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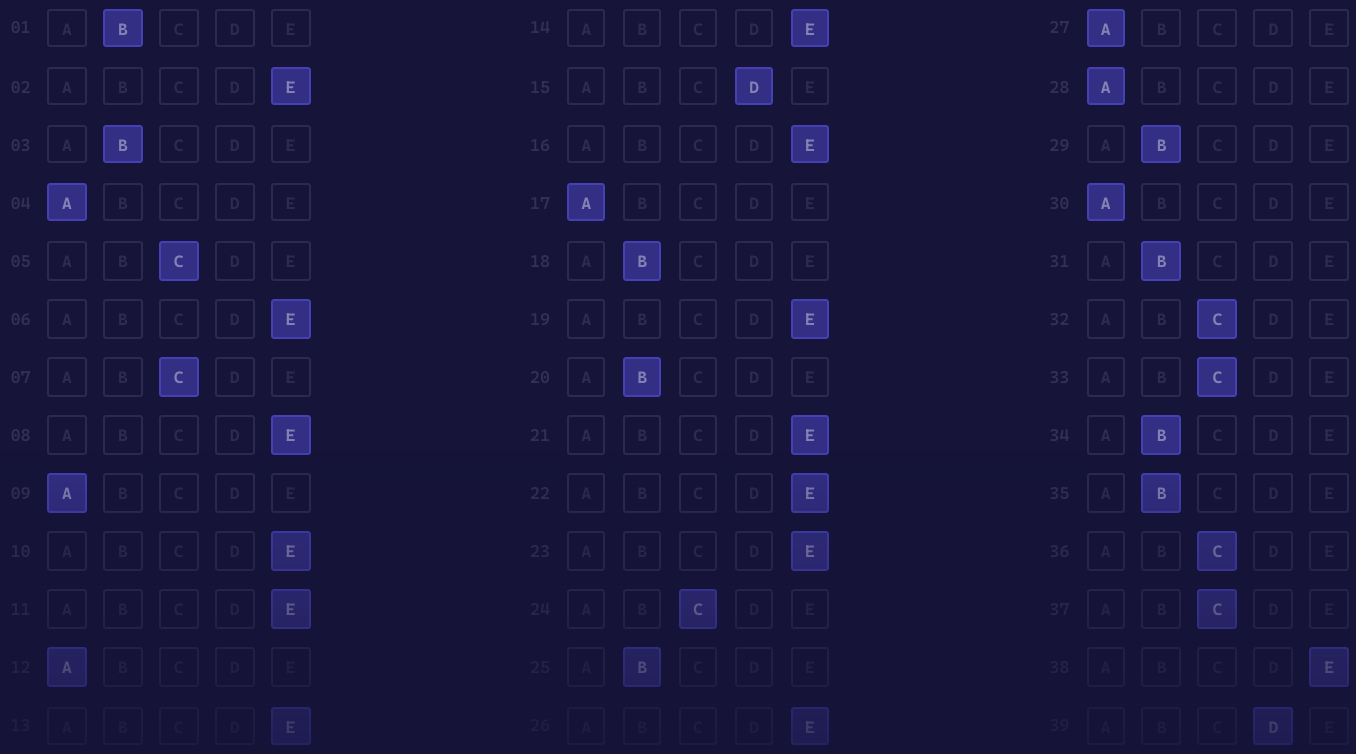

PRACTICE QUESTIONS

ABC-SD: South Dakota Department of Agriculture and Natural Resources

ERGLDHD4

South Dakota Wastewater Treatment Class 2

EDITION	QUESTIONS	FORMAT
Demo	9	Limited Edition PDF

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Before you begin

What this is

9 practice questions for ABC-SD: South Dakota Department of Agriculture and Natural Resources `ERGLDHD4`, each with its answer key and an explanation. Answer a question before you read its key — the explanation is worth more once you have committed.

If something looks wrong

Send us three things and we will check it:

- the exam code, `ERGLDHD4`
- the question number
- the email address on your order

Write to **support@mometrix.net**. We reply within one business day.

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QUESTION 1 SINGLE CHOICE

Which operational parameter is the primary indicator of adequate biological activity in a conventional activated sludge aeration tank?

A **Mixed liquor suspended solids (MLSS) concentration**

B Influent pH

C Effluent turbidity

D Return activated sludge (RAS) flow rate

ANSWER **A**

WHY Mixed liquor suspended solids (MLSS) concentration is the primary indicator of biomass concentration in the aeration tank. Maintaining an appropriate MLSS level (typically 1,500–3,000 mg/L for conventional systems) directly reflects the population of microorganisms responsible for biological treatment. While pH, turbidity, and RAS flow rate are monitored, they are not the primary indicators of biological activity.

QUESTION 2 SINGLE CHOICE

When performing a biochemical oxygen demand (BOD) test, why is a nitrification inhibitor (allylthiourea) typically added to the dilution water?

A **To prevent oxygen consumption by nitrifying bacteria so that only carbonaceous BOD is measured**

B To sterilize the dilution water and eliminate background oxygen demand

C To increase the solubility of oxygen in the dilution water

D To neutralize chlorine residual that would otherwise kill the seed organisms

ANSWER **A**

WHY Adding allylthiourea (ATU) inhibits the nitrification reaction by suppressing Nitrosomonas activity, preventing ammonia-oxidizing bacteria from consuming oxygen. This ensures the 5-day BOD reading reflects only the carbonaceous oxygen demand (CBOD) rather than combined carbonaceous and nitrogenous demand. ATU is not a sterilizer, does not affect oxygen solubility, and does not neutralize chlorine.

QUESTION 3 SINGLE CHOICE

A treatment plant operator enters a wet well to perform routine inspection. Which sequence of atmospheric tests must be conducted in the correct order before entry under confined-space permit requirements?

A **Oxygen, then combustible gases, then hydrogen sulfide**

B Hydrogen sulfide, then oxygen, then combustible gases

C Combustible gases, then hydrogen sulfide, then oxygen

D Oxygen, then hydrogen sulfide, then combustible gases

ANSWER **A**

WHY Confined-space atmospheric monitoring must be performed in this order: oxygen concentration first (to confirm a life-sustaining atmosphere, typically 19.5–23.5%), then combustible/lower explosive limit gases (LEL), and finally hydrogen sulfide and carbon monoxide. Testing oxygen first protects the entrant because many gas sensors require adequate oxygen to function properly, and oxygen deficiency is the most immediate life-threatening hazard.

QUESTION 4 SINGLE CHOICE

What is the primary purpose of grit removal at the headworks of a wastewater treatment plant?

A To reduce biochemical oxygen demand of the incoming flow

B **To remove inorganic materials such as sand and gravel that would cause abrasive wear on downstream equipment**

C To remove floating scum and grease before primary clarification

D To eliminate pathogens prior to biological treatment

ANSWER **B**

WHY Grit removal systems (aerated grit chambers, vortex units, or horizontal flow channels) are designed to capture heavy inorganic particles—sand, gravel, and cinders—that would otherwise abrade pumps, clog pipes, and accumulate in digesters or aeration basins. Grit removal does not significantly reduce BOD, remove scum/grease (a primary clarifier function), or eliminate pathogens.

QUESTION 5 SINGLE CHOICE

In an anaerobic digester, which operating parameter has the greatest direct effect on the rate of methane production and overall digester performance?

A Influent dissolved oxygen

B Volatile solids loading rate and detention time at mesophilic temperature (95–105°F)

C Surface wind speed across the digester cover

D Effluent disinfection contact time

ANSWER B

WHY Anaerobic digester performance is governed primarily by volatile solids loading rate, hydraulic/solids retention time, and temperature, with the mesophilic range of 95–105°F (35–40°C) being the standard operating condition. Methanogenic bacteria are highly sensitive to temperature, loading rate, and retention time. Influent dissolved oxygen is actually undesirable (the process is anaerobic), and effluent disinfection applies after the digester, not within it.

QUESTION 6 SINGLE CHOICE

A Class 2 operator is calculating the chlorine contact time (CT) required for adequate disinfection at a wastewater treatment plant. Which combination correctly represents the CT concept?

A The product of chlorine residual (mg/L) and contact time (minutes) at peak flow

B The sum of chlorine dosage applied and water temperature in degrees Celsius

C The product of flow rate (MGD) and detention time of the chlorine contact tank

D The ratio of free chlorine residual to combined chlorine residual over a 24-hour period

ANSWER A

WHY CT (contact time) is defined as the chlorine residual concentration in mg/L multiplied by the effective contact time in minutes, often evaluated under worst-case (peak flow) hydraulic conditions. This product is the standard basis for comparing disinfection effectiveness between facilities, because both residual concentration and contact duration determine microbial inactivation. Flow × detention yields volume, not CT, and dosage + temperature are not combined in this way.

QUESTION 7 SINGLE CHOICE

A 24-inch diameter pipe is flowing half-full. What is the actual cross-sectional flow area, expressed in square feet, used for open-channel flow calculations?

A **1.57 square feet**

B 3.14 square feet

C 4.71 square feet

D 6.28 square feet

ANSWER **A**

WHY Pipe radius = 12 in = 1 ft. Full pipe area = $\pi \times r^2 = 3.1416$ ft^2. For a circular pipe flowing half-full, the flow area is exactly half the full area: 3.1416 / 2 = 1.57 ft^2. A common mistake is to use the full area (3.14 ft^2) or to assume a different fraction, but half-full always yields half the full circular area.

QUESTION 8 SINGLE CHOICE

Under typical NPDES permit requirements for wastewater treatment plants, which type of sample most accurately represents the discharged effluent quality over a 24-hour period?

A Single grab sample collected at the start of the shift

B **Composite sample collected automatically using a time- or flow-weighted sampler**

C Manual grab sample collected at peak daytime flow

D Dip sample taken from the surface of the chlorine contact tank

ANSWER **B**

WHY Composite sampling (time-weighted or flow-weighted) integrates effluent quality over an entire sampling period (typically 24 hours) and provides the most representative picture of discharge quality for parameters such as BOD, TSS, and total nitrogen. Grab samples are appropriate for parameters requiring immediate analysis (pH, residual chlorine, temperature, dissolved oxygen) but are not used as the basis for compliance on BOD or TSS.

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QUESTION 9 MULTIPLE CHOICE

An operator observes rising sludge in the secondary clarifier and a significant increase in effluent suspended solids. Which two factors are most likely contributing to the problem? (Choose two.)

A **Excessive sludge blanket height in the clarifier due to high sludge return rates or low wasting**

B Loss of return activated sludge (RAS) pumping resulting in no sludge return

C Increase in dissolved oxygen to 6.5 mg/L in the aeration tank

D **Denitrification in the sludge blanket producing nitrogen gas that floats solids**

ANSWER **A · D**

WHY Both a high sludge blanket (caused by insufficient wasting or overly high RAS rates) and denitrification in the clarifier (anoxic conditions in the blanket releasing nitrogen gas that buoys solids upward) are classic causes of rising sludge and elevated effluent TSS. Loss of RAS pumping (B) would more likely result in washout of MLSS. Higher DO (C) is generally beneficial, not problematic.

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