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37	A	B	C	D	E
38	A	B	C	D	E
39	A	B	C	D	E

PRACTICE QUESTIONS

ABC-MO: Missouri Department of Natural Resources

ERGLDLCA

Drinking Water Distribution Level 3 (DS-3)

EDITION

Demo

QUESTIONS

9

FORMAT

Limited Edition PDF

Before you begin

What this is

9 practice questions for ABC-MO: Missouri Department of Natural Resources ERGLDLCA , 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, ERGLDLCA
- the question number
- the email address on your order

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

QUESTION 1

SINGLE CHOICE

A water operator is performing a free chlorine residual test using a DPD (N,N-diethyl-p-phenylenediamine) colorimetric method on a distribution system sample. Which of the following interferences most commonly causes a false-high free chlorine reading when using DPD?

- ☐ A Monochloramine in the sample
- ☒ B Manganese dioxide (MnO₂) present in the sample
- ☐ C Low sample temperature below 4°C (39°F)
- ☐ D Sample pH above 9.5
- ☐ E Use of a wide-bandwidth spectrophotometer at 660 nm

ANSWER B

WHY Manganese and certain other oxidized metals (e.g., chlorine-oxidized forms of manganese such as MnO₂) react with DPD and produce a color similar to that produced by free chlorine, leading to a false-high free chlorine residual reading. Monochloramine does not interfere with the free chlorine DPD reading when the procedure is followed correctly (it is read separately as combined chlorine after KI addition). Temperature, pH within typical ranges, and routine spectrophotometer wavelengths do not normally cause this specific false-high bias.

QUESTION 2

SINGLE CHOICE

Which backflow preventer is required by Missouri Department of Natural Resources rule for protection of a potable water supply at a high-hazard cross-connection where the potential contaminant is toxic (health hazard) and a pressure-type backflow condition could exist at all times?

- ☐ A Double check valve assembly (DCVA)
- ☒ B Reduced pressure principle backflow preventer (RPZ/RP)
- ☐ C Pressure vacuum breaker (PVB)
- ☐ D Atmospheric vacuum breaker (AVB)
- ☐ E Hose bibb vacuum breaker

ANSWER B

WHY For high-hazard (health/toxic) cross-connections under pressure, an RPZ/RP backflow preventer is required because it discharges water when the differential pressure drops, protecting against back-pressure and back-siphonage. DCVAs are acceptable only for low-hazard applications, while PVBs and AVBs do not protect against back-pressure and hose-bibb vacuum breakers are limited to point-of-use installations.

QUESTION 3

SINGLE CHOICE

During a unidirectional flushing program, the operator closes downstream valves and opens the targeted hydrant in order to produce a high-velocity flow. What is the target flushing velocity typically used to scour settled material from the pipe wall?

- ☐ A 0.1 to 0.3 ft/sec
- ☐ B 0.5 to 1.0 ft/sec
- ☒ C 2.5 to 5 ft/sec (approximately 5 fps or greater is commonly targeted)
- ☐ D 10 to 15 ft/sec
- ☐ E 20 to 25 ft/sec

ANSWER C

WHY Unidirectional flushing is designed to produce a target scouring velocity generally in the range of about 2.5 to 5 ft/sec (with many programs targeting approximately 5 fps or higher) to re-suspend sediments, biofilm, and tuberculation material. Velocities below 1 ft/sec will not scour, while velocities above roughly 10 ft/sec can cause excessive pipe wall shear, valve/hydrant damage, and customer service issues.

QUESTION 4

SINGLE CHOICE

A ground-level potable water storage tank is inspected, and the inspector notes that the overflow pipe terminates without a screened downturned elbow and that the vent is missing its fine-mesh insect screen. Which potential contamination pathway is most directly created by these two conditions?

- ☐ **A** Negative pressure from a fire pump pulling a vacuum and pulling soil water into the tank through the foundation
- ☒ **B** Entry of insects, small animals, birds, and airborne debris into the tank through the overflow and vent
- ☐ **C** Siphoning of finished water back into the distribution system during a main break
- ☐ **D** Corrosion of the interior coating due to dissolved oxygen in the vented air
- ☐ **E** Frost heaving of the tank foundation from cold air entering the overflow

ANSWER B

WHY An improperly terminated overflow (missing downturned, screened elbow) and a vent without a fine-mesh insect screen allow direct entry of insects, small animals, birds, leaves, dust, and other airborne contaminants into the storage tank. This is a recognized sanitary deficiency under AWWA and state storage tank standards. The other options describe different failure modes (vacuum, backflow, corrosion, frost) not addressed by these two specific deficiencies.

QUESTION 5

SINGLE CHOICE

When calculating CT (concentration $\times$ time) for free chlorine disinfection of a distribution-related premise (e.g., a clearwell or storage facility), which three parameters determine the CT value the operator must achieve?

- ☐ A Free chlorine residual, water temperature, and pH
- ☐ B Free chlorine residual, contact time, and water temperature
- ☒ C Free chlorine residual, contact time, and pH
- ☐ D Chlorine dose, contact time, and pH
- ☐ E Total chlorine residual, contact time, and turbidity

ANSWER C

WHY CT is the product of disinfectant residual concentration (C, mg/L) and contact time (T, minutes) at a given pH (and, for some tables, temperature). For free chlorine under the Surface Water Treatment Rules, the CT tables are organized by free chlorine residual $\times$ contact time $\times$ pH (and sometimes temperature). Chlorine dose is not used — only measured residual. Turbidity is a separate compliance parameter, not part of CT.

QUESTION 6

SINGLE CHOICE

A distribution system is switching from free chlorination to chloramination by feeding both chlorine and ammonia, and the operator must verify that the chlorine-to-ammonia-N ratio is in the correct range to minimize formation of dichloramine and trichloramine odors. What Cl₂-to-NH₃-N weight ratio is the typical target?

- ☐ A 1:1 to 2:1 (by weight)
- ☒ B 3:1 to 5:1 (by weight)
- ☐ C 6:1 to 8:1 (by weight)
- ☐ D 10:1 to 15:1 (by weight)
- ☐ E 20:1 or greater

ANSWER B

WHY The standard target chlorine-to-ammonia-N weight ratio for forming monochloramine and minimizing the formation of dichloramine and trichloramine (which cause taste and odor complaints) is approximately 3:1 to 5:1 by weight. Ratios well above this range push the system toward free chlorine residuals and break point, while ratios well below this range produce excess ammonia and can promote nitrification in the distribution system.

QUESTION 7

SINGLE CHOICE

Two identical pumps are operated in parallel from a common suction, discharging into a common header. Compared to a single pump operating alone, how does the combined head-capacity curve change?

- ☐ A Head doubles at every flow rate
- ☒ B Flow capacity roughly doubles at every head, producing a new curve shifted to roughly twice the flow at the same head
- ☐ C The combined curve is the intersection of the two individual curves
- ☐ D Combined flow equals the difference of the two individual flows at the same head
- ☐ E Head is unchanged and flow is unchanged

ANSWER B

WHY Pumps in parallel add their capacities at the same head; the combined head-capacity curve is obtained by summing the flow rates of each pump at each head value, effectively shifting the curve to roughly twice the flow at the same head (assuming identical pumps). In contrast, pumps in series would double the head at the same flow. This is a fundamental hydraulic principle for pump station design and operation.

QUESTION 8

SINGLE CHOICE

Under the Total Coliform Rule (TCR) as adopted in Missouri, a water system collecting routine total coliform samples must collect them at sites that are representative of the distribution system. Which of the following is a required characteristic of the sample sites?

- ☐ A Samples must be collected only from the treatment plant finished water tap
- ☐ B Samples must be collected from dedicated sampling stations located downstream of all storage tanks
- ☒ C Samples must be collected at regular intervals throughout the distribution system at locations representative of all service areas
- ☐ D Samples must be collected only during periods of peak demand
- ☐ E Samples must be collected only after a flushing event

ANSWER C

WHY Routine total coliform samples under the TCR must be collected at regular intervals and from sites throughout the distribution system that are representative of all service areas and the various water sources feeding the system. Sampling only at the treatment plant, only downstream of storage, only at peak demand, or only after flushing does not meet the requirement of representative coverage.

QUESTION 9

MULTIPLE CHOICE

When performing a wet tap (pressure tap) on an existing ductile iron water main to install a new service, the operator must take several precautions to ensure a safe and sanitary connection. Which of the following are required elements of a proper wet tap procedure? (Choose three.)

- ☐ **A** Verify that the main is depressurized to zero psi before tapping
- ☒ **B** Clean and disinfect the tapping sleeve and tapping valve per AWWA standards before installation
- ☒ **C** Use a tapping machine and pilot drill sized correctly for the corporation stop and main material
- ☒ **D** Obtain a backflow-safe tapping machine that prevents contaminated water from entering the main during the cut
- ☐ **E** Allow the coupon cut from the main to fall into the main and remain there

ANSWER B · C · D

WHY A proper wet tap is performed under pressure (the main is NOT depressurized — that is a dry cut). The tapping sleeve and valve must be cleaned and disinfected before installation, the tapping machine and pilot drill must be correctly sized for the main material and corporation stop, and the tapping machine must provide backflow protection to prevent slurry and contaminants from entering the live main. The coupon must be retrieved, not left inside the pipe.