Certification Boulevard

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Test Your Knowledge of Water Supply and Other Topics

1. What is the velocity in cubic feet per second (cfs) of a 1.5 mgd stream of water?
   a. 1.55 cfs b. 8.34 cfs
   c. 2.32 cfs d. 92.84 cfs

2. Given the following data, calculate the approximate horsepower delivered by this pump:
   • Flow is 675 gpm
   • TDH is 95 feet
   • Pump efficiency is 88%
   • Motor efficiency is 95%
   a. 13.5 HP b. 19 HP
   c. 25 HP d. 7.5 HP

3. What is the flow velocity in a 6-inch pipe as compared to the flow velocity in a 12-inch pipe, assuming both pipes are flowing an identical volume of water?
   a. The same
   b. Twice the velocity
   c. Three times the velocity
   d. Four times the velocity

4. When pumping water, the Total Dynamic Head is the sum of three main components. List these components:
   a) _____
   b) _____
   c) _____

5. Which repair kit is designed for use with chlorine tank cars?
   a. "A" kit
   b. "B" kit
   c. "C" kit
   d. None of the above

6. What is the weight relationship of chlorine liquid as compared to water?
   a. Water weighs more than liquid chlorine.
   b. Liquid chlorine weighs 2.5 times more than water.
   c. Water weighs 1.5 times more than liquid chlorine.
   d. Liquid chlorine weighs 1.5 times more than water.

7. What will the pressure gauge read on the suction of a pump if the pump is located at floor elevation of the tank and the tank has 25 feet of static water level?
   a. About 58 psi
   b. About 9.5 psi
   c. About 11 psi
   d. About 17 psi

8. When alkalinity is high, the pH is always high.
   a. True b. False

9. Which has a lower pH … sodium hydroxide or aluminum sulfate?
   a. Aluminum sulfate
   b. Sodium hydroxide
   c. They are both the same

10. A potable water flow meter reads 83 gpm for 13 hrs/day and 47 gpm for the remaining 11 hrs/day. What is the total daily flow in mgd?
    a. 0.64740 mgd b. 0.09576 mgd
    c. 0.03102 mgd d. 0.1870 mgd

ANSWERS ON PAGE 54

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.

January Certification Boulevard Correction…

In the answer to Question 9 on page 70 of the January issue, the fraction "1/3" was accidentally omitted from the first line of the formula for Cone Volume during the printing process. Although the calculation was correct in the following lines, the absence of this fraction from the first line was confusing. Here is the question again, followed by the correct answer and calculations:

9. Given the following data, what is the total volume of this secondary clarifier (including the cone volume)?
   · 50-foot diameter
   · 12-foot SWD
   · 3-foot sludge blanket depth
   · 4-foot cone depth
   A. 176,154 gals B. 19,578 gals
   C. 324,578 gals D. 195,727 gals

ANSWER:
D. 195,727 gals

Total tank volume
= tank volume in gallons at SWD plus volume in gallons the cone
Tank volume, gals
= πr^2 x side water depth, ft. x 7.48 gals per cubic foot
= 3.14 x 25 ft. x 25 ft. x 12 ft. x 7.48 gal/ft^3
= 176,154 gallons at SWD
Cone volume, gals
= (1/3)πr^2 x cone depth, ft. x 7.48 gals per cubic foot
= (3.14 x 25 ft. x 25 ft. x 4 ft. x 7.48 gal/ft^3) ÷ 3
= 19,573 gallons in cone
Total Volume in Tank
= 176,154 gals at SWD + 19,573 gals in cone
= 195,727 gallons

Certification Boulevard Answer Key

From page 6

1. c. 2.32 cfs
   1,000,000 gpd ÷ 86,400 sec/day ÷ 7.48 gal/cu.ft. x 1.5 mgd
   = 2.32 cfs

2. b. 19 HP
   Horsepower
   = (gpm x TDH, feet x 8.34 lbs/gal) ÷ 33,000 foot lbs/second ÷ % pump eff ÷ % motor eff
   = (675 gpm x 95 TDH x 8.34 lbs/gal) ÷ 33,000 ÷ 0.88 ÷ 0.95
   = 19.38 HP

3. d. Four times the velocity
   Cross section of a 6-inch pipe = πr^2
   3.14 x (3 in. ÷ 12 in.)^2 = 0.196 ft^2
   Cross section of a 12-inch pipe = πr^2
   3.14 x (6 in. ÷ 12 in.)^2 = 0.785 ft^2

   0.785 ft^2 ÷ 0.196 ft^2 = 4.0

4. a) Suction Lift
   b) Discharge Head
   c) Friction Losses
   TDH: (Total Dynamic Head) A combination of various components - Static Head, which is a combination of suction lift and discharge head, and Friction Losses (Friction Head), which includes velocity head. All components are expressed in feet. Static Head is the actu - al vertical distance measured from the mini - mum water level in the basin to the highest point in the discharge piping. Friction Head is the additional head created in the discharge system due to resistance to flow within its components.

5. c. "C" kit

6. d. Liquid chlorine weighs 1.5 times more than water

7. c. About 11 psi
   Each foot of water generates 0.433 psi
   25 feet of water x 0.433 psi = 10.82 psi

8. b. False
   There is not necessarily a correlation between high alkalinity and high pH; sometimes the pH may be high, sometimes not.

9. a. Aluminum sulfate
   Aluminum sulfate (Alum) is an acid with a pH typically below 4.0.
   Sodium hydroxide (Caustic) is an alkaline with a pH typically greater than 12.

10. b. 0.09576 mgd
    (83 gpm x 13 hrs/day x 60 mins/hr) + (47 gpm x 11 hrs/day x 60 mins/day)
    = 64,740 gpd + 31,020 gpd
    = 95,760 gpd ÷ 1,000,000
    = 0.09576 mgd