

Abstract

This thesis presents a systematic approach to the classification and the identification of binding media found in the Persian historic works of art. It also provides an academic source for those who look for the binders used in old Persian arts. In this thesis, both modern analytical methods and the recipes available in old Persian treatises were used as valuable references to shed light on the technology of old Persian paintings and, particularly, their binders. Researcher hypothesized that special methods of preparation of painting materials could be recognized only by research on historic art technical texts and some methods based on optical microscopy and surface imaging of paint layers could be used for binding medium identification.

The first chapter of the thesis provided a list of possible media found in Persian painting materials based on available sources. These sources encompassed either written materials such as historic treatises and recent contributions to the analysis of materials of Persian artworks, or verbal communications including several interviews with traditional masters of Persian painting who are still alive. Fruit tree gum (*prunus* gum), gum Arabic, egg white, egg yolk, animal glue, sarcocolla gum, Serish, Kaman oil (boiled linseed oil and sandarac), sesame oil, and walnut oil were the binding media that were listed and subjected to further investigations in the subsequent chapters of the thesis.

In the second chapter, the above-mentioned binding media were discussed from the point of view of occurrence, chemical structure and the preparation. In the third chapter, however, the feasibility and the limitations of various analytical methods frequently used for the identification of ancient binding media were discussed. These methods were basically categorized into two groups including chemical and immunological and biological methods of analysis. To do so, wet micro-chemical spot tests, spectroscopic methods (FTIR, Raman spectroscopy, UV-Vis spectroscopy), chromatographic methods (GC, TLC, HPLC, *etc*) ELISA and IFM were of special interest of discussion.

In the final part, the fourth chapter, some of the aforementioned methods were tested on both artificially prepared samples and a few historic samples. Wet chemical tests, ATR-FTIR, TLC, HPLC, GC-MS, SEM and microscopic observation on the samples' surfaces showed that chemical spot tests, ATR-FTIR and Raman spectroscopy can be firstly used for the classification and, occasionally, for a detailed identification of ancient Persian binders. Various methods of chromatography, ELISA and IFM, however, can provide more detailed information about the chemical composition of the binders. Finally, it is suggested that a holistic approach to the identification of ancient binders should consider both historic art technical texts and modern analytical methods for a more accurate and precise identification.

Keywords: Binding media, Persian paintings, Historic treatises, Spectroscopy, Chromatography, Surface observation