 201N, 202N, 204N, 205N, 264N** | | |
| **Question** | **Answer** | **Source** |
| **20** | **B** | **User Instruction Manual, pg. 8, Preparing for Use, 13, Warning Statement**  *Comments*: The alarm valve is activated not the bypass valve. |
| **21** | **D** | **Benchman Instruction Manual, pg. 23, General Services Procedure, B, System Lubrication**  *Comments*: 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**  *Comments*: Only droops to 0º are considered to be significant, 35º angle is considered to be acceptable. |
| **23** | **B** | **User Instruction Manual, pg 10, Operation Instructions, 5, Alarm Whistle – Warning Statement.**  *Comments*: 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.**  *Comments*: 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 O2 cylinder. |
| **25** | **D** | **User Benchman Instruction Manual, pg. 15, Turn-Around Maintenance Procedure, D-2-j, Oxygen Cylinder Charging.**  *Comments*: Specified in manual |
| **26** | **B** | **Benchman Instruction Manual, pg. 20, Periodic Long-Term Maintenance, D, Flow Testing.**  *Comments*: 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.**  *Comments*: Specified in Manual. |

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| **User Instruction Manual – Revision F**  **Benchman Instruction Manual – Revision L**  **MSDS – Germicidal Detergent No. 201N, 202N, 204N, 205N, 264N** | | |
| **Question** | **Answer** | **Source** |
| **28** | **E** | **Benchman Instruction Manual, pg. 22, General Service Procedure, A, Scheduled Component Replacement.**  *Comments*: Specified in Manual. |
| **29** | **B** | **Benchman Instruction Manual, pg. 22, General Service Procedures, A, Scheduled Component Replacement**  *Comments*: Specified in manual, All others listed are replaced every 50 uses. |
| **30** | **C** | **User Instruction Manual, pg. 5, Special or Critical User’s Instructions**  *Comments*: 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 |