

Quiz for Module 4: Overview of CO₂ Monitoring Instruments and Ventilation Techniques

Name (please print) _____

Date _____

1. To prevent unsafe levels of CO₂ within the work area, consider which of the following:
 - a. Place remote sensors in the middle of a building to best represent readings of CO₂ levels in the general work area.
 - b. If remote sensors used for CO₂ monitoring are rugged enough, preventive maintenance is really not necessary
 - c. Ensure mechanical ventilation is provided in areas where CO₂ can collect
 - d. B and C
 - e. A and B

2. CO₂ is heavier than air? True or false

3. Locations where process-generated CO₂ can collect include which of the following (circle all that apply):
 - a. Buildings where fermentation tanks are housed
 - b. Confined areas including diked areas around any tank
 - c. Low-lying areas near process drains
 - d. Where CO₂ is collected and discharged

4. CO₂ in the atmosphere is at a concentration of :
 - a. 20.9 % (209,000 ppm)
 - b. 0.8% (8,000 ppm)
 - c. 0.04% (400 ppm)
 - d. 7% (70,000 ppm)

5. Adverse cognitive effects from CO₂ have been observed as low as what concentration in air: (choose the best answer)

- a. 5,000 ppm over 8 hours
 - b. 1,000 ppm over 2.5 hours
 - c. 2,500 ppm over 2.5 hours
 - d. 500 ppm over 60 minutes
6. When designing a ventilation system for a confined space that has excessive CO₂, if possible, you should design the ventilation system to exhaust starting from:
- a. The lowest level of the equipment's space
 - b. The highest point, since CO₂ generally rises to the top of the equipment space
 - c. The farthest point from the source of the CO₂ emissions
7. For the ethanol manufacturing industries, it is not necessary to monitor the atmosphere for CO₂ when oxygen levels are routinely or continuously monitored. True or False
8. Pulling air by negative pressure to a safe place away from any intake location is called?
- a. Exhaust ventilation
 - b. Supply ventilation
 - c. Dilution ventilation
 - d. Ventilation by diffusion
9. Supply air from an uncontaminated outside source is useful when air movement is provided for the comfort of workers inside the plant. True or false
10. Which of the following is a major disadvantage of mechanical ventilation in a confined space?
- a. The ductwork often takes up too much space for worker ease of entry
 - b. The silent nature of the air movement makes it difficult to determine if it is working
 - c. Air movement can be short-circuited
 - d. It removes static from production surfaces making it difficult to ground or bond
 - e. a and c

11. When there is little air movement _____ gas tends to collect in low lying areas.
12. Electronic monitors are the fastest, the most reliable and the most accurate of the available CO₂ sampling techniques. True or False
13. The most widely used CO₂ detector used for real time measurements is:
- Detector tubes
 - Ultra-violet spectroscopy
 - Portable mass spectroscopy
 - Flame ionizing detectors
 - NDIR
14. The most common accuracy of colorimetric direct reading (detector) tubes is:
- ± 25%
 - ± 10%
 - ± 5%
 - ± 1%
 - ± 50%
15. Detector tubes work on a principle that each airborne substance can react chemically with a specific material and cause a color change that can be visually measured in the tube. True and False
16. Portable monitors used in the ethanol manufacturing industries for confined space entry and other air monitoring need to include the following sensors: (circle all that apply)
- Lower explosive limit (LEL)
 - Carbon monoxide (CO)
 - Ammonia (NH₃)
 - Carbon dioxide (CO₂)
 - Hydrogen sulfide (H₂S)
 - Oxygen (O₂)
 - Nitrogen (N₂)

Answer sheet

- 1. C**
- 2. True**
- 3. A, B, C**
- 4. C**
- 5. B**
- 6. A**
- 7. False**
- 8. A**
- 9. True**
- 10. A and C**
- 11. Carbon dioxide**
- 12. True**
- 13. E**
- 14. A**
- 15. True**
- 16. A, B, D, E, F**