Certification Boulevard

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Test Your Knowledge of Water Treatment & 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 six hours. Assuming the tank starts empty, what is the average flow rate entering the tank in 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 °F?
   A. 59 °F B. 68 °F
   C. -5 °F D. 72 °F

4. Given the following data, what is the total daily backwash volume in this water filtration process?
   Filter Data:
   • Hydraulic inflow = 1,500 gpm
   • Operational loading rate = 3 gpm/ft^2
   • Backwash rate = 25 gpm/ft^2
   • Backwash cycles per day = 2
   A. 345,600 gpd backwash
   B. 3.15% of Q
   C. 1,800 gpd backwash
   D. 1.16% of Q

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. Alkalinity
   D. pH

6. What is created when chlorine reacts with total organic carbon?
   A. Ammonia B. Trihalomethane
   C. Alkalinity D. Trimethalamine

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

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. 67 lbs/day and 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. Chlorine and Ammonia

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

ANSWERS ON PAGE 62

SEND US YOUR QUESTIONS FOR CERTIFICATION BOULEVARD

Do you have a question or an exercise you would like to feature in "Certification Boulevard?" We'll be glad to publish it. Just send your question (with the answer) or your exercise (with the solution) to:

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There is no limit to the number of questions or exercises you may submit. Please include your name, city, and organization or company so we can give you credit.

Certification Boulevard Answer Key

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1. **C. 4,078 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 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. **D. 1.16% of Q**
   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

5. **C. Alkalinity**

6. **B. Trihalomethane**

7. **A. Dissolved**

8. **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

9. **D. Chlorine and Ammonia**

10. **D. Inorganic**