

1. Which of the following methods is best suited for determining the concentration of carbon (C) in a metal alloy?

- a) Volumetric analysis
- b) Gravimetric analysis
- c) Spot test
- d) Optical analysis

Answer: b) Gravimetric analysis

Explanation: Gravimetric analysis involves the precipitation of a compound containing the analyte, which is then isolated and weighed. Since carbon can form volatile compounds upon heating, gravimetric analysis is well-suited for determining its concentration in metal alloys.

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2. Which reagent is commonly used to test for the presence of sulfur (S) in metal alloys?

- a) Nitric acid
- b) Hydrochloric acid
- c) Silver nitrate
- d) Hydrogen peroxide

Answer: c) Silver nitrate

Explanation: Silver nitrate forms a white precipitate (silver sulfide) when reacted with sulfide ions, indicating the presence of sulfur in the metal alloy.

3. What method would be appropriate for determining the concentration of nickel (Ni) in a metal alloy if it is present in relatively low amounts?

- a) Gravimetric analysis
- b) Volumetric analysis
- c) Colorimetric method
- d) Optical analysis

Answer: c) Colorimetric method

Explanation: Colorimetric methods are sensitive and suitable for analyzing trace amounts of elements such as nickel in metal alloys. Nickel complexes can be formed with specific reagents, and the intensity of color produced is directly proportional to the concentration of nickel.

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4. Which equipment is commonly used for spectrophotometric analysis of metal alloys?

- a) Bunsen burner
- b) Pipette
- c) Spectrophotometer
- d) Centrifuge

Answer: c) Spectrophotometer

Explanation: A spectrophotometer measures the intensity of light transmitted through or absorbed by a sample. It is commonly used in spectrophotometric analysis to determine the concentration of elements in metal alloys based on their absorbance properties.

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5. What is the purpose of spot tests in chemical analysis of metal alloys?

- a) To determine the exact concentration of each element
- b) To identify the presence of specific elements
- c) To measure the density of the alloy
- d) To calculate the molar mass of the alloy

Answer: b) To identify the presence of specific elements

Explanation: Spot tests involve adding specific reagents to a small portion of the sample to observe characteristic color changes or precipitate formation, helping to identify the presence of particular elements in metal alloys.

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6. Which of the following elements is typically determined by volumetric analysis in metal alloys?

- a) Chromium (Cr)
- b) Manganese (Mn)
- c) Cobalt (Co)
- d) Magnesium (Mg)

Answer: a) Chromium (Cr)

Explanation: Volumetric analysis involves the measurement of volume changes during a chemical reaction. Chromium can be titrated with a suitable reagent to determine its concentration in metal alloys volumetrically.

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7. What type of analysis involves the separation of metal ions from a solution followed by weighing the resulting precipitate?

- a) Volumetric analysis
- b) Gravimetric analysis
- c) Colorimetric method
- d) Optical analysis

Answer: b) Gravimetric analysis

Explanation: Gravimetric analysis is based on the precipitation of a solid compound from a solution. The mass of the precipitate is then measured to determine the concentration of the analyte.

8. Which of the following methods relies on the measurement of light absorption by a sample to determine the concentration of an element in a metal alloy?

- a) Gravimetric analysis
- b) Volumetric analysis
- c) Colorimetric method
- d) Spot test

Answer: c) Colorimetric method

Explanation: Colorimetric methods measure the absorbance or transmission of light by a sample at a specific wavelength. The concentration of the element is determined based on the intensity of the color produced.

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9. What is the primary advantage of optical analysis in the chemical analysis of metal alloys?

- a) High sensitivity
- b) Quick results
- c) Low cost
- d) Simplicity

Answer: b) Quick results

Explanation: Optical analysis techniques, such as spectrophotometry, provide rapid results compared to other methods, making them advantageous for high-throughput analysis of metal alloys.

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10. Which of the following techniques is most suitable for determining the concentration of phosphorus (P) in a metal alloy?

- a) Optical analysis
- b) Gravimetric analysis
- c) Volumetric analysis
- d) Spot test

Answer: c) Volumetric analysis

Explanation: Phosphorus can be determined in metal alloys using volumetric analysis, where it is typically titrated with a standard solution of a suitable reagent to determine its concentration.

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