Water Distribution III / IV

Exam Preparation

Which one of the following types of pumps works on the basis of inertia or mass moving in a circular motion?

a. air lift

b. centrifugal

c. diaphragm

d. Gear

b. centrifugal

The effectiveness of chlorine disinfection is driven mostly by:

a) water pH and chlorine demand

a) concentration of chlorine and chlorine demand

c) concentration of chlorine and contact time

d) water ph and water temperature

[C] concentration and contact time; at a given pH and temperature concentration and time determine whether effective disinfection will be achieved

The annual operating cost is

Salaries = $5970 Chemicals = $2540 Power = $3251

Miscellaneous = $269

What is the cost per 1000 gallons if 2 million gallons of water are pumped each month?

a. $6.02

b. $2.99

c. $0.50

d. cannot be determined

What do we need to do?

Determine Total Annual Costs then Divide into Monthly Costs

$5970 + $2540 + $3251 + $269 = $12,030 Total Annual Costs

$12,030 / 12 = $1,002.50 per month

Then we need to find out how 1,000 GAL units are in 2,000,000 GAL

Divide 1,000 GAL / 2,000,000 GAL

2,000,000 / 1,000 = 2,000 (1,000 GAL units)

Then, Divide $1002.50 by the 2,000 units

$1002.50 / 2,000 = $.50/ 1,000 GAL

C. $.50

The control of scaling is called:

a) anti-galvanization
b) stabilization
c) chemical balance
d) corrosion inhibition

[B] stabilization; water should be brought to a point where it will not dissolve scale and will have a small tendency to form scale (calcium carbonate). The saturation index or Langelier Index provides a number related to the magnitude of the tendency to deposit or dissolve scale.

The coupon test can be used:

a. to determine water quality.
b. to calculate the influence of daily treatment changes.
c. as an indication of the corrosion/scaling rate.
d. none of the above.

What is a coupon test?

coupons are pre-weighed and measured metal strips
If they lose weight, then corrosion is occurring
If they collect a coating, then scaling is occurring

c. Is correct

A double check valve assembly

a. can be constructed from two reliable check valves.

b. has the relief port blocked off.

c. is less susceptible to vandalism.

d. is not recommended where a health hazard would result from its failure.

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Which of the following organisms would be the most difficult to inactivate using chlorine?

a) Hepatitis B virus

b) Polio virus

c) Giardia lamblia

d) e. coli

[C] protozoa that form cysts are difficult to inactivate with chlorine. Others in this group include amoeba and cryptosporidium.

The effect of partially closing the discharge valve on a three phase, induction motor-driven, centrifugal pump would be to

a. cause the motor to draw less amperage.

b. cause the motor to run hotter.

c. cause the motor to run slower.

d. cause the pumped wastewater to get colder.

a. cause the motor to draw less amperage.

To disinfect a drinking water well, for example, following equipment servicing, would require which combination of time and free chlorine residual?

a) 3 to 6 hours and 20 mg/L

b) 6 to 12 hours and 25 mg/L

c) 6 to 12 hours and 50 mg/L

d) 12 to 24 hours and 50 mg/L

[D] 12 to 24 hours contact time and a chlorine concentration of 50 mg/l per AWWA/ANSI Standard C654-03

The overflow pipe on an elevated balancing water tank should be of sufficient diameter to permit wastage of water

a. at half the filling rate.

b. at the normal filling rate.

c. in excess of the filling rate.

d. none of the above.

c. in excess of the filling rate.

Insurance Services Office requires a minimum residual gauge pressure (during hydrant flows in the vicinity) of ____ psi.

a. 10

b. 20

c. 30

d. 40

20 psi.

Everybody loves this number

NDEP
EPA
SNHD
Plumbing Codes
and the ISO

The first step in establishing a cross connection control program is

a. educating the public and municipal government.
b. inspecting premises.
c. passing the authorizing control ordinance.
d. planning.

d. planning.

Suppose the chlorine demand of a water is 4 mg/L and a 0.1 mg/L chlorine residual is desired. How many pounds of chlorine will be required for a flow of 1.2 mgd in 24 hr?

a. 20 lb
b. 39 lb
c. 41 lb
d. 62 lb

Continued….

Our chlorine demand of a water is 4 mg/L and a 0.1 mg/L chlorine residual is desired
The Question has our flow as 1.2 mgd in 24 hrs?
Isn't that the same thing as MGD

Let's find the right the formula
Demand + Residual = Dose
Dose X MG X Lbs. = lbs of Cl_2

So, our dose (4 mg/l + .1 mg/l) = 4.1 mg/l multiplies with our flow 1.2 MGD times 8.34 Lbs/gallon

4.1 X 1.2 X 8.34 = 41 lbs.

C. 41 lbs. is the correct answer.

If the horizontal scale on a plan is 1 in. = 100 ft, and the vertical scale is 1 in. = 10 ft, how long a line would represent a level length of pipeline 175 ft long?

a. 0.175 in.
b. 1.75 in.
c. 17.5 in.
d. 175 in.

Next..

If the horizontal scale on a plan is 1 in. = 100 ft, and the vertical scale is 1 in. = 10 ft, how long a line would represent a level length of pipeline 175 ft long?

Don’t let the context of the question confuse you. This is simple math. If 1 inch = 100 feet and the question is asking for a **level length**, then **we don’t need the vertical scale information.**

100 feet = 1 inch
75 ft/100 = .75 inches

1 + .75 = 1.75 inches. b. 1.75 in. is the correct answer

Which index is used to indicate whether or not lime scale would be deposited or dissolved by a given water?

a) C factor

b) Langelier Saturation Index , LI

c) Ryzner Index

d) pH scale

[B] LI, determined from (pH of the sample – calculated pHs) If the result is a negative number, scale will tend to dissolve and go away. If the result is a positive number, scale will tend to form under the test conditions. The greater the difference from zero, the greater the tendency to either form or dissolve scale.

The basic pipeline size used in a water distribution system is determined by

a. customer need.
b. desired pressure.
c. elevation and friction losses.
d. fire protection needs.

d. fire protection needs.

A chlorine residual of 0.2 mg/L means the amount present is

a. 0.2 gallon of chlorine in 1 million lb of water.
b. 0.2 kg of chlorine in 1 million m3 of water.
c. 0.2 lb of chlorine in 1 million gallons of water.
d. 0.2 lb of chlorine in 1 million lb of water.

d. 0.2 lb of chlorine in 1 million lb of water.

Which is the most important reason to reduce turbidity?

a) To reduce taste and odor problems

b) To remove pathogens

c) To reduce corrosion

d) To determine the efficiency of the coagulation and filtration processes

[B] to remove pathogens along with the solid and colloidal material

Who is ultimately responsible for being sure that your agency has a good record keeping system?

a. everyone
b. field workers
c. foreman
d. supervisor

Supervisor is the correct answer for this question.

What is the most important and all inclusive aspect of supervision?

a. proper utilization of people
b. proper utilization of finances
c. proper utilization of equipment
d. proper utilization of all resources

d. proper utilization of all resources

One opening has become available that would be an advancement to any one of
three qualified eager employees. How should this situation be handled?

a. Hire an outsider to fill the position.
b. Pick one and notify all personnel of the change.
c. Quietly move one up; everyone will soon know.
d. Talk to all three as a group, explain the situation and make your selection. Then notify all personnel of the change.

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In a parallel circuit, if one unit is burned out or disconnected, the other units will

a. become overloaded.
b. cease to function.
c. cease to function and then resume when the unit is replaced.
d. continue to function.

Next….

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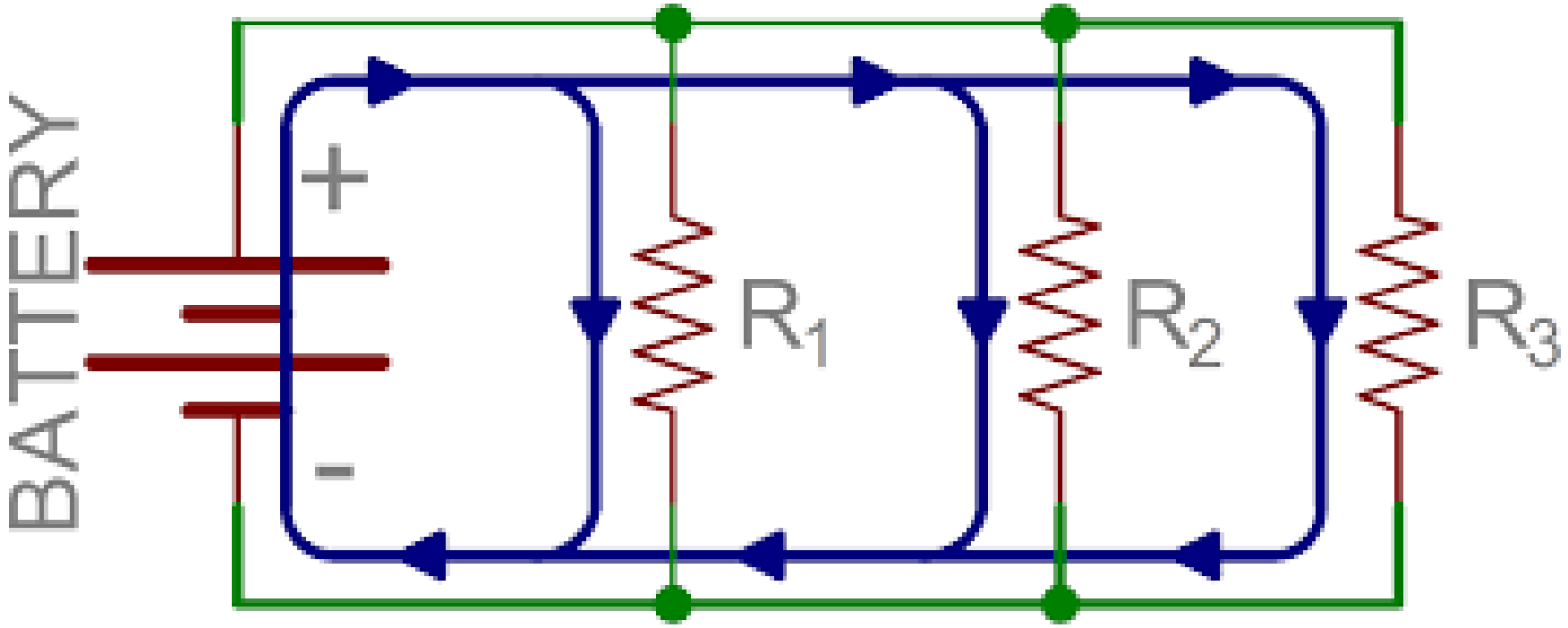
d. continue to function.



Disinfection using ultraviolet light is effective but has which major limitation?

a) Potential for DBP formation

b) Does not inactivate all microorganisms

c) Fluoride at very low concentrations can absorb most of the uv light

d) UV tube sheaths often become coated, diminishing the amount of light reaching the water

D] coating must be removed periodically

The location where residual pressure is measured should be

a. on the opposite nozzle of the flowing hydrant.
b. at the nearest hydrant upstream from the flowing hydrant.
c. between the source and the flowing hydrant.
d. between the flowing hydrant and the normal pressure.

b. at the nearest hydrant upstream from the flowing hydrant.

When working with electrical equipment outdoors

a. a ground fault interrupter power supply is required.
b. battery powered motor generators should be used instead of line voltage.
c. line power grounding should be tested with a volt-ohm meter before proceeding.
d. none of the above.

a. a ground fault interrupter power supply is required.

The most important thing a supervisor can do regarding potential personnel problems is to

a. delay action in order to think about it.
b. have the personnel officer talk to the personnel involved.
c. seek advice from superiors.
d. write each incidence down, file it for reference, and talk to the personnel involved.

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Water rates are
$0.50 per 100 ft3 for the first 2000 ft3
$0.40 per 100 ft3 from 2000 to 6000 ft3
$0.35 per 100 ft3 from 6000 to 20,000 ft3 and
$0.25 per 100 ft3 for 20,000 ft3 and over.
What is the charge for 1 acre-ft?

a. $108.90
b. $133.90
c. $154.00
d. $163.35

Next….

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$0.25 per 100 ft3 for 20,000 ft3 and over.

What is the charge for 1 acre-ft?

.5 X (2,000/100) = $10
.4 X (2,000-6,000/100) = $16
.35 X (6,000-20,000/100) = $49
.25 X (20,000-43,560/100) = $58.9

b. $133.90

What is the main reason for the poor accident record of operators?

a. lack of equipment
b. lack of interest
c. lack of time
d. lack of training

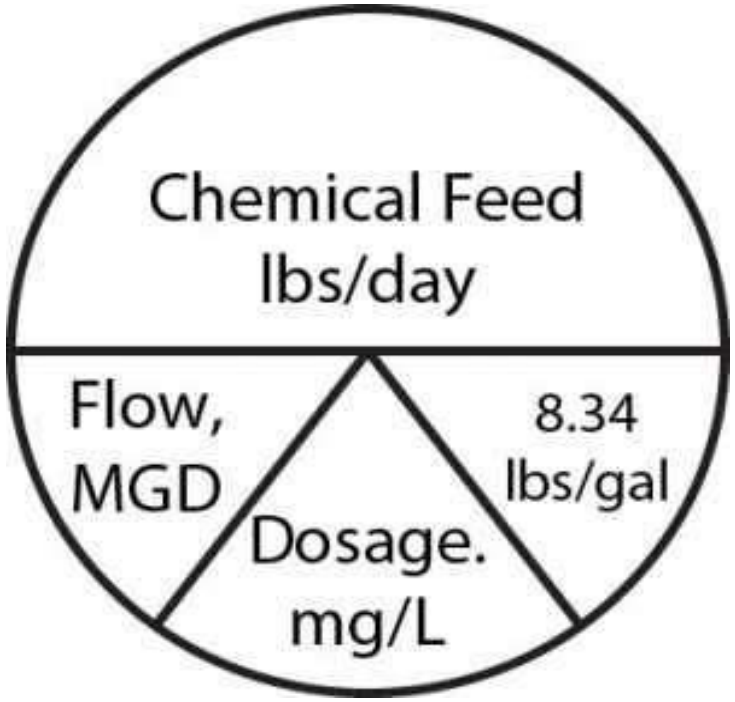
d. lack of training

The chlorine demand of a certain water is 3 mg/L. If the operator treats 250,000 gal of water with 10 lb of chlorine gas, the chlorine residual should be ____ mg/L.

a. 1.0
b. 1.8
c. 3.0
d. 4.8

Next….

Set it up 250,000 = .250 MG
10 lbs chlorine gas (considered 100%)
3 mg/L demand = ? Residual mg/l.



Dose x MG x lbs = lbs used

$$\frac{\text{lbs used}}{\text{MG x lbs}} = \text{Dose}$$

Dose = demand + residual
Dose – demand = residual

$$\frac{10\text{lbs}}{.25\text{ MG x 8.34 lbs.}} = \frac{10}{2.085} = 4.79\text{ mg/l} - 3\text{ mg/l} = 1.79\text{ mg/l}$$

b. 1.8

Two ways to reduce the chances of freezing in a water tank are

a. close air vents and increase internal tank pressure.
b. hold the water level stable and increase chlorine concentration.
c. vary the water level and increase the maximum water level.
d. vary the water level and lower the maximum water level.

d. vary the water level and lower the maximum water level.

Word has just come down from the top that operating funds are being cut. How should this be handled?

a. Cut supplies and repairs to balance the budget.
b. Fire some of the less productive old employees.
c. Keep it quiet and do what you have to do - "the less said the better".
d. Let the other personnel know what the situation is and ask for their help.

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If you were in charge of a large operation with four foreman, three whose work was exceptionally good and a fourth who was substandard, what should you do?

a. Demote the person giving your reasons.
b. Find a replacement and then fire the person.
c. Fire this person and then look for a replacement.
d. Tell the person of the shortcomings that bother you and offer to help the person before any other action is taken.

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An operator is caught in a room where chlorine gas is leaking. If the operator does
not have a mask, what should the operator do?

a. Keep mouth closed, keep head as high as possible and quickly walk out of the
room, holding breath if possible.
b. Lay down on the floor and quickly crawl out of the room.
c. Pull shirt over mouth and face and quickly walk out of the room.
d. Walk out of the room quickly.

Next…

An operator is caught in a room where chlorine gas is leaking. If the operator does
not have a mask, what should the operator do?

a. Keep mouth closed, keep head as high as possible and quickly walk out of the room, holding breath if possible.

Why is this correct?

When an employee refuses to observe safety requirements because the employee
"has learned over the years that they are useless,"
what action should the immediate supervisor take?

a. Approve of the employee's action.
b. Initiate immediate disciplinary action.
c. Make the employee sign a hold harmless agreement.
d. Tell other employees to ignore the situation.

b. Initiate immediate disciplinary action.

The customer's most memorable image of a utility is often

a. the professional public relations spokesperson.
b. the actions of the distribution field personnel.
c. radio and television reports on the utility's success.
d. bill stuffers received with the monthly water bill.

b. the actions of the distribution field personnel.

What is the percent unaccounted for water (water loss) when pumpage is 550,000 gpd and the total of customers meter readings is 63,800 ft3?

a. 1%
b. 2%
c. 13%
d. 15%

Next…..

What is the percent unaccounted for water (water loss) when pumpage is 550,000 gpd and the total of customers meter readings is 63,800 ft3?

550,000 gpd / 7.5 gal = 73,334 ft3 Pumped water

63,800 ft3 Customer used

63,800 ft3 / 73,334 ft3 = .87 – 1 = .13

c. 13%

If galvanized iron fittings are connected to copper pipe in moist ground, you would expect which of these to occur first?

a. The copper pipe will corrode.
b. The copper pipe will scale and plug.
c. The galvanized fittings will scale and plug.
d. The galvanized iron will corrode.

d. The galvanized iron will corrode.

Cathodic protection systems for tanks commonly use sacrificial anodes and

a. unpowered iron cathodes.
b. an integrated circuit controller.
c. an alternating current power source.
d. a direct current power supply.

d. a direct current power supply.

Some wells produce excessive amounts of sand in the water. There are some operating procedures that are helpful in over-coming this problem. One procedure is to reduce the pumping rate and the other procedure is to pump the well

a. continuously for long periods.
b. for short periods.
c. only every other day.
d. with an air lift.

a. continuously for long periods.

At the same flow, friction losses through a 12-inch line will be

a. less than through a 6-inch line.
b. the same as through a 6-inch line.
c. slightly more than through a 6-inch line.
d. twice as much as through a 6-inch line.

a. less than through a 6-inch line.

To test if a 110 V/AC is hot, set volt-ohm meter for

a. 100 A.
b. 100 V/AC.
c. 250 A.
d. 250 V/AC.

d. 250 V/AC.

What is the total head loss in a 6500 ft long 18-in. pipe, if the flow is 3.5 mgd and the head loss of the pipe is 0.28 ft/100 ft?

a. 2 ft.
b. 18 ft.
c. 23 ft.
d. 115 ft.

6500/ 100 = 65 x .28 ft/100 =18.2

b. 18 ft.

When two 2000 gpm high service pumps are operating, the following conditions are found
(1) the gauges on the pump discharge lines read 95 psi; and

(2) the difference in elevation between the gauges and the water level in the elevated tank is 139 ft.

The head loss due to friction is _____ psi.

a. 21.2
b. 25.5
c. 29.8
d. 34.8

139’ x .433 = 60.2 psi – 95 psi = 34.8

d. 34.8

The recommended distance for horizontal separation of water mains and sewer lines is _____ ft.

a. 5
b. 10
c. 20
d. 30

b. 10

Disaster planning is

a. a good training technique.
b. having manuals ready so they can be read if a disaster occurs.
c. something, that if properly done, will not need to be revised.
d. none of the above.

a. a good training technique.

What should the setting be on a chlorinator in pounds per day if the dosage desired is 3.25 mg/L and the pumping rate is 735 gpm?

a. 20.1 lb/d of chlorine
b. 8.83 lb/d of chlorine
c. 239.4 lb/d of chlorine
d. 28.7 lb/d of chlorine

d. 28.7 lb/d of chlorine

What is the most important measurement of water quality in the distribution system?

a. Turbidity
b. Temperature
c. pH
d. Chlorine Residual

d. Chlorine Residual

It’s best to have an _____ to prevent the collapse of a pipe when it is being emptied.

a. air-purging valve
b. air-and-vacuum relief valve
c. actuator
d. atmospheric vacuum breaker
b. air-and-vacuum relief valve

In the Ground Water Rule, systems found to be at high risk for fecal contamination are required to provide _____ inactivation of _____.

a. 2-log, Cryptosporidium
b. 4-log, viruses
c. 4-log, Cryptosporidium
d. 2-log, viruses
b. 4-log, viruses

Controlling lead leaching in the range of 6-9 pH units generally requires the dissolved inorganic carbon to be greater than _____.

a. 2 mg/L
b. 2.5 mg/L
c. 3.5 mg/L
d. 5 mg/L

a. 2 mg/L

What water quality problem can be considered both a chemical ad biological issue?

a. Nitrification
b. Color
c. *E*.coli
d. Tastes and Odors

d. Tastes and Odors

Chloramine produces a _____ , and it is also, compared to chlorine, relatively _____ for _____.

a. short-lasting residual, ineffective, inactivating most cyst-forming bacteria
b. Lower concentrations of THMs, ineffective, inactivating *Giardia*
c. Higher concentrations of DBPs, ineffective, inactivating most cyst-forming bacteria
d. Long-lasting residual, effective, *Giardia*

b. Lower concentrations of THMs, ineffective, inactivating *Giardia*

What parameter would not indicate a water quality problem with direct potential to impact public health?

a. Disinfectant decay
b. Sediment deposition
c. Nitrification
d. Tastes and Odors

b. Sediment deposition

A Sodium Hypochlorite solution is being pumped from a small tank that is 3.5 ft in diameter. If the level in the tank drops .35 ft in 24.0 HR, how many milliliters per minute of hypochlorite solution was used? Make sure to use the appropriate number of significant figures in your answer.

a. 66 mL/min
b. 66.17 mL/min
c. 66.2 mL/min
d. 70 L/min
e. 66 mL/min

First, determine the gallons pumped.
.785 x 3.5 x 3.5 x .35 ft x 7.48 = 25.175 gal

24 hours = 1440 minutes

Last determine the mL/min.

25.175 gal (3785 mL/gal) = 66.17 mL/min, round to 66 mL/min
1440 minutes /day

Thank You and Good Luck!
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