**2014 North Central Mine Rescue Contest**

**Wilmington, IL**

**Written Test – Technician Team Competition**

**Biomarine SCBA, Biopak 240R**

***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 240R 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 240R Closed-Circuit Breathing Apparatus**

**User Instructions – Revision G, March 2013**

**Benchman Manual – Revision M, March 2013**

**How to Successfully Wash, Disinfect, and Dry Your BioPak 240 Revolution**

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

**BioPak 240R Overview**

**11.** **A pre-packed carbon dioxide scrubber canister may be used if:**

A. Each canister has an O-ring installed.

B. The use-by date on the label has not yet expired.

C. The canisters have been pre-packed for less than one year.

D. The canisters must be sealed air-tight in the apparatus.

E. All of the above.

**12.** **The maximum heat-assisted drying temperature for all cleaned components is:**

A. 200°F.

B. 120°F.

C. 90°F.

D. 140°F.

**13.** **The maximum charging pressure of the Oxygen cylinder is 4000 psi.**

A. True

B. False

**14**. **Prior to each use of the BioPak 240R which of the following must be installed:**

A. Moisture control sponges.

B. A new RMS alarm monitor battery.

C. Anti-crush rings.

D. Kevlar breathing hose covers.

**15.** **Preparing the coolant canister includes all of the following except:**

A. Place clean coolant canister into the freeze form.

B. Place freeze forms on a level surface in the freezer.

C. Freeze for a minimum of 6 hours at 20°F.

D. Date and initial maintenance tag under “Ice Placed in Freezer”.

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

**16.** **The recommended apparatus duration of use with cooling canisters installed is one hour at 41°C to 60°C (105°F to 140°F)**

A. True

B. False

**17.** **When conducting a low pressure leak test – activating the emergency bypass valve empties gas into the breathing chamber raising the pressure to:**

A. Between 2” and 4” water column.

B. Between 6” and 8” water column.

C. Between 10” and 12” water column.

D. Between 1” and 2” water column.

E. None of the above.

**18.** **The phase change module (PCM) provides an optional method for:**

A. Carbon dioxide gas removal.

B. Water vapor removal.

C. Air cooling.

D. Particulate control.

E. All of the above.

**19.** **The electronic monitor’s LED will flash blue to remind the user that ice needs to be added to the BioPak:**

A. True

B. False

**20.** **When conducting a high pressure leak test – the oxygen cylinder’s pressure must be above 3000 psi to begin the test.**

A. True

B. False

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

**21.** **BioPak 240R apparatus that have been placed into long term storage should have the long term maintenance procedures performed:**

A. Every three months.

B. Every twelve months.

C. Every six months.

D. Every month.

E. None of the above.

**22.** **When conducting a constant flow test – at 3200 feet elevation: With the O2 cylinder pressure listed - which O2 flow result indicated a passing test:**

A. Cylinder Pressure 1800 psi – O2 flow of 1.6 lpm.

B. Cylinder Pressure 2200 psi – O2 flow of 1.8 lpm.

C. Cylinder Pressure 1600 psi – O2 flow of 2.0 lpm..

D. Cylinder Pressure of 2800 psi – O2 flow of 1.2 lpm.

E. None of the above.

**23.** **The apparatus must be cleaned and disinfected as soon as possible after each use with a 10% bleach solution.**

A. True

B. False

**24.** **The BioPak 240R’s oxygen cylinder must be:**

A. Retired from service 25 years after the date of manufacture.

B. Tested annually with the BioPak Service Kit.

C. Hydro-static tested every 5 years from the date of manufacture.

D. Christo-Lube coated on the valve collar exterior O-ring.

E. All of the above.

**25.** **The electronic monitor LED signals provide the wearer with which of the following system status signals:**

A. Flashing Green = System OK.

B. Flashing Red + Horn Sounding = End of Service Life.

C. Flashing Blue = Ice Reminder.

D. Flashing Red + Horn Sounding = System Fault

E. All of the above.

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

**26.** **A center section O-ring inspection - can be triggered by which of the following:**

A. Annually, or

B. 25 uses of the apparatus, or.

C. Apparatus failure during a high or low pressure leak test, or

D. All of the above.

**27.** **Anti-fog solution must be applied to the respirator lens before each use.**

A. True

B. False

**28.** **When conducting a high pressure leak test – which of the following is incorrect:**

A. Use oxygen safe leak detection fluid.

B. Wait 30 seconds after leak detection fluid is applied.

C. The presence of bubbles indicates a leak

D. Depressurize unit to begin repairs.

E. None of the above (all are correct).

**29.** **When conducting an inspection of the breathing diaphragm – which of the following would not be included:**

A. Quarterly inspection for apparatus in long term storage.

B. Inspect the diaphragm for signs of wear, cracking, and/or rot.

C. Disassemble the vent valve to inspect, clean and lubricate parts.

D. Reassemble taking care to ensure proper diaphragm alignment.

E. None of the above (all are included).

**30.** **Failure to install the carbon dioxide scrubber’s moisture pad can lead to:**

A. Scrubber canister flooding.

B. Elevated carbon dioxide levels in breathing gas.

C. Possible injury or death.

D. 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 Instructions – Revision G, March 2013****Benchman Manual – Revision M, March 2013****How to Successfully Wash, Disinfect, and Dry Your BioPak 240 Revolution****MSDS – Germicidal Detergent No. 201N, 202N, 204N, 205N, 264N** |
| **Question** | **Answer** | **Source** |
| **11** | **E** | **Benchman Manual, pg 14, Turn Around Maintenance Procedure, 1.2, Carbon Dioxide Scrubber Pre-Packing Procedure.***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 Manual, pg 11, Turn Around Maintenance Procedure, 1.5, Oxygen Cylinder***Comments*: The maximum pressure is 3000 psi. |
| **14** | **A** | **User Instructions, pg 8, Apparatus Description, 2.9, Optional Attachments.****Benchman Manual, pg 8, Special or Critical User’s Instructions.***Comments*: Alarm monitor battery good for 200 hours, Anti-crush rings = optional, Kevlar hose covers = optional |
| **15** | **C** | **Benchman Manual, pg 11, Turn Around Maintenance Procedures, 1.4, Coolant Canister.***Comments*: Minimum time is 8 hours at 10° F. |
| **16** | **A** | **User Instructions, pg 12, Preparation for Use, 3.6, Coolant Canister Installation.****Benchman Manual, pg 42, Apparatus Specifications – Note:***Comments*: Specified in Manual. |
| **17** | **B** | **Benchman Manual, pg 13, Turn Around Maintenance Procedure, 1.9, Low Pressure Leak Test***Comments*: Specified in Manual. |
| **18** | **C** | **User Instructions, pg 9, Apparatus Description, 2.9, Optional Attachments***Comments*: Specified in manual. |
| **19** | **A** | **User Instructions, pg 7, Apparatus Description, 2.7, Alarming System***Comments*: Specified in Manual. |
| **20** | **B** | **Benchman Manual, pg 15, Long Term Maintenance Procedure, 2.6, High Pressure Leak Test***Comments*: 3000 psi is the cylinder maximum operating pressure, 1500 psi is the minimum gas pressure for the test. |

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| **User Instructions – Revision G, March 2013****Benchman Manual – Revision M, March 2013****How to Successfully Wash, Disinfect, and Dry Your BioPak 240 Revolution****MSDS – Germicidal Detergent No. 201N, 202N, 204N, 205N, 264N** |
| **Question** | **Answer** | **Source** |
| **21** | **C** | **Benchman Manual, pg 15, Long Term Maintenance Procedure***Comments*: Specified in manual |
| **22** | **C** | **Benchman Manual, pg 12, Turn Around Maintenance Procedure, 1.8, Constant Flow Test***Comments*: Below 5280 ft Elevation: Cylinder Pressure 1500 – 2000 Flow 1.8 to 2.4 lpm, Below 5280 ft Elevation: Cylinder Pressure 2000 – 3000 Flow 1.9 to 2.5 lpm. |
| **23** | **B** | **Benchman Manual, pg 10, Turn Around Maintenance Procedure, 1.3, Cleaning/Disinfection.****MSDS Germicidal Detergent No. 201N, 202N, 204N, 205N, 264N.***Comments*: Only Biomarine cleaners/disinfectants are approved for use. |
| **24** | **C** | **Benchman Manual, pg 17, General Service Procedures, 3.3, Oxygen Cylinder***Comments*: Retirement is 15 years, The BioPak Service Kit cannot test the O2 cylinder, Lube is not to be used on the O2 cylinder. |
| **25** | **E** | **User Instructions, pg 7, Apparatus Description, 2.7, Alarming System***Comments*: Specified in manual |
| **26** | **D** | **Benchman Manual, pg 17, General Service Procedures, 3.1, Scheduled Component Inspection***Comments*: Specified in manual |
| **27** | **B** | **User Instructions, pg.10, Preparation for Use, 3.2, Mask Preparation****Benchman Manual, pg. 11, Turn Around Maintenance Procedure, 1.6, Facemask***Comments*: The 240R facemask is supplied with a permanent anti-fog film – solution is not needed. |
| **28** | **B** | **Benchman Manual, pg 15, Long Term Maintenance Procedure, 2.6, High Pressure Leak Test***Comments*: The wait time is 60 seconds. |

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| **ANSWER SOURCE KEY** |
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| **Question** | **Answer** | **Source** |
| **29** | **A** | **Benchman Manual, pg 17, General Service Procedures, 3.1, Scheduled Component Inspection****Benchman Manual, pg 29, Parts List, 5.8, Diaphragm Assembly***Comments*: Annual inspection frequency of long term storage units. |
| **30** | **D** | **User Instructions, pg 3, Warnings****User Instructions, pg 11, Preparation for Use, 3.5, Carbon Dioxide Scrubber Installation***Comments*: Specified in manual. |