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39	A	B	C	D	E

PRACTICE QUESTIONS

Association of Boards of Certification

QXGUBB9V

WPI Physical/Chemical Wastewater Treatment Operator Class
1

EDITION

Demo

QUESTIONS

9

FORMAT

Limited Edition PDF

Before you begin

What this is

9 practice questions for Association of Boards of Certification **QXGUBB9V**, 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, **QXGUBB9V**
- the question number
- the email address on your order

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

QUESTION 1

SINGLE CHOICE

Which wastewater characteristic is defined as the amount of dissolved oxygen required by aerobic microorganisms to stabilize the biodegradable organic matter in water under specified conditions?

- ☐ A Total suspended solids (TSS)
- ☒ B Biochemical oxygen demand (BOD)
- ☐ C Chemical oxygen demand (COD)
- ☐ D Total dissolved solids (TDS)

ANSWER B

WHY BOD specifically measures the dissolved oxygen consumed by aerobic microorganisms while biologically degrading organic matter over a standardized incubation period (commonly 5 days at 20°C, BOD₅). TSS and TDS measure solids concentrations, and COD measures total chemical oxidation of both biodegradable and non-biodegradable organics using a strong chemical oxidant.

QUESTION 2

SINGLE CHOICE

In activated sludge process control, the mixed liquor volatile suspended solids (MLVSS) to mixed liquor suspended solids (MLSS) ratio is typically used to estimate which parameter?

- ☐ A Food-to-microorganism ratio (F/M)
- ☒ B Active biomass fraction of the mixed liquor
- ☐ C Sludge volume index (SVI)
- ☐ D Mean cell residence time (MCRT)

ANSWER B

WHY The MLVSS/MLSS ratio estimates the fraction of the mixed liquor that is volatile (organic) and therefore considered biologically active, since inert inorganic solids remain in the MLSS residue after ignition. Typical values range from 0.7 to 0.85 in a healthy system. F/M is calculated from loading and MLSS, SVI is a settleability measurement, and MCRT is a sludge age calculation based on wasting rates.

QUESTION 3

SINGLE CHOICE

What is the primary purpose of the preliminary treatment stage at a wastewater treatment plant?

- ☐ A To remove dissolved organic matter through biological oxidation
- ☒ B To remove large debris, rags, and grit that could damage downstream equipment
- ☐ C To precipitate phosphorus using chemical addition
- ☐ D To disinfect the flow before discharge

ANSWER B

WHY Preliminary treatment (screening, grit removal, and comminution) protects pumps, pipes, and downstream processes from damage and clogging caused by large solids, rags, sticks, and abrasive grit. Biological oxidation occurs in secondary treatment, phosphorus precipitation is part of chemical/advanced treatment, and disinfection is typically the final step before discharge.

QUESTION 4

SINGLE CHOICE

Which chemical is most commonly used as a coagulant in physical/chemical wastewater treatment to destabilize colloidal particles and promote their aggregation?

- ☐ A Sodium hypochlorite (NaOCl)
- ☒ B Aluminum sulfate (alum)
- ☐ C Sodium hydroxide (NaOH)
- ☐ D Sulfuric acid (H₂SO₄)

ANSWER B

WHY Aluminum sulfate (alum) is one of the most widely used coagulants in water and wastewater treatment. When added to water, it hydrolyzes to form aluminum hydroxide floc, which destabilizes negatively charged colloidal particles and allows them to aggregate into settleable flocs. Sodium hypochlorite is a disinfectant, sodium hydroxide is used for pH adjustment, and sulfuric acid is used for pH reduction.

QUESTION 5

SINGLE CHOICE

Which gas, commonly produced in covered wastewater tanks and digesters, poses both an asphyxiation and explosion hazard and must be continuously monitored in confined spaces?

- ☐ A Oxygen (O₂)
- ☐ B Carbon dioxide (CO₂)
- ☒ C Methane (CH₄)
- ☐ D Nitrogen (N₂)

ANSWER C

WHY Methane is produced through anaerobic decomposition of organic matter in sewers, wet wells, and digesters. It is highly flammable (explosive range approximately 5–15% by volume in air) and displaces oxygen, creating both explosion and asphyxiation hazards. Continuous LEL monitoring and strict confined space entry procedures are required by OSHA 29 CFR 1910.146 when entering such spaces.

QUESTION 6

SINGLE CHOICE

A primary clarifier has a surface area of 500 ft² and receives a peak flow of 1.25 MGD. What is the surface overflow rate in gallons per day per square foot (gpd/ft²)?

- ☒ A 2,500 gpd/ft²
- ☐ B 2,500,000 gpd/ft²
- ☐ C 400 gpd/ft²
- ☐ D 4,000 gpd/ft²

ANSWER A

WHY Surface overflow rate (SOR) = Flow ÷ Surface Area. SOR = 1,250,000 gal/day ÷ 500 ft² = 2,500 gpd/ft². Typical primary clarifier SOR design values range from about 800 to 1,200 gpd/ft² at average flow, so this peak value is high, which would reduce settling efficiency. The other values result from unit errors or incorrect division.

QUESTION 7

SINGLE CHOICE

Which treatment process is specifically designed to remove nutrients (nitrogen and phosphorus) to very low levels beyond what conventional secondary treatment achieves?

- ☐ A Primary sedimentation
- ☐ B Trickling filtration
- ☐ C Conventional activated sludge
- ☒ D Tertiary/advanced treatment

ANSWER D

WHY Tertiary or advanced treatment processes—such as biological nutrient removal (BNR), chemical phosphorus precipitation followed by filtration, denitrification filters, and membrane filtration—are used to remove residual suspended solids, nitrogen, and phosphorus to meet stringent discharge limits. Primary sedimentation removes settleable solids, trickling filters and conventional activated sludge are secondary treatment, and they typically achieve only partial nutrient removal.

QUESTION 8

SINGLE CHOICE

In wastewater disinfection, what does CT represent in the CT concept used to evaluate disinfection effectiveness?

- ☒ A Concentration of disinfectant multiplied by contact time
- ☐ B Chlorine residual measured at the tank outlet
- ☐ C Combined total of chlorine and chlorine dioxide demand
- ☐ D Cumulative throughput of treated water through the contact basin

ANSWER A

WHY The CT concept, used by the U.S. EPA and in many regulatory disinfection frameworks, expresses disinfection efficacy as the product of the residual disinfectant concentration (C, in mg/L) and the effective contact time (T, in minutes) at a given temperature and pH. Operators must maintain a minimum CT to achieve the required log reduction of indicator organisms such as fecal coliforms or E. coli.

QUESTION 9

MULTIPLE CHOICE

Which of the following are common physical/chemical unit processes used in wastewater treatment? (Choose two.)

- ☐ A Activated sludge
- ☒ B Chemical precipitation
- ☐ C Trickling filter
- ☒ D Filtration

ANSWER B - D

WHY Chemical precipitation (e.g., for phosphorus removal using alum, ferric chloride, or lime) and filtration (e.g., sand filters, membrane filters) are physical/chemical unit processes. Activated sludge and trickling filters are biological (secondary) treatment processes that rely on microbial activity rather than physical/chemical mechanisms.