

2013 Nevada Mine Rescue Contest
Winnemucca, Nevada
March 12, 2013
Team Technician Written Test - Biomarine

Name: _____
Company: _____
Team: _____
Arm Band # or Position: _____

Chose the correct answer by circling the letter next to it using a pencil. If you make a mistake, please erase your marks completely.

MSHA Publication 3027, Modules 2 and 3 (revised 2008)

1. The formula used to find the quantity of air moving through a drift is:
 - a. Quantity (ft³) = Area (ft²) x Velocity (ft/min.) (#5, page 3-19, MSHA 3027)
 - b. Quantity (ft³) = Area (ft²) x Velocity (ft/sec.²)
 - c. Quantity (ft²) = Area (ft²) x Velocity (ft/min.)
2. It's okay to alter ventilation without command center approval if:
 - a. All team members agree it needs to be done.
 - b. All fires have been extinguished.
 - c. Gas readings at your present location are normal.
 - d. None of the above (Page 3-3, MSHA 3027)
3. High levels (1000 ppm) of sulfur dioxide (SO₂) will explode violently when combined with 21% oxygen.
 - a. True
 - b. False (Page 2-63, MSHA 3027)
4. Hydrogen sulfide (H₂S) is only considered a toxic gas.
 - a. True
 - b. False (Page 2-61, MSHA 3027)
5. After Damp is:
 - a. Toxic and explosive
 - b. A mixture of four mine gasses
 - c. Is always present after a mine fire or explosion
 - d. A and C (Pages 2-27 & 2-28, MSHA 3027)
 - e. None of the above
6. Gas diffuses slowly in higher temperatures.
 - a. True
 - b. False (Page 2-39, MSHA 3027)
7. A "line brattice" is used to
 - a. Connect two points on a mine map.
 - b. Direct air to flush out noxious or explosive gasses. (Page 3-24, MSHA 3027)
 - c. Divert water.

8. Overcasts are normally used to
 - a. Allow two air currents to cross at intersections without mixing. (Page 3-11, MSHA 3027)
 - b. Allow drainage
 - c. Neither of the above
9. Bulkhead and stopping mean the same thing when it comes to ventilation.
 - a. True (Page 3-8, MSHA 3027)
 - b. False
10. Hydrogen Sulfide has an explosive range of _____ in normal air
 - a. 3.4 to 54.5%
 - b. 4.3 to 45.5 ppm
 - c. 5 to 15%
 - d. 4.3 to 45.5% (Page 2-61, MSHA 3027)

Biomarine Questions

11. If you hear the demand every time you inhale, and you are not working hard, you should:
 - a. Use the Emergency By-pass valve
 - b. Breathe slower
 - c. Turn off the oxygen cylinder
 - d. Check your facemask fit and adjust it for a better seal (BioPak 240R User's quiz, Rev A, pg 1 #4)
12. Prior to donning the apparatus you notice that the harness has been modified by a previous user. The user punched extra holes in the straps to hold some of his gear and now the harness appears compromised. What best describes your actions?
 - a. Do nothing, everyone does it and it's not going to hurt anything, it's just a harness.
 - b. Scream obscenities at the guy who last used it telling him he just ruined a perfectly good harness.
 - c. Replace or repair the harness per the manufacturer's recommendations. (BioPak 240R User's and Benchman manual, pg 6, Benchman's quiz, Rev B, pg 2, Q 36)
 - d. None of the above
13. When installing my pressurized oxygen cylinder in a ready to go apparatus, caution should be used to ensure:
 - a. Oils from my fingers and hands do not get on the valve.
 - b. The cylinder and valve are clean.
 - c. It is filled with the correct gas.
 - d. It is pressurized to the correct amount.
 - e. All of the above. (BioPak 240 R User's Manual)

14. If the apparatus fails to deliver the proper amount of oxygen during use and both the demand and constant add fails you are instructed to:
- Slow your breathing down and run to the nearest fresh air base.
 - Hold your breath and run to the nearest fresh air base.
 - Manually fill your chamber with the bypass and run to the nearest fresh air base.
 - Manually fill your chamber with the bypass and walk to the nearest fresh air base. (BioPak 240 R User's Manual, Rev H, pg 16, 17, 18)
15. A small leak in the breathing circuit/loop will cause the _____ valve to operate.
- Relief/Vent
 - Demand (BioPak 240 R Benchman's Manual, Rev I, pg 15, 22; BioPak 240 R User's Quiz, Rev A, pg 1, Q4)
 - Bypass
 - None of the above
16. The constant add flow restrictor ensures:
- The oxygen is cleaned prior to breathing
 - The oxygen has no CO₂ in it prior to breathing
 - The oxygen contains the correct amount of moisture
 - The correct amount of oxygen is metered out to the user (BioPak 240 R Benchman's Manual Rev, pg 12)
17. I'm just training, so I can use my apparatus without any gel tube/ice canister or use some old CO₂ scrubber...
- Sure, I'm a Benchman and I can do anything I want.
 - Do what? Follow NIOSH/MSHA and the manufacturer's requirements in the manual. (BioPak 240 R User's Manual, Rev H, pg 6)
 - Who needs manuals?
 - It's okay as long as I'm not going underground.
18. You are preparing your team's apparatus' for a contest. You are getting the CO₂ scrubber ready and the keg/canisters do not have any factory markings or dates on them. Select the best answer:
- They look okay, you see no damage, but they have been opened. You go ahead and use them, it only a contest.
 - Upon further examination, it looks and smells okay so you use it anyway.
 - It's too much of a risk; you find CO₂ scrubber material that has the proper dates. (BioPak 240 R User's Manual, Rev H, pg 3)
 - I ask my captain and he tells me to use it anyway.
19. What best describes the breathing circuit/loop?
- It's the route my exhaled gas takes as it exits my mask and travels through the breathing chamber, the scrubber and the cooler then exiting to atmosphere.
 - It's the route my exhaled gas takes as it exits my mask and travels through the breathing chamber, the scrubber and the cooler and reenters my mask. (BioPak 240 R User's Manual, Rev H, pg 12)

20. If positive pressure could be attributed to ONLY ONE component is the apparatus, what would it be?
- The spring(s) (BioPak 240 R Benchman's Quiz, Rev B, pg 1, Q #4)
 - The breathing bag/chamber
 - Oxygen pressure
 - bypass

Industrial Scientific Gas Detector Questions

21. Oxygen deficient atmospheres may cause readings of combustible (methane) gas to be higher than actual concentrations.
- True
 - False (page 3 of iTX (rev 6)-1st item, MX6 (rev3)-6th item)
22. Oxygen enriched atmospheres may cause readings of combustible (methane) gas to be lower than actual concentrations.
- True
 - False (page 3 iTX (rev 6)-2nd item, MX6 (rev 3) 7th item)
23. Silica can affect the combustible gas sensor and may cause readings to be lower than actual gas concentrations.
- True
 - False (page 3 iTX (rev 6) 4th item, MX6 (rev 3) (9th item – states “silicon compounds” not silica which is sand.)
24. Sudden changes in atmospheric pressure will not cause temporary fluctuations in the oxygen reading.
- True
 - False (operation guide on iTX page 3, MX6 page 3)
25. The manufacturer recommends that a functional (bump) test be performed on the gas instrument after each day's use.
- True
 - False (ISC recommends the bump test prior to use (page 23 iTX (rev 6), page 17 MX6 (rev 3))
26. When the battery life is nearing its end, the following occurs (answer the question for your gas instrument)

For the iTX -with a minimum of 30 minutes of battery life, the unit will emit a periodic tone.	For the MX6 iBrid -if the remaining runtime is less than 30 minutes, “Low Battery” is displayed.
---	---

- True
- False (iTX ((rev 6) page 27 of manual (15 minutes)) MX6 (rev 3) page 11 (10 minutes))

27. Marginal calibration occurs if the span reserve is between _____ of the applied (calibration) gas value/concentration.
- 20% - 60%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%
 - None of the above (iTX (page 25, rev 6, slide 30), MX6 (slide 14 of on-line Calibration Training Tutorial Video))
28. While in the normal operational mode the screen on your instrument shows the battery at the _____ of the screen.
- Top middle
 - Top right
 - Bottom middle
 - Bottom right
 - None of the above ((iTX page 8, gas reading mode)(MX6 manual, page 11))
29. When the gas instrument is in non-latching mode, alarms set according to the Technician Team Competition is the MNM National Mine Rescue Contest Rule Book and exposed to 20.4% Oxygen, 1.2% Methane, 40.0 ppm Carbon Monoxide, and 2.0 ppm Nitrogen Dioxide, it will _____.
- Be in high alarm condition
 - Display “40” for the Carbon Monoxide reading
 - Display “2.0” for the Nitrogen Dioxide reading
 - All of the above
 - Only B and C (2010 MNM Contest Rule book; page 30 iTX (rev 6) manual & slide 19 of on-line Features Training Tutorial Video, 2010 MNM Contest Rule book; page 30 iTX (rev 6) manual & slide 19 of on-line Features Training Tutorial Video)
30. Both the iTX and the MX6 use a hydrogen-ion battery
- True
 - False (page 23 iTX (rev 6) manual, page 10 MX6 manual (rev 3))