



Certification Boulevard · Answer Key

Test Your Knowledge of Water Treatment Topics

1. If the discharge head on an electrically driven vertical turbine pump increases, what does the motor current do?
 - A. It remains the same
 - B. It goes up
 - C. **It goes down**
 - D. It will oscillate

Many people intuitively think if the discharge pressure rises the motor does more work, therefore, the current must go up. Of course, raising the discharge pressure on a centrifugal pump lowers the discharge flow, therefore, the pump actually does less work and the current goes down.

2. Given the following data, what is the total lbs/day of chlorine consumption in this water plant?
 - Raw water flow rate is 1.547 cfs
 - Inlet chlorination treatment is 3.5 mg/L
 - Pre-filtration chlorination is 1.75 mg/L
 - Finished water disinfection is 2.75 mg/L
 - A. 103 lbs/day
 - B. 61.9 lbs/day
 - C. **66.7 lbs/day**
 - D. 14.9 lbs/day

$$\begin{aligned} \text{Total Flow Treated} &= 1.547 \text{ cfs/mgd} \times 1,440 \text{ mins/day} \times 60 \text{ secs/min} \times 7.48 \text{ gal/ft}^3 \\ &= 999,782 \text{ gals flow rate per day ... say } 1.0 \text{ mgd} \end{aligned}$$

$$\begin{aligned} \text{Total Chlorine Dosage} &= 3.5 \text{ mg/L} + 1.75 \text{ mg/L} + 2.75 \text{ mg/L} \\ &= 8.0 \text{ mg/L} \end{aligned}$$

$$\begin{aligned} \text{Total Lbs/day Consumed} &= \text{Flow, mgd} \times \text{Total Dosage, mg/L} \times 8.34 \text{ lbs/gal} \\ &= 1.0 \text{ mgd} \times 8.0 \text{ mg/L} \times 8.34 \text{ lbs/gal} \\ &= 66.7 \text{ lbs/day} \end{aligned}$$

3. If a water sample has 40 mg/L Calcium and 10 mg/L Magnesium, what is the total hardness measured as calcium carbonate equivalent?
 - A. 100 mg/L CaCO₃
 - B. 185 mg/L CaCO₃
 - C. **140 mg/L CaCO₃**
 - D. 95 mg/L CaCO₃

Think of equivalent weight as meaning the weight of an equivalent number of molecules. The molecular weight of calcium carbonate is 2.5 times heavier than calcium and 4.0 times heavier than magnesium so: $40 \times (2.5) + 10 \times (4.0) = 140$.

4. If a finished water sample has a temperature of 29 °C, what is the conversion to °F?

- A. 77 °F
- B. 61 °F
- C. **84 °F**
- D. 72 °F

$$^{\circ}\text{C} \times 1.8 + 32 = ^{\circ}\text{F}$$

$$29^{\circ}\text{C} \times 1.8 + 32 = 84.2^{\circ}\text{F}$$

5. Alkalinity is a measure of which ions?

- A. **Carbonate, bicarbonate, and hydroxide**
- B. Calcium and magnesium
- C. Hydrogen and hydroxide
- D. Sulfate, chlorate, and nitrate

Borate, silicate, and phosphate also contribute to alkalinity but are not typically found in high enough concentrations to be significant.

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

- A. Ammonia
- B. **Trihalomethane**
- C. Alkalinity
- D. Trimethylamine

7. What should typically happen to filter backwash rates during summer months?

- A. Decrease
- B. Stay the same
- C. **Increase**
- D. Ramped up more slowly

Warm water is less dense 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.

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. Which of the following chemicals is not an ozone scavenger?

- A. Sodium bisulfite
- B. Calcium sulfate**
- C. Hydrogen peroxide
- D. Calcium thiosulfate

Ozone systems often require the ozone residual to be quenched with an ozone scavenger before leaving the contact chamber. Sodium bisulfite and hydrogen peroxide are used most often.

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Please forward your comments and sample questions for publication to:

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