

2018 National Metal and Nonmetal Mine Rescue Contest

Technician Team Competition Written Test (BioPak 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 23, 2018

2018 Metal/Nonmetal National Mine Rescue Contest

Technician Team Competition – BioPak 240S – Written Test

10 Questions for BioPak 240S:

1. As stated in the BioPak 240 S Cautions and Limitations, which of the following is TRUE:
 - A. Never substitute, modify, and or omit parts.
 - B. All users of the SCBA must be trained by qualified instructors
 - C. All repairs beyond the scope of this manual must be performed by Biomarine Incorporated

2. Relating to the use of high pressure Oxygen, which of the following is TRUE:
 - A. Do not open the cylinder valve in the presence of Nitrogen
 - B. The oxygen cylinder shall meet DOT specifications and shall be marked BREATHING GAS
 - C. Oxygen enrichment will decrease the energy required for the ignition of materials

3. Regarding the proper donning of the facepiece, which of the following is TRUE:
 - A. Tighten the facepiece as tight as you can
 - B. Beards and eyeglasses that cause seal failure are in violation OSHA and MSHA regulations and will void your NIOSH approval
 - C. Emphysema is a potential disqualifying factor for wearing a BioPak 240 S

4. The SCBA (BioPak 240S) is approved only when:
 - A. Filled to 3000 psi with breathing gas
 - B. Fully charged with compressed oxygen meeting U.S.P. specifications
 - C. Fully charged with compressed medical or aviation Grade oxygen

5. It is normal for the pressure gauge on the harness to take up to _____ to come to a full reading.
 - A. 1 Minute
 - B. 120 Seconds
 - C. 90 Seconds

6. In the event the USER feels that additional oxygen is required above that supplied by the normal operation of the BioPak, which valve will need to be depressed:
 - A. Demand Valve
 - B. Vent Valve
 - C. Bypass Valve


7. An alarm whistle will provide a _____ sounding when remaining oxygen stores will provide one final hour of operation.
- A. 92 dB
 - B. Electronic beep
 - C. Flashing red light
8. As depicted on the BioPak 240 S Flow Diagram which of the following is NOT TRUE:
- A. The Diaphragm Spring is outside of the breathing loop
 - B. The Exhalation Check valve is on the Right side of the Mask
 - C. Exhaled gasses flow through the coolant canister before reaching the Scrubber canister
9. Carbon Dioxide + Calcium Hydroxide yields:
- A. Sodium Carbonate + Water
 - B. Calcium Chloride + Water
 - C. Calcium Carbonate + Water
10. The short flexible connection hose supplies:
- A. Warm, wet, and carbon-dioxide laden gas from the breathing chamber to the coolant canister
 - B. Cool, wet, and carbon-dioxide laden gas from the breathing chamber to the coolant canister
 - C. Warm, wet, and carbon dioxide-free gas from the breathing chamber to the coolant canister.

10 Questions for MX6 iBrid:

11. The battery icon at >100% charge remaining is the color blue.
- A. True
 - B. False
12. The operating temperature range for the instrument is -25° Celsius to 55° Celsius.
- A. True
 - B. False
13. There are three levels of audio gas alarms based on the frequency of beeps and the length of delay between beeps.
- A. True
 - B. False
14. The bump test process does not allow qualified personnel to review and adjust a unit's settings
- A. True
 - B. False

15. The configuration mode display screens time out after 90 seconds. When activated, the main configuration screen remains on for 10 minutes.
- A. True
 - B. False
16. An optical media interface is located on the bottom of the instrument and is used for infrared data transmissions at speeds of _____ bytes/second.
- A. 100,000
 - B. 105,000
 - C. 115,000
 - D. None of the above
17. The alkaline battery pack is only approved for use with _____ or _____ batteries in the instrument.
- A. Duracell MM 2500, Rayovac LR10
 - B. Duracell MM 1500, Rayovac LR6
 - C. Duracell MM 2000, Rayovac LR8
 - D. None of the above
18. The measurement range for Hydrogen Sulfide (H₂S) electrochemical sensor is zero to _____ ppm.
- A. 50
 - B. 100
 - C. 500
 - D. None of the above
19. The LCD backlight flashes as part of all alarm sequences, except for the battery low condition. The visual alarm is also used as the confidence indicator which, when enabled, blinks the LEDs once every _____ seconds.
- A. 5
 - B. 10
 - C. 30
 - D. None of the above
20. For a Carbon Dioxide (CO₂) infrared sensor range of 0% to 5% volume, the measurement resolution is _____ % volume.
- A. 0.01
 - B. 0.02
 - C. 0.05
 - D. None of the above

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

21. The map symbol  indicates:
- A. An undercast.
 - B. An overcast
 - C. An axillary fan.
 - D. The main fan.
22. Mine Rescue teams should not alter ventilation without authorization from the command center because:
- A. Altering the ventilation could force explosive gases into areas where survivors might be located.
 - B. It could force deadly gases over fire areas or hot spots and cause an explosion.
 - C. It could supply additional oxygen to a fire area and “feed” the fire.
 - D. It could also result in ventilation changes that would alter the air at the command center.
23. Which of the following gases have the largest explosive range?
- A. Carbon Monoxide
 - B. Hydrogen
 - C. Butane
 - D. Acetylene
24. The specific gravity for Propane is _____.
- A. 1.5291
 - B. 1.5625
 - C. 1.5894
 - D. 2.0100
25. MSHA requires mine rescue stations serving underground M/NM mines to have _____ gas detectors appropriate for each gas which may be encountered at the mines served.
- A. Three
 - B. Four
 - C. Five
 - D. Enough

26. Chemical analysis is generally a more time-consuming process than testing with a portable device, but its advantage is timeliness. It tells exactly what gases the sample contains, and in precisely what amounts. A complete chemical analysis can also reveal the presence of gases that portable detectors are not designed to detect.
- A. True
 - B. False
27. The range of concentrations within which a gas will explode is known as its “explosive range.” Figures representing the higher and lower limits of the explosive range are expressed in percentages.
- A. True
 - B. False
28. With mechanical ventilation, mine fans are used to create the pressure differential by changing the air pressure at specified points in the mine. And the less pressure difference the fan creates, the faster the flow of air.
- A. True
 - B. False
29. In many mines during a rescue and recovery operation, air locks are put up to establish a fresh air base and enable teams to move forward into questionable air without contaminating the air at the fresh air base.
- A. True
 - B. False
30. **Anemometer** – Instrument used for measuring medium-velocity (120-2,000 cfm) and high-velocity (2,000-10,000 cfm) air currents in the mine.
- A. True
 - B. False

2018 Metal/Nonmetal National Mine Rescue Contest

Technician Team Competition – Written Test (BioPak 240S)

ANSWER KEY

	Answer	Page	Publication
1	A	4	User Manual Revision F
2	C	4	User Manual Revision F
3	B	7	User Manual Revision F
4	B	5	User Manual Revision F
5	C	8	User Manual Revision F
6	C	9	User Manual Revision F
7	A	7	Benchman Manual Revision L
8	C	8	Benchman Manual Revision L
9	C	10	Benchman Manual Revision L
10	C	10	Benchman Manual Revision L
11	A	33	MX 6 Manual Revision 9
12	B	3	MX 6 Manual Revision 9
13	B	6	MX 6 Manual Revision 9
14	A	11	MX 6 Manual Revision 9
15	B	32	MX 6 Manual Revision 9
16	D	7	MX 6 Manual Revision 9
17	D	3	MX 6 Manual Revision 9
18	C	39	MX 6 Manual Revision 9
19	C	7	MX 6 Manual Revision 9
20	A	6	MX 6 Manual Revision 9
21	D	7	MSHA 3027 Module 3
22	C	21	MSHA 3027 Module 3
23	D	47	MSHA 3027 Module 2
24	B	47	MSHA 3027 Module 2
25	B	3	MSHA 3027 Module 2
26	B	4	MSHA 3027 Module 2
27	A	7	MSHA 3027 Module 2
28	B	5	MSHA 3027 Module 3
29	A	23	MSHA 3027 Module 3
30	B	53	MSHA 3027 Module 3