Test Your Knowledge of Wastewater Disposal

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1. Which chemical is typically 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. Alum

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 unaffected by nitrite concentrations
   d. The chlorine demand is multiplied by at least five times for each pound of nitrite oxidized.

3. What is the detention time of a reclaimed water storage tank if the tank volume is 2.5 mil gal (MG) and the flow entering the tank is 4.5 mil gal per day (mgd)?

   a. 13.3 hours
   b. 16.4 hours
   c. 1.23 hours
   d. 3.90 hours

4. What typically happens to the oxidation reduction potential (ORP) value of reclaimed water when the ammonia concentration increases from 0.5 mg/L to 2.5 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 mg/L total suspended solids (TSS) in this reuse water sample?
   · 100 ml of sample
   · Tare weight of filter paper is 1.8873 grams
   · Final weight of filter paper after drying is 1.8875 grams

   a. 2.0 ppm
   b. 1.3 ppm
   c. 3.4 ppm
   d. 4.3 ppm

6. Which chemical is more commonly used to dechlorinate effluent following disinfection with chlorine?

   a. H_2SO_4
   b. Sodium hypochlorite
   c. SO_2
   d. $FeCL_3$

7. What is the equivalent in gal per minute (gpm) of a pipe that has 2.5 mgd flowing through it?

   a. 694 gpm
   b. 1,440 gpm
   c. 1,735 gpm
   d. 7.48 gpm

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 a 100-ft-diameter storage tank at a sidewater depth of 15 ft?

    a. 58,718 gal
    b. 880,770 gal
    c. 1,120,588 gal
    d. 238,545 gal

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Certification Boulevard Answer Key

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1. **C) Sodium Hydroxide**
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 common chemical used for this application is sodium hydroxide, or caustic soda.

2. **D) The chlorine demand is multiplied by at least five times 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. **A) 13.3 hours**
Detention Time, hours
= Tank Volume, MG x 24 hrs/day ÷ Flow entering the tank, mgd

2.5 MG x 24 hrs per day ÷ 4.5 mgd
= 13.3 hours

4. **B) The ORP value decreases.**
The ORP and ammonia are inversely proportional to each other; when the ammonia level increases, the ORP value decreases. Conversely, when the ammonia level decreases, the ORP value increases.

5. **A) 2.0 ppm**
TSS, ppm = weight of suspended solids in grams x (1,000,000 ÷ ml of sample)

Weight of TSS = Final Wt. - Paper Tare Wt.
= 1.8875 gm - 1.8873 gm
= 0.0002 gm

TSS, ppm
= 0 .0002 gm x (1,000,000 ÷ 100 ml sample)
= 2.0 mg/L (ppm)

6. **C) SO_2**
Sulfur dioxide (SO_2) is the only chemical on this list that will effectively dechlorinate chlorinated effluent. Other chemicals used for dechlorination may be sodium thiosulfate and sodium bisulfite.

7. **C) 1,735 gpm**
1,000,000 gals per day ÷ 1,440 mins per day
= 694 gpm per mgd x 2.5 mgd
= 1,735 gpm

8. **B) 2.5 mg/L**
225 mg/L x 0.989 = 222.525 mg/L
225 mg/L - 222.525 mg/L = Effluent TSS of 2.475 mg/L

OR

100% - 98.9 percent = 1.1 percent
225 mg/L x 0.011 = Effluent TSS of 2.475 mg/L

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 3.1415926535. Another way of calculating circumference is 2 times π times r, known as 2πr.

10. **B) 880,770 gallons**
Volume per ft
= πr2 x 1 ft x 7.48 gals/ft3
= 3.14 x 50 ft x 50 ft x 1 ft x 7.48 gals/ft3
= 58,718 gal per ft

58,718 gal per foot x 15 ft
= 880,770 gal in 15 ft of a 100-ft-diameter tank.