Scientific Foundations of Art History

Art History · Practice Test · 18 Questions

1. Which specific copper-based mineral was primarily used as a pigment in Egyptian blue, the world's first synthetic pigment?

A) Azurite
B) Malachite
C) Calcium copper silicate
D) Chrysocolla

2. What analytical technique, using high-energy radiation to induce characteristic X-ray emissions, is commonly used to identify elemental compositions in oil paintings without sampling?

A) X-ray fluorescence (XRF)
B) Gas chromatography
C) Mass spectrometry
D) Raman spectroscopy

3. Which binding medium, identified through gas chromatography-mass spectrometry, was historically favored by Northern Renaissance painters for its rapid drying and film-forming properties?

A) Walnut oil
B) Linseed oil
C) Egg yolk
D) Gum arabic

4. In the context of pigment analysis, which chemical compound is responsible for the distinct red color of 'Vermilion' used extensively in medieval manuscripts?

A) Lead tetroxide
B) Mercuric sulfide
C) Ferric oxide
D) Cadmium sulfide

5. What is the primary constituent of 'bone black,' a pigment produced through the carbonization of animal bones?

A) Calcium phosphate
B) Activated carbon
C) Titanium dioxide
D) Lead carbonate

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6. Which physical phenomenon causes the structural color observed in the iridescent effects of historical glass artifacts buried in soil?

A) Thin-film interference
B) Rayleigh scattering
C) Fluorescence
D) Phosphorescence

7. The degradation of 'Lead White' (basic lead carbonate) in frescoes exposed to atmospheric pollutants typically results in the formation of which black compound?

A) Lead dioxide
B) Lead sulfide
C) Lead sulfate
D) Lead chloride

8. What specific form of carbon is used in the objective scientific dating of organic materials found within art objects, such as wood panels or canvas fibers?

A) Carbon-14
B) Carbon-12
C) Carbon-13
D) Carbon-11

9. Which mineral is the primary source for the pigment 'Ultramarine,' historically more expensive than gold due to the extraction process required to isolate it from impurities?

A) Sodalite
B) Lapis lazuli
C) Lazurite
D) Haüyne

10. What chemical process allows for the identification of synthetic ultramarine, which was developed in 1826 and differs from natural ultramarine in its homogeneous crystalline structure?

A) Scanning Electron Microscopy
B) Atomic Absorption Spectroscopy
C) Infrared thermography
D) Thermal gravimetric analysis

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11. The presence of 'cadmium yellow' (cadmium sulfide) in a painting generally provides a terminus post quem for its creation, as it was not commercially available until approximately which year?

A) 1780
B) 1817
C) 1850
D) 1905

12. Which optical property explains why the 'sfumato' technique, used by Leonardo da Vinci, creates a blurred transition between colors through atmospheric scattering?

A) Mie scattering
B) Refraction
C) Diffraction
D) Total internal reflection

13. What is the main chemical component of 'Titanium White,' which replaced Lead White in the early 20th century due to its non-toxicity and high refractive index?

A) Titanium dioxide
B) Titanium silicate
C) Titanium carbonate
D) Titanium oxide-hydroxide

14. In conservation science, what is the 'glass transition temperature' primarily used to measure in the context of synthetic varnish polymers?

A) Melting point
B) Surface tension
C) Polymer chain mobility
D) Solubility parameter

15. Which technique utilizes the molecular vibration signatures of chemical bonds to identify binding media and organic pigments in complex paint layers?

A) Raman spectroscopy
B) Neutron activation analysis
C) X-ray diffraction
D) Nuclear magnetic resonance

16. The 'browning' effect seen in some Renaissance oil paintings is often due to the oxidation and polymerization of which specific component?

A) Drying oils
B) Proteins in egg yolk
C) Natural resins
D) Trace metallic impurities

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17. Which metal, when used as an additive in historical stained glass (specifically cobalt), is responsible for the deep 'cobalt blue' color?

A) Cobalt oxide
B) Cobalt aluminate
C) Cobalt silicate
D) Cobalt carbonate

18. What is the primary scientific method for determining the wood species of an art object's support panel to assist in provenance and dating?

A) Dendrochronology
B) Petrography
C) Palynology
D) Radiocarbon analysis

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