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## Test Your Knowledge of Collection and Distribution Topics

- Which may be the most appropriate chemical to use in a wet scrubber treating high levels of ammonia?
  - Sodium hydroxide
  - Sulfuric acid
  - Unchlorinated water
  - Polymer
- Water seeping out of a collection system pipe is called exfiltration. True or False
- Which condition is typically the least likely to be in the air space of a sewer collection system?
  - Explosive gases
  - Hydrogen sulfide
  - Methane
  - Oxygen
- If the velocity in a sanitary sewer pipeline is about 1 fps (feet per second), what may happen to the debris in the pipeline?
  - The debris will dissolve.
  - The debris will be carried forward.
  - The debris will settle.
  - Velocity has nothing to do with debris in a pipeline.
- Given the following data, what is the capacity of this wet well?
  - wet well diameter is 16 ft
  - bottom elevation of wet well is 82.5 ft
  - top elevation of wet well is 103.4 ft
  - 177,563 gallons
  - 31,416 gallons
  - 332,043 gallons
  - 24,391 gallons
- Which hazardous gas will typically be located at the lowest point of a manhole?
  - Carbon dioxide
  - Hydrogen sulfide
  - Methane
  - None—they will all be at high levels.
- What does it mean when there is a lack of any odor coming from a lift station manhole?
  - Dangerous gases may be present because some gases do not emit an odor.
  - The oxygen level may be too low for entrance.
  - Some gases deaden the sense of smell.
  - All of the above.
- Manhole covers should be lifted with
  - your fingers.
  - a manhole hook.
  - a screw driver.
  - a hammer.
- Which of the following materials is not commonly used in the construction of a collection system?
  - Vitrified clay
  - Aluminum
  - Ductile iron
  - Precast concrete
- What procedure should be performed before entering a manhole that has been classified as a permit-required confined space?
  - Wear a body harness.
  - Test the air with a gas detector.
  - Complete a confined space entry permit.
  - Have a trained attendant with you.
  - Use a tripod for fall protection.
  - Use a tripod for retrieval purposes.
  - All of the above.

Answers on page 66

### SEND US YOUR QUESTIONS

Readers are welcome to submit questions or exercises on water or wastewater treatment plant operations for publication in Certification Boulevard. Send your question (with the answer) or your exercise (with the solution) by email to [roy.pelletier@cityoforlando.net](mailto:roy.pelletier@cityoforlando.net), or by mail to:

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# Certification Boulevard Answer Key

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- 1. B) Sulfuric acid**  
*Sulfuric acid is typically used when a wet scrubber is treating odorous air high in ammonia (NH<sub>3</sub>). This chemical reaction decreases the pH within the scrubber liquid and converts the ammonia to ammonium sulfate.*
- 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. 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.*
- 4. 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.*
- 5. B) 31,416 gallons**  
**Gallons Capacity**  
 $= 0.785 \times \text{diameter}^2 \times \text{depth, ft.} \times 7.48 \text{ gal per ft}^3$   
Or  
 $= \pi r^2 \times \text{depth, ft.} \times 7.48 \text{ gal per ft}^3$   
**Liquid depth in wet well**  
 $= 103.4 \text{ feet} - 82.5 \text{ feet} = 20.9 \text{ feet}$   
 $= 0.785 \times 16 \text{ feet} \times 16 \text{ feet} \times 20.9 \text{ feet} \times 7.48 \text{ gal per ft}^3$   
 $= 31,416.5 \text{ gallons}$
- 6. A) Carbon dioxide**  
*Hydrogen Sulfide (H<sub>2</sub>S) gas is heavier than air, with a specific gravity of 1.189. Death can occur when people unsafely enter poorly ventilated spaces such as deep wells, underground tanks, or sewer systems. Carbon dioxide, however, with a specific gravity of 1.5189, is heavier than H<sub>2</sub>S and will settle to the lowest point of an enclosed space.*
- 7. D) All of the above.**
- 8. B) 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 polyvinyl chloride [PVC]) are all materials constructed for various pipes. Aluminum is not a common material for collection system components.*
- 10. G) All of the above.**  
*All of these tasks are important and required to safely enter a permit-required confine space.*