

Test Your Knowledge of Water Supply and Other Miscellaneous Topics



Roy Pelletier

1. What is the term used to describe the removal of volatile odor producing compounds through the process of forcing air up against a column of water flowing down?
 - A. Destratification
 - B. Reaeration
 - C. Degasification
 - D. Diversion
2. What is the flow rate in cubic ft per second (cfs) of a 2.25 mgd stream of water?
 - A. 1.55 cfs
 - B. 8.34 cfs
 - C. 3.48 cfs
 - D. 92.84 cfs
3. What is the term used to describe bacteria, viruses, or other organisms capable of causing disease?
 - A. Pathogenic
 - B. Nonpathogenic
 - C. Facultative
 - D. Coliform
4. Given the following data, calculate the approximate hydraulic horsepower (HP) delivered by this pump:
 - Flow is 675 gal per min (gpm)
 - TDH is 95 ft
 - A. 13.5 HP
 - B. 16.2 HP
 - C. 25 HP
 - D. 7.5 HP
5. Which minerals in groundwater are the primary causes of hard water?
 - A. Calcium and limestone
 - B. Calcium and magnesium
 - C. Iron and manganese
 - D. Calcium and iron
6. Which repair kit is designed for use with chlorine ton containers?
 - A. "A" kit
 - B. "B" kit
 - C. "C" kit
 - D. None of the above.
7. What is the weight relationship of chlorine liquid as compared to water?
 - A. Water weighs more than liquid chlorine.
 - B. Liquid chlorine weighs 2.5 times more than water.
 - C. Water weighs 1.5 times more than liquid chlorine.
 - D. Liquid chlorine weighs 1.5 times more than water.
8. What will the pressure gauge read on the suction of a pump if the pump is located at floor elevation of the tank and the tank has 25 ft of static water level?
 - A. About 58 psi.
 - B. About 9.5 psi.
 - C. About 11 psi.
 - D. About 17 psi.
9. Which polymer is used as a coagulant chemical because it has a positive charge that will neutralize the negative charge that is present with solids?
 - A. Cationic
 - B. Anionic
 - C. Nonionic
 - D. Polyionic
10. Which has a lower pH: sodium hydroxide or aluminum sulfate?
 - A. Aluminum sulfate
 - B. Sodium hydroxide
 - C. They are both the same.

Answers on page 74

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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, or by mail to:

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Certification Boulevard Answer Key

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1. **C) Degasification**

Degasification is the term used to describe the removal of volatile compounds from water. The removal rate of volatile compounds increases as the rate of air through water is increased. The basic principle of degasification is to force a column of air up and through a column of water flowing down. The degasifier has three main components: the tower, the blower, and the sump.

2. **C) 3.48 cfs**

$1,000,000 \text{ gpd} \div 86,400 \text{ sec/day} \div 7.48 \text{ gal/cu ft} \times 2.25 \text{ mgd} = 3.48 \text{ cfs}$
OR
 $1.55 \text{ cfs per mgd} \times 2.25 \text{ mgd} = 3.48 \text{ cfs}$

3. **A) Pathogenic**

Pathogenic organisms are capable of producing disease in host organisms. Diseases that are transmitted through the water (waterborne) include typhoid, cholera, and dysentery. Organisms that do not cause disease are referred to as nonpathogenic.

4. **B) 16.2 HP**

Horsepower
 $= (\text{gpm} \times \text{TDH, ft} \times 8.34 \text{ lbs per gal}) \div 33,000 \text{ ft lbs per second}$
 $= (675 \text{ gpm} \times 95 \text{ TDH} \times 8.34 \text{ lbs per gal}) \div 33,000$
 $= 16.21 \text{ HP}$
Note: TDH = Total Dynamic Head

5. **B) Calcium and magnesium**

Hardness is a characteristic of water caused mainly by the salts of calcium and magnesium, such as bicarbonate, carbonate, sulfate, chloride, and nitrate. Excessively hard water will result in calcium scale forming in the distribution system. Water that is too soft will be corrosive.

6. **B) "B" kit**

The "A" kit contains equipment for fixing a leak on a 150-lb cylinder. The "B" kit is for 1-ton cylinders. The "C" kit is for tank cars and tank trucks.

7. **D) Liquid chlorine weighs 1.5 times more than water.**

Chlorine is a clear amber-colored liquid about 1.5 times heavier than water. Gaseous chlorine is greenish-yellow, about 2.5 times heavier than air. Uses include water purification; sanitation of industrial waste; disinfection of wastewater treatment effluent; swimming pools; bleaching of pulp and textiles; manufacture of carbon tetrachloride, glycol, and numerous other organic compounds; and phosgene gas.

8. **C) About 11 psi.**

Each ft of water generates 0.433 psi
 $25 \text{ ft of water} \times 0.433 \text{ psi} = 10.82 \text{ psi}$
OR
 $1 \text{ psi} = 2.31 \text{ ft of head}$
 $25 \text{ ft of head} \div 2.31 \text{ ft per psi} = 10.82 \text{ psi}$

9. **A) Cationic**

Cationic polymer has a positive charge that will neutralize the negative charge associated with solids. Once the electrical charge is neutralized, the particles will no longer repel each other and will clump together. Anionic and nonionic polymers are typically used as filter aids.

10. **A) Aluminum sulfate**

Aluminum sulfate (alum) is an acid with a pH typically below 4.0. Sodium hydroxide (caustic) is an alkaline with a pH typically greater than 12.

Questions 1, 3, 5, and 9 (and their answers) are from Scott Ruland, chief operator with the City of Deltona.