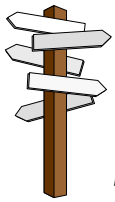

Certification Boulevard · Answer Key

Test Your Knowledge of Water Treatment … And Other Miscellaneous Topics

(submitted by: Ronald S. Karpa – certified operator)

1. A water plant has a ground storage reservoir that is 100 feet in diameter and fills to its maximum operating depth of 25 feet in 6 hours ... what is the average flow rate entering the tank in gpm?

   A. 650 gpm
   B. 3,125 gpm
   C. 4,078 gpm
   D. 4,546 gpm

Capacity of Tank at Max Level ***= pi r^2 x depth x 7.48 gal/cu. ft.***
= 3.14 x 50 ft. x 50 ft. x 25 ft. x 7.48 gal/cu. ft.
= 1,467,950 gals

Total Minutes of Pumping ***= 6 hrs x 60 mins/hr = 360 minutes***

Average Flow Rate ***= Capacity, gals divided by Minutes Pumped***
= 1,467,950 gals divided by 360 mins
= 4,078 gpm

2. Given the following data, what is the total lbs/day of chlorine consumption in this water plant?
   - Raw water flow rate is 2,550 gpm
   - Inlet treatment is 3.5 mg/L
   - Pre-filtration is 1.75 mg/L
   - Finished water disinfection is 2.75 mg/L

   A. 2,245 lbs/day
   B. 245 lbs/day
   C. 145 lbs/day
   D. 1,145 lbs/day

Total Flow Treated ***= 2,550 gpm x 1,440 mins/day***
= 3,672,000 gpd or 3.672 mgd

Total Chlorine Dosage ***= 3.5 mg/L + 1.75 mg/L + 2.75 mg/L***
= 8.0 mg/L

Total Lbs/day Consumed ***= Flow, mgd x Total Dosage, mg/L x 8.34 lbs/gal***
= 3.672 mgd x 8.0 mg/L x 8.34 lbs/gal
= 245 lbs/day

3. The finished water product temperature after thermal treatment is 15 ^{o}C, what is the conversion to ^{o}F?

A. <u>59 °F</u>
B. 68 °F
C. -5 °F
D. 72 °F

^{o}C x 1.8 + 32 = ^{o}F

15 ^{o}C x 1.8 + 32 = 59 ^{o}F

4. Given the following data, what is the total daily backwash volume in this effluent filter?

   Filter Data:

   - Hydraulic inflow of 1,500 gpm
   - Operational loading rate of 3 gpm/ft^2
   - Backwash rate of 25 gpm/ft^2
   - Two (2) backwash cycles per day

   A. 345,600 gpd backwash
   B. 3.15% of Q
   C. 1,800 gpd backwash
   D. <u>1.16% of Q</u>

Q to filter, gpd = 1,500 gpm x 1,440 min/day = 2,160,000 gpd
Filter surface area, ft^2 = 1,500 gpm ÷ 3 gpm/ft^2 = 500 ft^2
Filter backwash volume, gpd = 500 ft^2 x 25 gpm/ft^2 x 2 cycles per day = 25,000 gpd
Filter backwash rate, % of Q = 25,000 gpd backwash ÷ 2,160,000 gpd inflow = 0.01157 x 100 = 1.16% of Q

(submitted by: Ken Martin – certified operator at Lake Correctional Institution)

5. Which water quality indicator reduces the effectiveness of copper sulfate as an algaecide when treating source waters for taste and odor caused by algae?

   A. Total suspended solids
   B. Temperature
   C. <u>Alkalinity</u>
   D. pH

6. What is created when chlorine reacts with volatile organics?

   A. Ammonia
   B. <u>Trihalomethane</u>
   C. Alkalinity
   D. Trimethalamine

7. Which type of solids are not typically removed with standard water filtration?

   A. <u>Dissolved</u>
   B. Suspended
   C. Settleable

D. Total

(submitted by: Ken Martin – certified operator at Lake Correctional Institution)

8. Given the following data, and considering a 10% increase in the flow rate, and an increased chlorine consumption of 34%, calculate the new lbs/day consumption and dosage of chlorine in this water plant.

   Plant Data:

   - The plant flow rate is 1,388 gpm
   - Chlorine consumption is 50 lbs/day

   A. 55 lbs/day and 3.0 ppm
   B. 50 lbs/day and 4.0 ppm
   C. 75 lbs/day and 3.25 ppm
   D. <u>67 lbs/day and 3.6 ppm</u>

$$\textit{New plant flow in mgd} = \frac{\textit{1,388 gpm x 1.1}}{\textit{694 gpm/mgd}} = \textit{2.2 mgd}$$

$$\textit{New chlorine consumption} = \textit{50 lbs/day x 1.34} = \textit{67 lbs/day}$$

$$\textit{New chlorine dosage} = \frac{\textit{67 lbs/day}}{\textit{2.2 mgd x 8.34 lbs/gal}} = \textit{3.6 ppm}$$

9. Which two chemicals are typically used in a water system chlor-ammonation process?

   A. Chlorine and Sulfur Dioxide
   B. Ammonia and Sodium Hydroxide
   C. Chlorine and Caustic
   D. <u>Chlorine and Ammonia</u>

10. What is another term for non-volatile?

    A. Dissolved
    B. Soluble
    C. Organic
    D. <u>Inorganic</u>

Please forward your comments and sample questions for publication to:

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