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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

American Petroleum Institute: Individual Certification Programs (API)

936

936 - Refractory Personnel Certification

EDITION

Demo

QUESTIONS

9

ISSUED

September 3, 2026

Before you begin

What this is

9 practice questions for American Petroleum Institute: Individual Certification Programs (API) 936, 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, 936
- the question number
- the email address on your order

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

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QUESTION 1

MULTIPLE CHOICE

Which of the following monolithic refractory installation methods are correctly matched to their typical applications in a refinery fired heater? (Choose two.)

- ☒ **A** Gunning — used to apply refractory to areas that are difficult to access or to repair worn linings without shutting down the unit
- ☐ **B** Casting (pouring) — used to form intricate, thin-walled precast shapes that are later anchored in place
- ☒ **C** Ramming — used to consolidate a dry mix around forms by means of a pneumatic or hand rammer for dense, monolithic linings
- ☐ **D** Spraying (shotcreting) — used exclusively for insulating ceramic fiber blankets on cold face linings

ANSWER A • C

WHY Gunning is the standard method for applying refractory by pneumatically projecting a mix against a surface, commonly used for repairs and hard-to-access areas without full shutdown. Ramming uses a pneumatic or hand rammer to consolidate a dry mix around forms to produce a dense monolithic lining. Precast shapes (option B) are manufactured by casting, not the cast-in-place installation of intricate heater components described, and spraying is not limited to ceramic fiber blankets (option D).

QUESTION 2

MULTIPLE CHOICE

Which of the following statements about metal anchors used to retain refractory linings in refinery equipment are correct? (Choose two.)

- ☒ **A** Anchors are typically welded to the shell and are designed to carry the mechanical load of the refractory while allowing some movement from thermal expansion
- ☐ **B** Stainless steel anchors are selected primarily for their low cost compared to carbon steel anchors
- ☒ **C** The anchor pattern, spacing, and orientation are important to prevent hot spots, lining spalling, and premature failure
- ☐ **D** Anchors should always be installed after the refractory has been placed so that their tips are encapsulated by the cured material

ANSWER **A • C**

WHY Anchors are welded to the casing/shell and carry the mechanical load of the refractory while accommodating thermal expansion differences. Their layout (pattern, spacing, and orientation) is critical to prevent hot spots on the shell, spalling, and premature lining failure. Stainless steel is selected for corrosion/oxidation resistance at temperature, not low cost (B), and anchors must be in place before refractory installation (D).

QUESTION 3

SINGLE CHOICE

A castable refractory is most accurately described as:

- A** A mixture of refractory aggregate and a hydraulic or chemical binder that is mixed with water or another liquid and placed by casting, vibrating, or pumping
- B** A preformed refractory shape that has been factory-fired and is installed by setting it into position with mortar
- C** A dry refractory mix that is pneumatically projected against a surface without the addition of liquid at the nozzle
- D** A fibrous blanket made from alumina-silica fibers used exclusively on the cold face of a vessel lining

ANSWER A

WHY Castable refractories are a family of monolithic refractories made from refractory aggregate bonded with a hydraulic cement (e.g., calcium aluminate cement) or chemical binder and installed by mixing with water or another liquid and placing by casting, vibration, or pumping. Option B describes preformed/brick shapes, C describes gunning mixes, and D describes ceramic fiber blanket.

QUESTION 4 SINGLE CHOICE

Why is a controlled drying and heat-up schedule required after the installation of a monolithic refractory lining?

- ☒ **A To allow the binder in the lining to develop full strength without explosive spalling caused by rapid release of free and chemically combined water**
- ☐ B To increase the density of the installed lining beyond what was achieved during placement
- ☐ C To melt the aggregate so that it fuses into a continuous ceramic mass
- ☐ D To ensure the metal shell expands at the same rate as the refractory lining

ANSWER A

WHY Monolithic linings contain free and chemically combined water that must be removed slowly to prevent explosive spalling. A controlled drying/heat-up schedule allows the hydraulic or chemical bond to develop properly without damage. Drying does not melt the aggregate (C) or raise density beyond placement (B), and matching shell expansion (D) is not the purpose.

QUESTION 5 SINGLE CHOICE

Which refractory property is most directly indicated by a low apparent porosity value in a test specimen?

- ☐ A Low density of the material
- ☒ **B High resistance to penetration by molten slag or metal**
- ☐ C D. Low thermal conductivity
- ☐ D C. High refractoriness under load

ANSWER B

WHY Apparent porosity measures the volume of open pores in a refractory. Low apparent porosity means fewer connected pores, which directly improves resistance to penetration by slags, metals, and gases. Density, thermal conductivity, and refractoriness-under-load are separate measured characteristics and not defined by porosity alone.

QUESTION 6

SINGLE CHOICE

Which failure mechanism in a refractory lining is characterized by the progressive removal of the hot face surface in thin layers, typically caused by abrasion from solids or high-velocity gas streams?

- ☐ A Spalling
- ☒ B Erosion
- ☐ C Slag penetration
- ☐ D Thermal shock cracking

ANSWER B

WHY Erosion is the wearing away of the refractory surface by the mechanical action of moving particles or gases. Spalling (A) is flaking or breaking off due to thermal/mechanical causes, slag penetration is chemical ingress of molten slag, and thermal shock cracking results from rapid temperature changes.

QUESTION 7

SINGLE CHOICE

Expansion joints in a refractory brick lining are provided primarily to:

- ☐ A Increase the thermal conductivity of the lining
- ☒ B Allow for thermal expansion of the brickwork at operating temperature and to relieve compressive loads that could otherwise cause the lining to buckle or spall
- ☐ C Provide a pathway for combustion gases to escape through the lining into the shell
- ☐ D Eliminate the need for a backup layer of insulating material

ANSWER B

WHY Expansion joints accommodate the thermal expansion of brickwork as it heats to operating temperature, preventing the buildup of compressive stress that would otherwise cause buckling, cracking, or spalling of the lining. They do not increase conductivity (A), are not designed as gas pathways (C), and do not replace backup insulation (D).

QUESTION 8

SINGLE CHOICE

During the initial heat-up of a new hydraulic-bonded castable lining, what is the purpose of holding the temperature at the recommended water-removal point for several hours?

- ☒ **A** To allow any remaining free water to be driven out gradually without generating steam pressures high enough to spall the lining
- ☐ **B** To melt the calcium aluminate cement so it can flow and seal microcracks
- ☐ **C** To pre-shrink the lining so it fits exactly inside the vessel
- ☐ **D** To bring the steel shell up to its final operating temperature before refractory loading begins

ANSWER A

WHY The hold at the water-removal temperature (commonly around 200–300 °F / 95–150 °C depending on the product) gives free water time to migrate to the surface and evaporate slowly. If heat-up proceeds too quickly, steam pressure can build inside the lining and cause explosive spalling. Calcium aluminate cement does not melt (B), and the hold is unrelated to shell temperature (D) or dimensional pre-shrink (C).

QUESTION 9

SINGLE CHOICE

Which refractory lining failure is most directly associated with chemical reaction between the hot face of a basic or alumina-based refractory and constituents in process slags or fuel ash?

- ☐ **A** Erosion
- ☐ **B** Mechanical spalling from vibration
- ☒ **C** Chemical attack / slag penetration leading to structural degradation
- ☐ **D** Freeze-thaw damage

ANSWER C

WHY Chemical attack occurs when constituents in slags, ashes, or process streams react with refractory components (for example, iron oxide attacking silica, or vanadium attacking alumina-magnesia linings), forming new, often lower-melting phases and degrading the lining. Erosion (A), mechanical spalling (B), and freeze-thaw (D) are distinct, non-chemical mechanisms.