

01	☐ A	☐ B	☐ C	☐ D	☒ E
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36	☐ A	☐ B	☐ C	☒ D	☐ E
37	☒ A	☐ B	☐ C	☐ D	☐ E
38	☐ A	☒ B	☐ C	☐ D	☐ E
39	☐ A	☒ B	☐ C	☐ D	☐ E

PRACTICE QUESTIONS

Association of Boards of Certification

CAC2QQCS

WPI Water Treatment Operator Class 4

EDITION

Demo

QUESTIONS

9

FORMAT

Limited Edition PDF

Before you begin

What this is

9 practice questions for Association of Boards of Certification **CAC2QQCS**, 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.

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Send us three things and we will check it:

- the exam code, **CAC2QQCS**
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Write to **support@mometrix.net**. We reply within one business day.

QUESTION 1

SINGLE CHOICE

A raw water sample is collected at the intake of a surface water treatment plant. Which of the following parameters is LEAST likely to vary significantly on a daily basis?

- ☐ A Turbidity
- ☐ B Temperature
- ☐ C pH
- ☒ D Geological/bedrock mineral content of the watershed

ANSWER D

WHY Turbidity, temperature, and pH of a surface water source can fluctuate significantly day to day due to rainfall, runoff, sunlight, and biological activity. The underlying mineral content contributed by the watershed's geology and bedrock changes very slowly over geologic time and would not vary meaningfully on a daily basis.

QUESTION 2

SINGLE CHOICE

An operator adds an overdose of a cationic polymer coagulant to a raw water with high alkalinity. Which of the following effects on the coagulation/flocculation process is most likely to occur?

- ☒ A Charge reversal on the colloidal particles, causing restabilization of the suspension
- ☐ B A permanent improvement in turbidity removal regardless of pH
- ☐ C Elimination of the need for any flocculation time
- ☐ D An immediate increase in finished water dissolved oxygen

ANSWER A

WHY Coagulants work by neutralizing the negative surface charge on colloidal particles. Excessive cationic coagulant overdoses the system and reverses the particle charge back to a net positive value, restabilizing the colloids and making clarification fail. The other options describe outcomes that do not match the chemistry of polymer coagulation.

QUESTION 3

MULTIPLE CHOICE

A water treatment plant switches from free chlorination to chloramination for disinfection of the finished water. Which of the following operational changes are typical when making the switch? (Choose two.)

- ☒ **A** Feeding ammonia (typically as aqueous ammonia or ammonium sulfate) downstream of the chlorine application point
- ☐ **B** Significantly increasing the free chlorine residual target throughout the distribution system
- ☒ **C** Carefully controlling the chlorine-to-ammonia ratio to minimize formation of nitrogen trichloride
- ☐ **D** Eliminating the need for any disinfectant residual monitoring
- ☐ **E** Adding breakpoint chlorination upstream of the ammonia feed

ANSWER A - C

WHY Chloramines are formed by adding ammonia downstream of chlorine at a controlled Cl₂:N ratio (commonly in the 3:1 to 5:1 range by mass). Proper ratio control limits undesirable byproducts such as nitrogen trichloride. Free chlorine residual targets are actually reduced compared to free chlorination, breakpoint chlorination is a separate process used before ammonia addition, and residual monitoring remains mandatory.

QUESTION 4

SINGLE CHOICE

During a filter run, the head loss across a rapid sand filter gradually increases while the effluent turbidity remains acceptable. The operator decides to backwash the filter when the head loss reaches a terminal value. What is the primary operational purpose of this backwash procedure?

- ☐ A To recharge the filter media's ion exchange capacity
- ☒ B To remove accumulated solids and re-expand the filter media so filtration can resume
- ☐ C To sterilize the filter media against bacterial growth
- ☐ D To recalibrate the effluent turbidity meter

ANSWER B

WHY As a filter run progresses, solids accumulate in the filter media, increasing head loss. The primary purpose of backwashing is to fluidize and scour the media to remove the trapped solids so that head loss is reduced and the filter is restored to serviceable condition. Sand filters do not rely on ion exchange, and although backwash water quality matters, the procedure is not primarily for sterilization or meter calibration.

QUESTION 5

SINGLE CHOICE

A treatment plant uses lime-soda ash softening to remove hardness from groundwater. The operator wants to maximize calcium hardness precipitation while minimizing magnesium hardness precipitation. Which of the following adjustments to the process is most appropriate?

- ☐ **A** Raise the pH well above 10.3 by adding excess lime so that magnesium hydroxide also precipitates
- ☒ **B** Hold the pH between approximately 9.3 and 10.3 so that calcium carbonate precipitates but magnesium remains largely in solution
- ☐ **C** Eliminate lime addition and rely solely on soda ash
- ☐ **D** Add a strong acid to lower the pH below 7

ANSWER B

WHY Calcium carbonate precipitation in lime-soda softening becomes significant at pH values above about 9.3. Magnesium hydroxide precipitation requires a substantially higher pH (above about 10.3) and additional lime beyond that needed for calcium removal. By operating near pH 9.5–10, calcium hardness is preferentially removed and soda ash is not wasted on magnesium. Operating well above 10.3 would precipitate magnesium as well, which is a different treatment objective.

QUESTION 6

SINGLE CHOICE

A laboratory technician performs a jar test to determine the optimal coagulant dose. Which of the following sequences of mixing conditions most accurately represents standard jar test practice?

- ☒ **A** Rapid mix at approximately 100–300 rpm for about 1 minute, followed by slow mix at 25–50 rpm for 15–30 minutes, then a settling period
- ☐ **B** Slow mix for 30 minutes, followed by rapid mix for 5 minutes, then immediate filtration
- ☐ **C** Continuous rapid mix for the entire 60-minute test with no settling period
- ☐ **D** No mixing; jars are allowed to stand undisturbed for 24 hours

ANSWER A

WHY A standard jar test simulates full-scale treatment by first rapidly mixing coagulant with raw water (typically about 1 minute at 100–300 rpm) to disperse the coagulant, then slowly mixing (about 15–30 minutes at 25–50 rpm) to promote floc growth, and finally a settling period to evaluate clarified water quality. The other sequences do not reflect standard jar test protocol.

QUESTION 7

SINGLE CHOICE

Under the federal Lead and Copper Rule, a water system must collect tap water samples from a representative number of homes that are at high risk of lead/copper leaching. What is the required type of sampling location for these compliance samples?

- ☒ **A** First-draw samples collected after the tap has been stagnant for at least 6 hours, typically in homes with lead service lines or interior lead plumbing
- ☐ **B** Samples collected from the clearwell inside the treatment plant immediately after filtration
- ☐ **C** Flushed samples collected after running the cold water tap for 5 minutes
- ☐ **D** Grab samples from the raw water intake

ANSWER A

WHY The Lead and Copper Rule requires first-draw, stagnation-period tap samples (typically after at least 6 hours of stagnation) collected from Tier 1 sites that are most likely to contain lead service lines or lead-containing plumbing. Samples are taken at the consumer's tap, not in the treatment plant, and they are not flushed samples. The procedure is designed to capture the worst-case exposure from contact with interior plumbing.

QUESTION 8

SINGLE CHOICE

A distribution system operator notices a sudden drop in disinfectant residual and an increase in coliform detections in a specific zone of the distribution system. Which of the following is the most likely cause?

- ☐ A Routine customer water use during morning peak demand
- ☒ B A biofilm disturbance or contamination event allowing microbial regrowth within the mains
- ☐ C A minor, gradual increase in source water temperature
- ☐ D Normal seasonal fluctuation in distribution water age

ANSWER B

WHY Disinfectant residual loss combined with coliform detections suggests microbial activity in the mains — typically due to biofilm disturbance, a cross-connection/backflow incident, main break, or other contamination event that allows regrowth. Routine demand peaks, modest seasonal temperature changes, or gradual water-age fluctuations do not normally cause a sudden residual collapse paired with coliform positives.

QUESTION 9

SINGLE CHOICE

An operator must apply a chlorine dose of 2.5 mg/L to a flow of 8.0 MGD. How many pounds of chlorine per day are required? (Use 8.34 lb/gal as the weight of water.)

- ☐ A Approximately 139 lb/day
- ☒ B Approximately 167 lb/day
- ☐ C Approximately 200 lb/day
- ☐ D Approximately 20.9 lb/day

ANSWER B

WHY Pounds per day = dose (mg/L) × flow (MGD) × 8.34 lb/gal. So: $2.5 \text{ mg/L} \times 8.0 \text{ MGD} \times 8.34 \text{ lb/gal} = 166.8 \text{ lb/day}$, which rounds to approximately 167 lb/day. The other values correspond to common arithmetic mistakes (e.g., forgetting the 8.34 factor or using it incorrectly).