Certification Boulevard

Test Your Knowledge of Various Wastewater Treatment Topics

Answer key

1. What is the minimum velocity in a sanitary sewer pipeline necessary to prevent settling of solids and debris?

   a. 1 fps
   b. 0.5 fps
   c. 2 fps
   d. 2 fpm

2. What is the detention time in a primary clarifier that is 100 feet long, 25 feet wide, 13 feet deep, and the influent flow is 5 mgd?

   a. 2.3 hours
   b. 1.8 hours
   c. 1.2 hours
   d. 3.1 hours

   $$\frac{\text{length 100 feet x width 25 feet x depth 13 feet x 7.48 gal/ft}^3 \text{ x 24 hrs/day}}{\text{5,000,000 gal/day}}$$

3. Given the following data, what is the surface settling rate of the secondary clarifiers?

   - Three (3) Secondary Clarifiers
   - Each Clarifier Has a Diameter of 100 Feet
   - The Plant Influent Flow is 15 mgd

   a. 637 gal/day/ft^2
   b. 3,414 gal/day/ft^2
   c. 736 gal/day/ft^2
   d. 159 gal/day/ft^2

   Each Clarifier Surface Area in ft^2 = 50 x 50 x 3.14 = 7,850 ft^2

   $$\frac{\text{15,000,000 gal/day}}{\text{3 Clarifiers = 23,550 ft}^2}$$

4. Given the following data, how many gallons of WAS should be removed if a 10 day SRT is the desired target?

   - Two (2) Aerations Tanks
   - Each Aeration Tank is 140 Feet Long, 45 Feet Wide, and 15 Feet Deep
   - The MLSS Concentration is 3,500 ppm
   - The WAS Concentration is 8,500 ppm

   a. 1.12 mgd
   b. 158,250 gpd
   c. 20,790 gpd
   d. 58,217 gpd

Lbs in Aeration =
140 ft x 45 ft x 15 ft x 7.48 gal/ft3 x 2 tanks = 1,413,720 gals
1.41372 mg x 3,500 ppm x 8.34 lbs/gal = 41,266 lbs MLSS

Lbs/day to WAS =

$$\frac{\textit{41,266 lbs MLSS}}{\textit{10 day SRT}} = \textit{4,127 lbs WAS}$$

Gals/day to WAS =

$$\frac{\textit{4,127 lbs WAS}}{\textit{8,500 ppm WAS x 8.34 lbs/gal}} = \textit{0.058217 mgd}$$

5. Which term is most related to vector attraction reduction in an aerobic digester?

a. Settleometer
b. Pathogen
c. SOUR
d. F/M

6. What does the term adsorption mean?

a. Impregnate a liquid with air
b. The taking in of one substance in the body of another
c. To gather onto the surface of a substance
d. Soak like a sponge

7. Which chemical is most commonly for odor control when dealing with H_2S gas?

a. Polymer
b. Sodium hydroxide
c. Alum
d. Water

8. Which activated sludge growth phase is considered to have the lowest F/M ratio, the highest SRT, the lowest sludge yield, and the worse oxygen utilization efficiency?

a. High rate aeration
b. Extended aeration
c. Conventional aeration
d. Log growth

9. Which group of bacteria are facultative and are responsible for $CBOD_5$ removal, and denitrification, in the activated sludge process?

a. Heterotrophic
b. Nitrosomonas
c. Autotrophic
d. Fermenters

10. Given the following data, what is the sludge blanket detention time?

- Secondary Clarifier is 50 Feet Diameter
- Sludge Blanket Depth is 3 Feet
- Floor Slope is 1:12
- RAS Rate is 0.55 mgd

a. 1.9 hours
b. 0.58 days
c. 2.4 hours
d. 12.5 hours

Gals of Sludge in the Clarifier Blanket =
25 ft x 25 ft x 3.14 x 3 ft Blanket x 7.48 gal/ft^3 = 44,038 gals

Gals of Sludge in the Clarifier Cone =
25 ft x 25 ft x 3.14 x 2.08 ft Cone Depth x 7.48 gal/ft^3 ÷ 3 = 10,178 gals

Total Gals Sludge in Clarifier =

$$\frac{54{,}216 \text{ gals} \times 24 \text{ hrs/day}}{550{,}000 \text{ gal/day}} = 2.36 \text{ hrs}$$