

Operator Quiz Test No. 110 – Rotating Biological Contactor

The following questions are designed for trainees as they prepare to take the ABC wastewater operator test. It is also designed for existing operators to test their knowledge. Each issue of *Clear Waters* will have more questions from a different section of wastewater treatment. Good Luck!

- Use the following data to determine the organic loading rate of a trickling filter: rock media 5' deep, 160' diameter, 8.0 mgd, 110 mg/L BOD primary effluent:
 - 73 lbs/day/1000 ft³
 - 9.17 lbs/day/1000 ft³
 - 875 lbs/day/1000 ft³
 - 11.7 lbs/day/1000 ft³
- A trickling filter with a hydraulic loading rate of 75 gal/day/ft² would be considered what type of trickling filter?:
 - High rate filter
 - Roughing filter
 - Standard rate filter
 - Tertiary filter
- Determine the hydraulic loading rate of a trickling filter using the following specifications: 6,250 gallons per minute, 140' diameter, 6' deep:
 - 1585 mgd/ft²
 - 585 gpd/ft²
 - 975 gpm/ft²
 - 115 gph/ft²
- All of the following are types of drive assemblies used to rotate an RBC, except:
 - Motor with chain drive
 - Motor with direct shaft drive
 - Air drive
 - Magnetic drive
- What is the organic loading rate on a rotating biological contactor with the following data: 50,000 gpd, 125 mg/L influent BOD, surface area of 28,000 ft²?:
 - 0.0019 lbs/day/1000ft²
 - 1.86 lbs/day/1000ft²
 - 0.0019 lbs/day/1000ft³
 - 1.86 lbs/day/1000ft³
- When the temperature of the influent to a trickling filter is warmer than ambient air, the air will:
 - Flow down through the media
 - Flow up through the media
 - Recirculate throughout the media
 - Air temperature compared to influent temperature has no bearing on air flow
- What is the purpose of the under drain system in a trickling filter?:
 - Controls wastewater flow to the filter media
 - Distributes flow evenly to the filter media
 - Collects untreated wastewater and distributes it to top of filter
 - Collects treated wastewater and permits air flow to filter media
- voids between the filter media in a trickling filter:
 - Must be kept open to allow sloughing of biology and proper air flow
 - Must be kept plugged to allow proper detention time of wastewater
 - Must be kept plugged to allow for retention of biology in the filter
 - Must be kept open to allow for visual inspections of filters
- By controlling the organic strength of wastewater into a trickling filter, an operator can directly control:
 - The amount of filter flies breeding
 - The thickness of biological buildup
 - The amount of wastewater flow into the filter
 - The amount of inorganic materials treated
- Of the following, which describes the best rotating speed in a rotating biological contactor (RBC):
 - 10 rpm and is adjusted based on media diameter
 - A speed rate which shears off growth allowing for constant hungry growth to develop
 - A speed which coincides with incoming flow; higher flow means faster speed
 - A slow to nearly stopped speed which allows biomass to stay submerged in wastewater
- The best observed characteristic of biomass in an RBC can be described as:
 - Being white in appearance denoting special bacteria are treating sulfur compounds
 - Being black in appearance denoting biomass effectively using dissolved oxygen in treatment
 - Being brown to grey in color, shaggy in appearance and uniformly covering the media
 - Being brown to grey in color, smelling of sulfide and sloughing off, exposing many bare spots
- A small community has a wastewater plant with an RBC system and experiences a high flow during the day and very low flow during the night. Which of the following is the most true statement describing the best operational parameters?:
 - High loading during the day provides the biomass food, RBC experiences sloughing due to low loading at night. Influent flows should be throttled during the peak times making use of an equalization tank, and secondary flows should be recycled at night.
 - High flows during the day provide a diluted influent and low flows during the night provide a concentrated influent. Secondary flows should be recycled at a high rate during the day and reduced during the night.
 - These flow parameters are normal flows for an RBC system. The operator should make very small adjustments throughout the day and night
 - A flow equalization tank should be installed in the plant and only used when flows are consistent throughout the day and night.

This quiz material was compiled from Vol. 17 of Operation of Wastewater Treatment Plants, OWP.

For those who have questions concerning operator certification requirements and scheduling, please contact Tanya May Jennings at 315-422-7811 ext. 4, tmj@nywea.org, or visit www.nywea.org/OpCert.

ANSWERS: 1 A, 2 C, 3 B, 4 D, 5 B, 6 B, 7 D, 8 A, 9 B, 10 B, 11 C, 12 A

Operator Quiz Test No. 111 – Disinfection

The following questions are designed for trainees as they prepare to take the ABC wastewater operator test. It is also designed for existing operators to test their knowledge. Each issue of *Clear Waters* will have more questions from a different section of wastewater treatment. Good Luck!

- Calculate the chlorine demand given the following information:
Feed rate = 150 lbs. /day
Flow = 11.5 MGD
Measured chlorine residual = 0.5 mg/L
 - 1.06 mg/L
 - 1.56 mg/L
 - 2.06 mg/L
 - There is not enough information to determine the chlorine demand.
- Chlorine gas is:
 - Lighter than air
 - Heavier than air
 - Has a "rotten egg" smell
 - Is safe to breath in concentrations of less than 500 ppm.
- Which of the following would be used to detect a chlorine leak:
 - Sodium Hydroxide
 - Ferric Chloride
 - Ammonia
 - Nitric Acid
- A chemical commonly used for dechlorination is:
 - Sodium Hypochlorite
 - Sulfur Dioxide
 - Ozone
 - Fluoride
- Which of the following methods is not used to determine chlorine residual:
 - Amperometric Method
 - DPD Method
 - Iodometric Method
 - Winkler Method
- Subtracting the chlorine residual from the chlorine dose is:
 - Chlorine Feed Rate
 - Chlorine Demand
 - MPN (Most Probable Number)
 - Alkalinity
- Pathogenic organisms can be removed from the wastewater treatment process by which of the following:
 - Physical removal through sedimentation and filtration
 - Die-off through natural means and unfavorable environmental conditions
 - Destruction by chemicals added to the treatment process
 - Pathogenic organisms can be removed by all of the above
- Which of the following treatment processes is not an acceptable way to ensure all pathogenic microorganisms are destroyed:
 - Chlorination
 - Filtration
 - Ultraviolet light
 - Ozone
- The addition of chlorine gas into water represented by the following equation can most accurately be described as yielding which of the following?:
$$\text{Cl}_2 + \text{H}_2\text{O} \rightarrow \text{HCl} + \text{HOCl}$$
 - Hypochlorous and hydrochloric acids
 - Sodium hypochlorite and water
 - Sodium hypochlorite and hydrochloric acid
 - Hypochlorous acid and sodium hydroxide
- Calculate the chlorine dosing rate in lbs/day given the following information:
Chlorine demand, mg/L = 16 mg/L
Chlorine residual, mg/L = 2.0 mg/L
Flow, MGD = 5.5 MGD
 - 8.26 mg/l
 - 826 lbs/day
 - 8.26 lbs/day
 - 8.26 mg/l
- Which of the following parameters is not considered when operating a disinfection system using ultraviolet light?:
 - Keeping the UV channel water at a constant level
 - Preventing an excessive water level above the top lamp row
 - Keeping the UV lamps submerged at all times
 - Maintaining the proper chlorine residual in the effluent
- Calculate the chlorine residual given the following information:
Dosing rate = 5.8 mg/L
Flow = 80 MGD
Chlorine demand = 4.5 mg/L
 - 1.3 mg/L
 - 10.3 mg/L
 - 0.3 mg/L
 - 0.93 mg/L
- Given the information in the previous question, calculate the required pumping rate of 15% sodium hypochlorite.
 - 3096 lbs/day
 - 3870 gallons/day
 - 3096 gallons/day
 - 1251 lbs/day



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Operator Quiz Test No. 112 – Digesters

The following questions are designed for trainees as they prepare to take the ABC wastewater operator test. It is also designed for existing operators to test their knowledge. Each issue of *Clear Waters* will have more questions from a different section of wastewater treatment. Good luck!

- An anaerobic digester with a normal operating temperature of 95°F would be considered:
 - Psychrophilic
 - Mesophilic
 - Thermophilic
 - Atmospheric
- How many pounds of total solids are loaded into a digester given the following:
Sludge Feed = 5,000 gals
Digester Volume = 10,000 ft³
Total Solids = 5.8 percent
Volatile solids = 62 percent
 - 2,419 lbs.
 - 2,585 lbs.
 - 1,500 lbs.
 - 242 lbs.
- Anaerobic digesters should have a volatile acid to alkalinity ratio of:
 - 1:10
 - 1:2
 - 10:1
 - 2:1
- Two main gases produced by the breakdown of volatile matter in a digester are:
 - Oxygen and Methane
 - Methane and Carbon Dioxide
 - Hydrogen Sulfide and Carbon Monoxide
 - Carbon Dioxide and Oxygen
- If an aerobic digester that is 15' wide, 10' deep, and 100' long is fed 5,000 gallons of sludge per day, what is the detention time?:
 - 22.4 days
 - 3 days
 - 0.04 days
 - 2.24 days
- What course of action should a wastewater operator take if an anaerobic digester is "sour":
 - Increase the amount of sludge pumped to the digester
 - Add an acidic substance to decrease the alkalinity
 - Add a basic substance to increase the alkalinity
 - Remove the hatches to introduce oxygen to the digester
- The breakdown of wastes by microorganisms in the presence of dissolved oxygen is called:
 - Anaerobic Digestion
 - Endogenous Respiration
 - Aerobic Digestion
 - Stasis
- This type of bacteria grows and thrives in a temperature range above 113°F:
 - Mesophilic
 - Thermophilic
 - Psychrophilic
 - Supernatant
- A scale composed of soluble forms of ammonia, phosphate and magnesium formed from the digestion process commonly found in digested sludge lines and valves is known as:
 - Enzymes
 - Alkalinity
 - Saprophytes
 - Struvite
- What is the volatile matter reduction percentage of a digester that has an input sludge of 70 percent volatile matter and an output sludge of 55 percent volatile matter?
 - 4.7 percent
 - 21 percent
 - 15 percent
 - 48 percent

Answers: 1 B, 2 A, 3 A, 4 B, 5 A, 6 C, 7 C, 8 B, 9 D, 10 D



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