Certification Boulevard

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Test Your Knowledge of Wastewater Disposal

1. Which chemical typically is not used to adjust effluent pH (between 6.0 to 8.5) before being discharged to a surface water outfall?
   a Lime
   b Polymer
   c Sodium hydroxide
   d Caustic soda

2. What typically happens to the chlorine demand of reclaimed water when the nitrite concentration is elevated?
   a. The chlorine demand doubles for each pound of nitrite oxidized.
   b. The chlorine demand is cut in half for each pound of nitrite oxidized.
   c. The chlorine demand is fairly unaffected by nitrite concentrations.
   d. The chlorine demand is multiplied by more than five for each pound of nitrite oxidized.

3. What is the detention time of a reclaimed water storage tank if the tank volume is 0.14 mg and the flow entering the tank is 0.96 mgd?
   a. 6.8 hours
   b. 164 hours
   c. 3.5 hours
   d. 1.5 hours

4. What typically happens to the ORP value of reclaimed water when the ammonia concentration drops from 3 mg/L to 1 mg/L?
   a. The ORP value increases.
   b. The ORP value decreases.
   c. The ORP value is fairly unaffected by the ammonia level.
   d. Ammonia at any level will cause a typical ORP probe to fail.

5. Given the following data, what is the pressure equivalent expressed in bar delivered by this effluent pump?
   • Pump discharges 1,500 gpm.
   • Total dynamic head (TDH) is 95 feet.
   a. 1.4 bar
   b. 41 bar
   c. 14.7 bar
   d. 2.8 bar

6. Which chemical is more commonly used to dechlorinate chlorinated effluent?
   a. Sodium hypochlorite
   b. Bleach
   c. Sulfur dioxide
   d. Ferric chloride

7. Given the following data, what is the equivalent percent total solids?
   • 10 ml of sample.
   • Tare weight of filter is 1.8873 grams.
   • Final weight of filter after drying is 2.2255 grams.
   a. 2.2 percent
   b. 1.3 percent
   c. 3.4 percent
   d. 4.3 percent

8. What is the final effluent TSS value if the plant influent TSS is 225 mg/l, and the TSS percent removal is 98.9 percent?
   a. 7.6 mg/L
   b. 2.5 mg/L
   c. 6.7 mg/L
   d. 1.1 mg/L

9. Which formula is used to calculate the circumference of a circular tank?
   a. πr^2
   b. πd^2
   c. $0.785\ d^2$
   d. πd

10. What is the volume of reclaimed water in 14 inches of a storage tank with a diameter of 75 feet?
   a. 33,029 gallons
   b. 3,752 gallons
   c. 20,588 gallons
   d. 38,545 gallons

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1. **b. Polymer**

   Water that is disinfected with chlorine, and then dechlorinated with sulfur dioxide, may require a chemical to stabilize the pH within the required 6.0 to 8.5 range. A commonly used chemical for this application is sodium hydroxide … caustic soda. Polymer would never be used for this application.

2. **d. The chlorine demand is multiplied by more than 5 for each pound of nitrite oxidized.**

   Nitrites (NO_2) will consume about five times their weight in chlorine before a residual is detected; however, nitrate (NO_3) values have little to no affect on demand for chlorine in the disinfection process.

3. **c. 3.5 hours**

   Detention Time, hours
   = Tank Volume, mg x 24 hrs/day ÷ Flow into Tank, mgd
   = 0.14 mg x 24 hr per day ÷ 0.96 mgd
   = 3.5 hours

4. **a. The ORP value increases**

   ORP and ammonia are inversely proportional to each other. When the ammonia level drops, the ORP value increases. Conversely, when the ammonia level increases, the ORP value decreases.

5. **d. 2.8 bar**

   1.0 bar = 14.7 psi
   = 95 feet TDH x 0.433 psi per foot of head
   = 41.135 psi ÷ 14.7 psi/bar = 2.79 bar
           OR
   = 95 feet TDH ÷ 2.31 feet of head per psi
   = 41.125 psi ÷ 14.7 psi/bar = 2.79 bar

6. **c. Sulfur dioxide**

   Sulfur dioxide is the only chemical on this list that will effectively dechlorinate chlorinated effluent. Other chemicals used for dechlorination are sodium thiosulfate and sodium bisulfite.

7. **c. 3.4 percent**

   TSS, ppm
   = weight of suspended solids in grams x (1,000,000 ÷ ml of sample)
   Weight of TSS
   = Final Wt. - Paper Tare Wt.
   = 2.2255 gm – 1.8873 gm
   = 0.3382 gm
   TSS, ppm
   = 0.3382 gm x 1,000,000 ÷ 10 ml sample
   = 33,820 mg/L (ppm)
   = TSS, mg/L ÷ 10,000 mg/L per 1%
   = 33,820 mg/L ÷ 10,000 mg/L per 1%
   = 3.38%

8. **b. 2.5 mg/L**

   Influent TSS of 225 mg/L x 0.011
   = Effluent TSS of 2.47 mg/L
   (100% - 98.9% = 1.1%)

9. **d. πd**

   Circumference is calculated as pi times the diameter … or πd. Basically, you can take the diameter of any circle and wrap it around the circumference (the outer wall of the circle) 3.14 times. If you have a calculator with a pi button, it typically displays 3.14159265359 …

10. **d. 38,545 gallons**

    Volume per foot = πr^2 x 1 foot x 7.48 gals/ft³
    = 3.14 x 37.5 ft x 37.5 ft x 1 ft x 7.48 gals/ft³
    = 33,029 gallons per foot
    = 14 inches ÷ 12 inches per foot = 1.167 feet
    = 33,029 gals per foot x 1.167 feet
    = 38,544.8 gallons in 14 inches in a 75 foot diameter tank