

# ***2016 National Metal and Nonmetal Mine Rescue Contest***

## **Technician Team Competition Written Test (BioPak 240R / 240S)**

### **Directions:**

- 1. Find the correct answer to each of the questions.**
- 2. Select only one answer per question.**
- 3. Then, fill in the corresponding circle on the answer sheet for each numbered question.**

**Good Luck!**



***July 25, 2016***

Please do not write on this test. Use the answer sheet provided.

## **2016 Metal/Nonmetal National Mine Rescue Contest** **Technician Team Competition – BioPak 240R / 240S – Written Test**

### **10 Questions for BioPak 240R and 240S:**

1. The BioPak 240 R and 240 S breathing apparatus is best described by NIOSH to be:
  - A. Open-Circuit, On Demand, Entry and Escape Self Contained Breathing Apparatus
  - B. Close- Circuit, On Demand, Escape Only Self Contained Breathing Apparatus
  - C. Semi-Closed Circuit, Pressure Demand, Entry and Escape Self Contained Breathing Apparatus
  - D. Closed-Circuit, Pressure Demand, Entry and Escape Self Contained Breathing Apparatus
  
2. Never substitute, modify, and or omit parts. Use only exact replacement parts in the configuration specified by:
  - A. MSHA and NIOSH
  - B. OSHA and State Agencies
  - C. The manufacturer
  - D. The Mine Safety Manager
  
3. Which is NOT one of the Medical and/or Psychological conditions listed under the Special or Critical USER's Instructions in both the USER and BENCH Manuals:
  - A. Abnormal or Ruptured Ear Drum
  - B. Corrective eye wear
  - C. Evidence of reduced pulmonary function
  - D. Pernicious Anemia
  
4. Always handle oxygen cylinders with care. Do not allow-
  - A. Oil, grease or other combustible materials to come in contact with the cylinder valve
  - B. Oxygen cylinders to go below 1,500 PSI
  - C. Oxygen cylinder valves to be stored in one location
  - D. Oxygen valves to be opened all the way
  
5. If the BioPak 240 R & S Maintenance Tag is missing you must:
  - A. Perform a quick inspection and place into service
  - B. Place into service only after completing a full Turn-Around Maintenance procedure
  - C. Complete a Low Pressure Leak Test
  - D. Turn the oxygen cylinder on and off and listen for the whistle or horn.

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6. Checking the inhalation and exhalation check valves located in the Face piece/Mask Adapter is performed:
  - A. During the 30 day MSHA Apparatus Check
  - B. By the Benchman during Turn-Around Maintenance
  - C. By the User at the first apparatus check
  - D. By the User during DONNING and prior to entry into the Mine
  
7. The Face piece/Mask is provided with speaking diaphragm(s) that transmit the user's voice to the external surrounding environment and location. When speaking the USER should:
  - A. Speak slightly louder, slower and enunciate/pronounce words clearly
  - B. Use complicated hand signals
  - C. Write instructions down on a white board
  - D. Draw pictures in the dirt
  
8. When performing a Low Pressure Leak Test what BEST describes the proper use of the Test Key(s):
  - A. Insert the Test Key(s) in to the back of BioPak after the oxygen is turned on.
  - B. Insert the Test Key(s) in to the back of the BioPak once the chamber fills up.
  - C. Insert the Test Key(s) in to the back of the BioPak prior to turning on the oxygen
  - D. Insert the Test Key(s) from the BioPak after the pressure settles in the breathing chamber
  
9. Oxygen cylinders should be immediately retired/removed from service when:
  - A. When the cylinder is ten years old
  - B. When the cylinder has been empty for 30 days
  - C. When the cylinder has not been used in 30 days
  - D. When the cylinder shows signs of cracking, flaking or exposed fibers
  
10. Under the General Service Procedures in the Benchman Manual the Breathing Diaphragm is removed to:
  - A. Check the expiration date on the back of the diaphragm
  - B. Ensure Oxygen acidosis is not present
  - C. Check for signs of wear, cracking or rot
  - D. Check for signs of spring tension over torqueing

**10 Questions for MX6 iBrid:**

11. The visual alarm is used as a confidence indicator which, when enabled, blinks the LEDs once every minute.
  - A. True
  - B. False

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12. During the calibration process, calibration gas should be applied at a flow rate of 0.5 lpm.
- A. True
  - B. False
13. Passwords are a minimum of three characters and a maximum of 10.
- A. True
  - B. False
14. If there is a CO<sub>2</sub> sensor present in the instrument, it is zeroed first
- A. True
  - B. False
15. Oxygen deficient atmospheres may cause combustible gas readings to be lower than actual concentrations.
- A. True
  - B. False
16. "PID" is an abbreviation of a type of sensor technology used in the MX6 ibrid. What does it stand for?
- A. Proportional Integral Derivative
  - B. Proportional Integrator Differentiator
  - C. Photoionization Detector
  - D. Programmable Instrumental Detector
17. If the runtime is less than \_\_\_\_\_ minutes, instrument alerts the user of impending shutdown by showing "Low Battery" on the lower central part of the display.
- A. 5
  - B. 10
  - C. 15
  - D. 20
18. When sampling with a motorized pump and tubing, how much time should one allow *per foot* of tubing prior to noting the monitor readings?
- A. 2 minutes
  - B. 2 minutes plus 2 seconds
  - C. 3 minutes
  - D. 3 minutes plus 3 seconds

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19. If the user doesn't remember the password, entering "\_\_\_\_\_" as the password and pressing the [LEFT] and [RIGHT] navigation buttons simultaneously resets the password to nothing.
- A. 123
  - B. 000
  - C. 213
  - D. 412
20. When calibrated using methane concentrations less than 5% of volume, reading accuracy of the infrared methane sensor may not be guaranteed to be better than +/- \_\_\_\_\_%.
- A. 20
  - B. 15
  - C. 10
  - D. 5

**10 Questions from MSHA Publication 3027 (Module 2 and Module 3):**

21. Which Diffusion of Gases statement below is incorrect?
- A. An increase in pressure causes a gas to contract.
  - B. An increase in pressure causes a gas to expand.
  - C. An increase in temperature causes a gas to expand.
  - D. A decrease in temperature causes a gas to contract.
22. The gas's rate of diffusion is affected by the ventilating air currents in the mine. The rate of diffusion is greatly decreased by higher velocities of air currents or by turbulence in the air.
- A. True
  - B. False
23. Gases issuing into still air without mixing tend to stratify according to the gas's specific gravity. Light gases or mixtures tend to stratify against the back and heavy gases or mixtures tend to stratify along the floor.
- A. True
  - B. False
24. The amount of oxygen that must be present for an explosion to occur is also expressed as "normal air." When the necessary oxygen concentration approaches that found in normal air, the level is expressed simply as a percentage. The explosive range of hydrogen, for example, is 4.0 to 74.2 percent in the presence of normal air.
- A. True
  - B. False

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25. Gases that is neither toxic nor explosive:
1. are not found in mine atmospheres
  2. are not dangerous
  3. can be dangerous because they can displace oxygen
  4. cannot be detected with today's detection instruments
26. To help ensure your team's safety while working underground, the main fan(s) should be monitored or guarded by an unauthorized individual to make sure that it operates continuously. If the fan goes down while you're underground, and hazardous conditions ensue, you may be recalled from the mine.
- A. True
  - B. False
27. The exhaust air must be at a lower pressure than the intake to get air flow. If this pressure difference exists naturally between the two airways, then the mine has natural ventilation. Natural ventilation is one of two methods of ventilating a mine. The other method is Pressure ventilation where fans are used to create the pressure differential.
- A. True
  - B. False
28. Permanent bulkheads are built of concrete blocks, sandfill, or other incombustible material. They are sealed tightly against the back, floor, and sides of a mine passage so that no air can leak through. Porous stoppings such as concrete block stoppings are usually plastered on the high-pressure side to reduce air leakage.
- A. True
  - B. False
29. You are taking a smoke tube reading in an entry that is 10' wide and 10' high. Your average smoke tube readings averaged 30 seconds in a 25' distance. What is the quantity of air flow?
- A. 12,500 cfm
  - B. 5,000 cfm
  - C. 10,000 cfm
  - D. 5,000 f/m
30. During rescue team explorations, the main fan:
- A. Should be kept running.
  - B. Should be continually monitored.
  - C. Both of the above.
  - D. None of the above

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## Technician Team Competition – Written Test (BioPak 240R / 240S)

### ANSWER KEY

	Answer	Page	Publication
1	D	-	BioPak 240R & S USER and Benchman Manuals - NIOSH Certification Approvals Page with NIOSH Label (Located in the front of each manual)
2	C	-	BioPak 240R & S USER and Benchman Manuals - NIOSH Certification Approvals Page with NIOSH Label (Located in the front of each manual)
3	B	-	BioPak 240R & S USERS and BENCH Manuals S-SPECIAL OR CRITICAL USER'S INSTRUCTION
4	A	-	BioPak 240R & S USERS and BENCH Manuals S-SPECIAL OR CRITICAL USER'S INSTRUCTION
5	B	-	BioPak 240R USER Manual Pg. 14, BioPak 240S USER Manual Pg. 6
6	D	-	BioPak 240R USER Manual Pg. 18, BioPak 240S USER Manual Pg. 7
7	A	-	BioPak 240R USER Manual Pg. 19, BioPak 240S USER Manual Pg. 9
8	C	-	BioPak 240R BENCHMAN Manual Pg. 13, BioPak 240S BENCHMAN Manual Pg. 20
9	D	-	BioPak 240R BENCHMAN Manual Pg. 17, BioPak 240S BENCHMAN Manual Pg. 24
10	C	-	BioPak 240R BENCHMAN Manual Pg. 17; BioPak 240S BENCHMAN Manual Pg. 22
11	B	7	MX 6 Manual Revision 9
12	A	35	MX 6 Manual Revision 9
13	A	26	MX 6 Manual Revision 9
14	B	34	MX 6 Manual Revision 9
15	A	4	MX 6 Manual Revision 9
16	C	40	MX 6 Manual Revision 9
17	B	33	MX 6 Manual Revision 9
18	B	5	MX 6 Manual Revision 9
19	D	26	MX 6 Manual Revision 9
20	A	6	MX 6 Manual Revision 9
21	B	5	MSHA 3027 Module 2
22	B	5	MSHA 3027 Module 2
23	A	6	MSHA 3027 Module 2
24	B	7	MSHA 3027 Module 2
25	C	71	MSHA 3027 Module 2
26	B	4	MSHA 3027 Module 3
27	B	5	MSHA 3027 Module 3
28	A	8	MSHA 3027 Module 3
29	B	20	MSHA 3027 Module 3
30	C	49	MSHA 3027 Module 3