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39	A	B	C	D	E

PRACTICE QUESTIONS

ARIZONA REGISTRAR OF CONTRACTORS

PW8VT9CY

AZ CR-54 Water Conditioning Equipment
(Residential/Commercial)

EDITION

Demo

QUESTIONS

9

FORMAT

Limited Edition PDF

Before you begin

What this is

9 practice questions for ARIZONA REGISTRAR OF CONTRACTORS PW8VT9CY , 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, PW8VT9CY
- 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 residential customer has a private well and reports that their water leaves white scale on fixtures and causes soap to scum. Which test result most directly confirms that a water softener is the appropriate conditioning equipment?

- ☐ A A free chlorine residual of 0.5 ppm
- ☒ B A total hardness of 18 gpg (grains per gallon)
- ☐ C An iron concentration of 0.1 mg/L
- ☐ D A pH of 7.8

ANSWER B

WHY Total hardness, measured in grains per gallon (gpg), is the parameter that determines the need for and sizing of an ion-exchange water softener. The customer-described symptoms (scale and soap scum) are classic hardness indicators, and 18 gpg is considered very hard water, confirming that softening is appropriate. Free chlorine, low iron, and a slightly alkaline pH do not, by themselves, justify installing a softener.

QUESTION 2

SINGLE CHOICE

During regeneration of a residential ion-exchange softener, brine is drawn from the salt tank into the resin tank. What is the primary purpose of the brine solution in the regeneration cycle?

- ☐ A To backwash and lift loose sediment from the top of the resin bed
- ☐ B To flush chloramines and free chlorine out of the resin
- ☐ C To rinse the resin with fresh water after the salt draw completes
- ☒ D To replace calcium and magnesium ions on the resin beads with sodium ions

ANSWER D

WHY The brine (sodium chloride solution) introduced during regeneration is the source of sodium ions that displace the calcium and magnesium ions previously captured on the cation exchange resin. Backwashing and the final fresh-water rinse are separate steps in the regeneration cycle, and brine is not used to remove chlorine.

QUESTION 3

SINGLE CHOICE

A four-person household uses an average of 75 gallons of water per person per day. The incoming water has a hardness of 25 gpg. What is the approximate total compensated hardness load (in grains per day) that the softener must handle, assuming a typical 4 gpg compensation factor for iron?

- ☐ A Approximately 6,750 grains per day
- ☐ B Approximately 7,250 grains per day
- ☐ C Approximately 8,500 grains per day
- ☒ D Approximately 8,750 grains per day

ANSWER D

WHY Daily water use = 4 persons $\times$ 75 gpd = 300 gpd. Compensated hardness = 25 gpg hardness + 4 gpg (iron compensation) = 29 gpg. Grains per day = 300 $\times$ 29 = 8,700 grains per day, which is closest to 8,750. The softener must be sized to remove this daily grain load between regenerations.

QUESTION 4

SINGLE CHOICE

When installing a residential ion-exchange water softener, which installation requirement is mandated by typical plumbing code and manufacturer instructions?

- ☐ A The unit must be installed on the discharge side of the water heater
- ☒ B The unit must be installed on a dedicated bypass with an air gap drain for the brine tank overflow
- ☐ C The unit must be installed downstream of every plumbing fixture in the home
- ☐ D The unit must be installed inside a conditioned space with no provision for floor drain access

ANSWER B

WHY Standard plumbing practice and manufacturer installation manuals require a bypass arrangement so the softener can be isolated for service, and an air-gap drain for the brine tank overflow and the backwash/rinse discharge to prevent cross-connection between the drain and the potable water system. Softeners are installed on the supply side (before the water heater), not on the discharge side or downstream of fixtures.

QUESTION 5

SINGLE CHOICE

A customer reports that their water softener's salt tank is full of salt, but the level in the tank does not drop and the water has become hard again. The most likely cause is:

- ☐ A The control valve timer has been set to the wrong time of day
- ☐ B The resin has been exhausted by iron fouling and must be replaced
- ☒ C A salt bridge has formed in the brine tank, preventing proper brine formation
- ☐ D The drain line is clogged with resin fines

ANSWER C

WHY A salt bridge is a hollow hardened crust that forms in the brine tank above the water level, supporting the salt above so it appears full while brine cannot form and reach the resin. The classic symptom is an apparently full salt tank with hard water at the tap. Breaking up the bridge with a broom handle and flushing the tank is the corrective action. A bad timer, fouled resin, or a clogged drain would produce different symptoms.

QUESTION 6

SINGLE CHOICE

In a residential reverse osmosis (RO) system, what is the role of the semipermeable membrane?

- ☐ A It releases chlorine into the water to kill bacteria
- ☐ B It adds sodium ions to reduce hardness in the product water
- ☒ C It allows water molecules to pass while rejecting dissolved salts and contaminants
- ☐ D It conditions the water by raising the pH to reduce corrosion

ANSWER C

WHY A reverse osmosis membrane is a semipermeable barrier that, under applied pressure greater than the osmotic pressure of the feed water, allows water molecules to pass through to the product side while rejecting the majority of dissolved salts, organics, and other contaminants to the concentrate (reject) side. RO does not add sodium, chlorinate, or adjust pH by design.

QUESTION 7 SINGLE CHOICE

Why is an air gap required between the drain line of a water softener and the floor drain or standpipe it discharges into?

- ☐ A To prevent the loss of brine prime during regeneration
- ☐ B To prevent the growth of iron bacteria inside the drain line
- ☒ C To eliminate any chance of drain water being siphoned back into the potable water system
- ☐ D To allow the regeneration cycle timer to operate correctly

ANSWER C

WHY An air gap is a required cross-connection control measure. Without an air gap, a flooded drain or a siphon condition could pull non-potable drain water (which may contain brine, contaminants, or sewage) back into the softener's drain line and ultimately into the potable water system. The air gap provides a physical, visible break that protects against backsiphonage and backpressure backflow.

QUESTION 8 SINGLE CHOICE

Which problem in residential water is most effectively addressed by installing an activated carbon filter?

- ☐ A Hardness that produces scale on plumbing fixtures
- ☐ B Elevated iron that causes red staining of fixtures
- ☒ C Chlorine taste and odor in the water supply
- ☐ D Low pH that corrodes copper piping

ANSWER C

WHY Activated carbon adsorbs chlorine and many organic compounds that cause taste and odor problems in municipal water. It is not effective at removing hardness (which requires ion exchange), iron (which requires oxidation/filtration or specific iron-removal media), or low pH (which requires neutralization with a calcite or soda ash filter).

QUESTION 9

MULTIPLE CHOICE

A technician is performing routine service on a residential salt-based water softener. Which of the following safety and handling practices must be followed? (Choose two.)

- ☒ **A** Wear appropriate personal protective equipment such as gloves and safety glasses when handling salt and brine
- ☐ **B** Pour brine directly into a floor drain that is connected to a septic system without an air gap
- ☒ **C** Verify that the salt tank and surrounding area remain dry to prevent slip hazards and corrosion
- ☐ **D** Store additional bags of salt directly next to a gas-fired water heater for convenience

ANSWER **A - C**

WHY Personal protective equipment (gloves and eye protection) should be used when handling salt pellets and brine, which can irritate skin and eyes. The installation area must be kept dry because wet salt and brine create slip hazards and accelerate corrosion of surrounding metal. Brine must never be discharged into a potable water system without an air gap, and storing salt next to a gas appliance is a fire and contamination hazard.