Certification Boulevard

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Test Your Knowledge of Collection Systems

1. Which may be the most appropriate chemical to use in a wet scrubber treating high levels of hydrogen sulfide?
   A. Sodium hydroxide
   B. Sulfuric acid
   C. Unchlorinated water
   D. Polymer

2. ***True or False:*** Water seeping out of a collection system pipe is called exfiltration.

3. Given the following data, what is the capacity of this wet well?
   • Wet well diameter is 16 feet
   • Bottom elevation of wet well is 82.5 feet
   • Top elevation of wet well is 103.4 feet
   A. 177,563 gallons B. 31,416 gallons
   C. 332,043 gallons D. 24,391 gallons

4. Which condition is typically the least likely to be in the air space of a sewer collection system?
   A. Explosive gases
   B. Hydrogen sulfide
   C. Methane
   D. Oxygen

5. If the velocity in a sanitary sewer pipeline is about 1 fps, what may happen to the debris in the pipeline?
   A. The debris will dissolve
   B. The debris will be carried forward
   C. The debris will settle
   D. Velocity has nothing to do with debris in a pipeline

6. Which hazardous gas will typically be located at the lowest point of a manhole?
   A. Carbon dioxide
   B. Hydrogen sulfide
   C. Methane
   D. None – they will all be at high levels

7. What does it mean when there is a lack of any odor coming from a lift station manhole?
   A. Dangerous gases may be present because some gases do not emit an odor
   B. The oxygen level may still be too low for entrance
   C. Some gases deaden the sense of smell
   D. All of the above

8. How should manhole covers be lifted?
   A. Your fingers
   B. A manhole hook
   C. A screw driver
   D. A hammer

9. Which of the following materials is not commonly used in the construction of a collection system?
   A. Vitrified clay
   B. Aluminum
   C. Ductile iron
   D. Precast concrete

10. What procedure should be performed before entering a manhole that has been classified as a permit confined space?
    A. Wear a body harness
    B. Test the air with a gas detector
    C. Complete a confined space entry permit
    D. Have a trained attendant with you
    E. Use a tripod for fall protection
    F. Use a tripod for retrieval purposes
    G. All of the above

ANSWERS ON PAGE 61

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There is no limit to the number of questions or exercises you may submit. Please include your name, city, and organization or company so we can give you credit.

Certification Boulevard Answer Key

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1. **A. Sodium hydroxide**
   Sodium hydroxide is typically used when a wet scrubber is treating odorous air high in hydrogen sulfide (H_2S). This chemical reaction increases the pH within the scrubber liquid and absorbs, or drives, H_2S from the air into the solution.

2. **True**
   Water leaking out of a collection system pipe is called exfiltration … meaning it is exiting the pipe. Water seeping into a collection system pipeline is called infiltration. Water entering a collection system through manhole covers and cleanouts is called in-flow.

3. **B. 31,416 gallons**
   Gallons Capacity
   = .785 x diameter^2 x depth, ft. x 7.48 gal per ft^3
   Or
   = πr^2 x depth, ft. x 7.48 gal per ft^3

   Liquid depth in wet well
   = 103.4 feet - 82.5 feet = 20.9 feet
   = .785 x 16 feet x 16 feet x 20.9 feet x 7.48 gal per ft^3
   = 31,416.5 gallons

4. **D. Oxygen**
   It is not common to find oxygen in the air space of a sewer collection system; however, if oxygen is present in the air space, it could cause damage to the crown of the pipe due to oxidation.

5. **C. The debris will settle**
   Sanitary sewer pipelines are typically designed and constructed to maintain a minimum velocity of 2 fps (feet per second) to prevent settling of solids and debris. So, a velocity in a pipeline of 1 fps will cause debris to settle.

6. **B. Hydrogen sulfide**
   Since hydrogen sulfide (H_2S) gas is heavier than air, with a specific gravity more than 1.0, its concentration is greatest near the bottom of enclosed spaces. Death can occur when people enter poorly ventilated spaces such as deep wells, underground tanks or sewer systems.

7. **D. All of the above**

8. **B. A manhole hook**
   The right tool for the right job! A manhole hook is designed to safely lift and remove a manhole cover, and should be the only tool used to perform this task.

9. **B. Aluminum**
   Forms of clay, iron or concrete (and PVC) are all materials of construction for various pipes … aluminum is not a common material for collection system pipes.

10. **G. All of the above**
    All these tasks are important and are required to safely enter a permit-required confined space.