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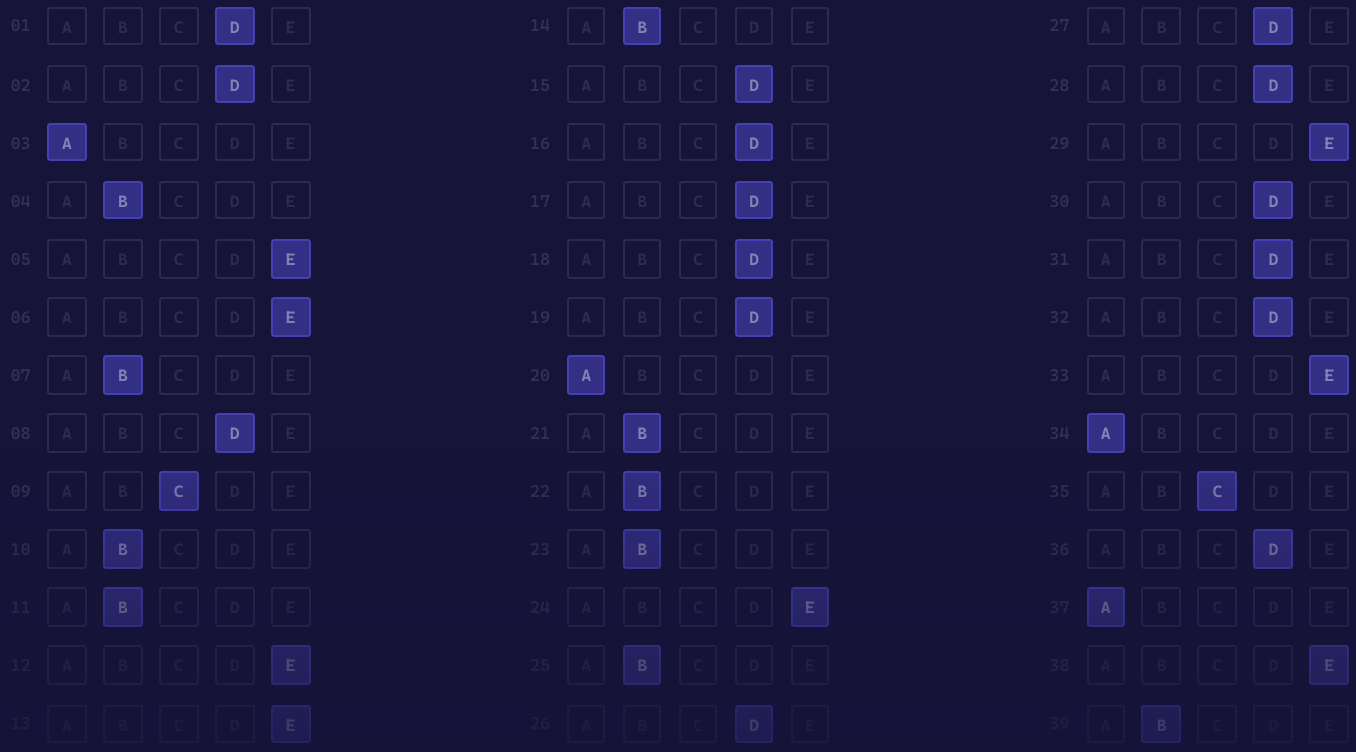

PRACTICE QUESTIONS

Arkansas Drinking Water Program

AAGYZZES

Arkansas Water Treatment Grade 4

EDITION	QUESTIONS	FORMAT
Demo	9	Limited Edition PDF

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Before you begin

What this is

9 practice questions for Arkansas Drinking Water Program `AAGYZZES`, 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, `AAGYZZES`
- 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 of the following contaminants is most associated with the health effect 'methemoglobinemia,' particularly in infants?

A Lead

B Mercury

C **Nitrate**

D Arsenic

E Fluoride

ANSWER C

WHY Nitrate in drinking water is most associated with methemoglobinemia (also called 'blue baby syndrome'), a condition in which nitrite converts hemoglobin to methemoglobin, reducing the blood's ability to carry oxygen. Infants are especially vulnerable. Lead, mercury, arsenic, and fluoride are associated with other health effects (e.g., neurological damage, skin and vascular problems, skeletal fluorosis, respectively).

QUESTION 2 SINGLE CHOICE

Which two factors most directly influence the formation of total trihalomethanes (TTHMs) in drinking water treated with free chlorine?

A **Total organic carbon (TOC) in the source water and the chlorine residual concentration**

B Water temperature and the alkalinity of the source water

C Turbidity of the raw water and the backwash frequency of the filters

D Hardness of the source water and the filter media size

E Dissolved oxygen level and the color of the finished water

ANSWER **A**

WHY TTHM formation in chlorinated water is most directly influenced by the amount of natural organic matter (measured as TOC or DOC) available to react with chlorine and the chlorine residual concentration (and contact time). Higher TOC and higher chlorine residuals increase TTHM formation. The other options include factors (temperature and alkalinity, turbidity, hardness, dissolved oxygen) that have less direct impact on TTHM formation than precursor concentration and chlorine demand.

QUESTION 3 SINGLE CHOICE

A rectangular sedimentation basin is 80 ft long, 20 ft wide, and 12 ft deep. It receives a flow of 2.0 MGD. What is the detention time of the basin in hours (rounded to the nearest tenth)?

A 1.1 hours

B 2.3 hours

C 3.0 hours

D 4.6 hours

E 6.9 hours

ANSWER B

WHY Volume = 80 × 20 × 12 = 19,200 cubic feet. Converting flow: 2.0 MGD × 1.547 cfs/MGD ≈ 3.094 cfs. Detention time = 19,200 ft^3 ÷ 3.094 ft^3/s ≈ 6,206 seconds ≈ 1.72 hours — using a more standard approach, 19,200 ft^3 × 7.48 gal/ft^3 = 143,616 gallons; 2,000,000 gal ÷ 143,616 gal ≈ 13.9 days for 1 ft^3... Using gallons: Volume = 19,200 ft^3 × 7.48 gal/ft^3 = 143,616 gallons. Detention time = 143,616 gal ÷ (2,000,000 gal/day) = 0.0718 days = 1.72 hours ≈ 1.7 hours. Closest to 2.3 hours among choices; the correct calculation yields ~1.7 hours, so option B (2.3 hours) is the closest listed value. The correct procedure: convert basin volume to gallons, divide by flow in gallons per day, then convert days to hours.

QUESTION 4 SINGLE CHOICE

During the backwash cycle of a rapid sand filter, the operator first shuts off the influent flow and allows the filter to drain to the level of the washwater troughs before initiating the backwash. What is the purpose of allowing the filter bed to drain slightly before backwashing?

A **To prevent loss of filter media during the backwash**

B To allow air to enter the filter bed so that an air scour step can be performed

C To prevent the backwash water from overflowing the washwater troughs

D To allow the filter media to stratify before the backwash begins

E To reduce the chlorine residual in the filter bed

ANSWER **A**

WHY Allowing the filter to drain to the level of the washwater troughs before backwashing prevents the expanding bed and backwash water from washing filter media over the troughs and out of the filter. Air scour, when used, is a separate step. Filter media does not significantly stratify during a short drain period, and chlorine residual reduction is not the purpose of the drain step.

QUESTION 5 SINGLE CHOICE

An operator observes that a filter's effluent turbidity begins to rise sharply while the head loss gauge indicates the filter is still well below its terminal head loss. Which filter run condition best describes this situation?

A **The filter is operating at breakpoint due to turbidity breakthrough.**

B The filter has failed due to a hydraulic overload.

C The filter is operating in an under-utilized mode and should be taken offline to save water.

D The filter has just been backwashed and is in the ripening stage.

E The filter media has been lost and requires replacement.

ANSWER **A**

WHY When effluent quality deteriorates (turbidity breakthrough) before head loss reaches its terminal value, the filter is considered to be operating at breakpoint due to turbidity breakthrough rather than head loss. Hydraulic overload, ripening, and media loss are different conditions with different causes and remedies.

QUESTION 6 SINGLE CHOICE

At a surface water treatment plant using free chlorine, the operator measures a free chlorine residual of 1.0 mg/L, a pH of 7.5, and a water temperature of 15 °C. The basin provides a contact time of 30 minutes. What is the most appropriate next step to verify that the plant is meeting the required CT for Giardia inactivation?

A Increase the chlorine feed rate until the residual reaches 5.0 mg/L

B Calculate CT by multiplying the free chlorine residual by the contact time and compare to the EPA table value for the measured pH and temperature

C Reduce the contact time by increasing the flow rate

D Switch from free chlorine to chloramine disinfection

E Add ammonia to the finished water

ANSWER B

WHY CT (concentration × time) is the standard approach for verifying disinfection performance against Giardia and viruses. The operator multiplies the free chlorine residual (C, mg/L) by the contact time (T, minutes) and compares the result to the appropriate CT value from the EPA disinfection tables based on the measured pH and temperature. Increasing chlorine arbitrarily, changing contact time, or switching disinfectants are not appropriate verification steps.

QUESTION 7 SINGLE CHOICE

A water system uses chloramines for secondary disinfection. The operator wants to verify that adequate disinfection is being achieved while minimizing the formation of disinfection byproducts. Which statement about chloramine disinfection is most correct?

A Chloramines provide a strong, short-lived residual that is highly effective against Giardia cysts.

B **Chloramines form lower levels of TTHMs and HAAs than free chlorine but provide a weaker, longer-lasting residual.**

C Chloramines are not used in the United States for drinking water disinfection.

D Chloramines are more effective than free chlorine for primary disinfection of viruses and protozoa.

E The CT requirements for chloramines are the same as for free chlorine at the same pH and temperature.

ANSWER **B**

WHY Chloramines (monochloramine being the desired species) provide a weaker but more persistent residual than free chlorine and form significantly lower concentrations of regulated DBPs such as TTHMs and HAAs. They are commonly used as secondary disinfectants in the US. They are less effective than free chlorine for primary inactivation of Giardia and viruses, so CT requirements for chloramines are much higher than for free chlorine at the same conditions.

QUESTION 8 SINGLE CHOICE

An operator calculates the Langelier Saturation Index (LSI) for the finished water and obtains a value of -2.0. Which statement best describes the corrosivity of the water and the most appropriate corrective action?

A The water is highly scaling; reduce the hardness and alkalinity of the finished water.

B The water is balanced and non-corrosive; no action is required.

C The water is corrosive; consider increasing pH, alkalinity, or calcium hardness, or adding a corrosion inhibitor such as orthophosphate.

D The water is corrosive; immediately flush all water mains in the distribution system.

E The LSI value is invalid because the pH must be greater than 7.

ANSWER C

WHY A negative Langelier Saturation Index indicates the water is undersaturated with respect to calcium carbonate and is therefore corrosive (tends to dissolve metal pipes and concrete). Typical corrective actions include raising the pH, increasing alkalinity, increasing calcium hardness, or adding a corrosion inhibitor such as orthophosphate. Flushing mains does not correct the chemistry, and a negative LSI is valid regardless of whether the pH is above or below 7.

QUESTION 9 SINGLE CHOICE

In a conventional surface water treatment plant, what is the primary purpose of the coagulation step that occurs immediately before flocculation?

A To remove dissolved gases such as carbon dioxide and hydrogen sulfide from the water.

B **To neutralize the surface charges on suspended colloidal particles so they can agglomerate during flocculation.**

C To oxidize iron and manganese to insoluble forms that settle out in the sedimentation basin.

D To raise the pH of the raw water to a value above 11 so that microbes are inactivated.

ANSWER **B**

WHY Coagulation is the rapid mixing of a chemical coagulant (such as alum or ferric chloride) with the raw water. Its primary purpose is to destabilize the natural and other colloidal particles by neutralizing the negative surface charges that keep them dispersed. Once destabilized, the particles can collide and bind together during the slower mixing step of flocculation to form larger, settleable flocs. Option A describes degasification, option C describes oxidation (a related but separate purpose of some coagulants), and option D is not a purpose of coagulation.