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Test Your Knowledge of Emerging Issues and Other Miscellaneous Topics

- Which solids handling process uses high pressures greater than 3,200 psi, and high temperatures greater than 500°C, to treat sludge?
A. Aerobic digestion
B. Lime stabilization
C. Supercritical water oxidation
D. Anaerobic digestion
- In which form are nutrients better utilized by microorganisms in a biological treatment process?
A. Particulate B. Solid
C. Gaseous D. Soluble
- An industrial facility has a confined space manhole with hazardous gas, and the vapor density of the hazardous gas present is 0.92; where is this gas more likely to be found?
A. Near the top of the space.
B. Equally distributed throughout the space.
C. Near the bottom of the space.
D. At this density, the gas will dissipate immediately.
- What is a typical return activated sludge (RAS) to Q ratio for an extended aeration activated sludge process?
A. 10 percent to 25 percent
B. 25 percent to 50 percent
C. 1 percent to 2 percent
D. 75 percent to 150 percent
- What happens to the activity rate of activated sludge microorganisms as the wastewater temperature increases by 10°C?
A. It triples.
B. It doubles.
C. It remains the same.
D. It is cut in half.
- Given the following data, calculate the carbonaceous biochemical oxygen demand (CBOD₅) in a sample of influent wastewater:
 - Sample volume = 3 ml
 - Initial dissolved oxygen = 6.2 mg/L
 - Final dissolved oxygen = 3.9 mg/LA. 160 mg/L B. 230 mg/L
C. 345 mg/L D. 487 mg/L
- An industrial waste facility has a total suspended solids (TSS) value of 1,560 mg/L entering its pretreatment process, with a TSS value of 275 mg/L entering the sanitary sewer. Calculate the percent removal of TSS in the pretreatment process.
A. 29.3 percent B. 60.7 percent
C. 25.5 percent D. 82.4 percent
- What is the term when ammonia-N, nitrate-N, and nitrite-N are added together?
A. TKN B. SON
C. TN D. TIN
- What does the term "aliquot" mean:
A. Composite sample
B. Grab sample
C. Total volume of sample
D. Portion of a sample
- Which of the following is considered to be the least harmful organism?
A. Typhoid B. Fecal coliform
C. Cholera D. Streptococcus

Answers on page 61

LOOKING FOR ANSWERS?

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Are you new to the water and wastewater field? Want to boost your knowledge about topics you'll face each day as a water/wastewater professional?

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SEND US YOUR QUESTIONS

Readers are welcome to submit questions or exercises on water or wastewater treatment plant operations for publication in Certification Boulevard. Send your question (with the answer) or your exercise (with the solution) by email to roy.pelletier@cityoforlando.net, or by mail to:

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Certification Boulevard Answer Key

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- C) Supercritical water oxidation**
Supercritical water oxidation (SCWO) is a solids handling process that uses pressures greater than 3,200 psi, and temperatures greater than 50°C, to oxidize greater than 99 percent of the organic material in the sludge feed to water, carbon dioxide, inert material, and heat energy.
- D) Soluble**
Think about solid or particulate matter as “steak,” where the bugs first have to breakdown the material to assimilate the substrate. Now, think about soluble as a “milk shake,” where bugs can “soak up” the food value much easier.
- A) Near the top of the space.**
Gasses with a density of less than 1.0 will rise to the top of a space, whereas gasses with a density greater than 1.0 will settle to the bottom of a space.
- D) 75 percent to 150 percent**
Typically, an extended aeration process uses a ratio of about 1:1. RAS to Q means that a volume equal to the influent flow rate is returned as RAS from the bottom of the final clarifier to the beginning of the aeration tank. So, with a 1:1 RAS to Q ratio, if the influent flow rate is 1.0 mgd, the RAS flow rate would be 1.0 mgd.

- B) It doubles.**
It is estimated that for every 18°F (10°C) rise in temperature, the speed at which biological reactions occur will double. There is a limit, however, to the maximum temperature that living organisms can tolerate. Usually, beyond 167°F (75°C) there is no longer an increase in the reaction rate.
- B) 230 mg/L**
CBOD₅, mg/L
$$= (\text{Initial D.O., mg/L} - \text{Final D.O., mg/L}) \div$$
$$(\text{sample volume, ml} \div 300 \text{ ml})$$
$$= (6.2 - 3.9) \div (3 \text{ ml} \div 300 \text{ ml})$$
$$= 2.3 \div 0.01$$
$$= 230 \text{ mg/L}$$

Note: 300 ml is the size of the BOD bottle
- D) 82.4 percent**
Percent TSS Removal
$$= (\text{Inlet TSS, mg/L} - \text{Outlet TSS, mg/L}) \div \text{Inlet TSS, mg/L} \times 100$$
$$= (1,560 \text{ mg/L} - 275 \text{ mg/L}) \div 1,560 \text{ mg/L} \times 100$$
$$= 1,285 \div 1,560 = 0.8237 \times 100$$
$$= 82.4\%$$
- D) TIN**
TIN stands for total inorganic nitrogen and is the combination of all forms of nitrogen except organic nitrogen.

- D) Portion of a sample**
In mathematics: An aliquot part; a portion of a whole.
In chemistry: A sample or portion of the total amount of a solution.
In pharmacology: A method of measuring ingredient below the sensitivity of a scale.
- B) Fecal coliform**
None of these things sound good to me!
However, fecal coliform is considered the least harmful because it is not pathogenic. Fecal coliform is an indicator of pathogenic organisms; it is easier to analyze and more difficult to kill. That's what makes it a good indicator to determine the presence or absence of pathogenic organisms.



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