Certification Boulevard

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Test Your Knowledge of Water Treatment and Other Topics

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. Assuming the tank starts empty, what is the average flow rate entering the tank in gallons per minutes (gpm)?
   A. 416 gpm B. 3,125 gpm
   C. 4,078 gpm D. 4,546 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

3. The finished water product temperature after thermal treatment is 15 °C; what is the conversion to oF?
   A. 59 °F B. 68 °F
   C. -5 °F D. 72 °F

4. 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. Alkalinity
   D. pH

5. What should typically happen to filter backwash rates during summer months?
   A. They decrease.
   B. They stay the same.
   C. They increase.
   D. They ramp up more slowly.

6. Which type of solids are not typically removed with standard water filtration?
   A. Dissolved B. Suspended
   C. Settleable D. Total

7. Given the following data, and considering a 10 percent increase in the flow rate and an increased chlorine consumption of 34 percent, 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. 67 lbs/day and 3.6 ppm

8. 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. Chlorine and ammonia

9. Which of the following is not a by-product of disinfection?
   A. Trihalomethanes B. Bromate
   C. Haloacetic acids D. Nitrite

10. What is another term for non-volatile?
    A. Dissolved B. Soluble
    C. Organic D. Inorganic

ANSWERS ON PAGE 60

SEND US YOUR QUESTIONS

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 e-mail to roy.pelletier@cityoforlando.net, or by mail to:

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Certification Boulevard Answer Key

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1. **C. 4,078 gpm**
   Capacity of Tank at Max Level
   = π 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 minutes
   = 4,078 gpm

2. **B. 245 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. **A. 59 °F**
   °C x 1.8 + 32 = °F
   15 °C x 1.8 + 32 = 59 °F

4. **C. Alkalinity**

5. **C. They increase.**
   Warm water is less dens,e so higher backwash rates are required to achieve the same media bed expansion. Filtration plants should consider adjusting backwash rates seasonally to account for water density.

6. **A. Dissolved**

7. **D. 67 lbs/day and 3.6 ppm**
   New plant flow in mgd
   = 1,388 gpm x 1.1 ÷ 694 gpm/mgd
   (Note: 1.1 is the 10% increase in flow)
   = 2.2 mgd
   New chlorine consumption
   = 50 lbs/day x 1.34
   (Note: 1.34 is the 34% increase in chlorine)
   = 67 lbs/day
   New chlorine dosage
   = 67 lbs/day ÷ 2.2 mgd x 8.34 lbs/gal
   = 3.6 ppm

8. **D. Chlorine and ammonia**

9. **D. Nitrite**

10. **D. Inorganic**