The Feasibility of Making the Black Ink Based on the Common Instructions in Persian Calligraphy Treatises and the Practical Writing Test with Samples

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Introduction

The necessity of using tools and materials which improve the speed and quality of writing has led to the creation of a material called ink. In Iran, ink has also been considered as a writing tool by calligraphers since long ago as showcased by different instructions in calligraphy treatises. One of the instructions, deployed as the basis of the samples of this study, is that "soot is as much as the alum, gall is as much as both, gum is as much as the three and, then, the power of elbows works". The aim of this study is to make a practical ink which can be used in calligraphy in different proportionalities. This study tries to answer the question how it is possible to gain an appropriate ink based on the common instruction in calligraphy treatises. Accordingly, two kinds of Persian black inks were produced and tested in a practical writing test.

Research Method

This study first investigated the historical studies and methods of making the Persian black ink in calligraphy treatises; then, some samples were prepared. To do so, data were gathered from library studies and laboratories. The Persian black inks samples created for this study were of two kinds based on the common instruction "soot is as much as the alum, gall is as much as both, gum is as much as the three and then the power of elbows works". These samples were examined in a practical writing test. Thus, the method is scientific-experimental. In making these samples, elements such as soot, gall, and gum were considered fixed. However, since alum is mentioned generally in common instructions without referring to its type, two kinds of alums were used in making these samples. By investigating treatises on calligraphy such as Medad al-Khotout, Adab-ol-Mashgh, Savad al-Khatt (Khatt va Savad), Joharriyeh, Kashf al-Sanaye, Adab al-Khatt, Holiyat-al Kottab, a treatise on paper and painting, Aowhal and Moshajjar Scripts, the poems of Emad ol-Kottab, Serat al-Sotour and also Golestan-e Honar which had mentioned the white, the Cypriot, the Turkish, the black, the Kermani, the red, the yellow and the Circumcision alums and Zameh, it turned out that those kinds of alums like the white, the Turkish, and the Cypriot alums were used more than the other kinds. Since the Turkish and the Cypriot alums with the chemical formula $FeSO_4 5H_2O$ are, indeed, the very green alum ($FeSO_4 \cdot xH_2O$), two kinds of alums, fr including the green one (Iron (II) sulfate: $FeSO_4$) and the white one ($Al_2 (SO_4)_3$), were used in making these samples.

Research Findings
The black ink is a perdurable old material that human has used for writing, communication, and the transferring of thoughts and experiences throughout the world. Black inks can be classified into two common categories; the first category itself is divided into two groups: carbon inks and iron-gall inks. The second category is divided into three groups: carbon inks, iron-gall inks, and compound or mixed inks. Carbon inks are composed of carbon, water, and Arabic gum. In contrast, iron-gall inks are made of gallnut extract with Iron (II) sulfate. Combining carbon inks with iron-gall inks makes a compound or a mixed ink. The compound ink is the same ink which has been used from the past by calligraphers, especially in the Timurid, Safavid, and Qajar eras. It was also called the Persian black ink. The Iranians made Persian ink for the first time by mixing the carbon ink and the gall ink. It happened in the fourth century when Ibn Muqla added carbon to the common iron-gall ink. In Persian treatises on calligraphy, different instructions are mentioned for making the black ink. One of the most common ones, a couplet, is deployed in this research to investigate the feasibility of making ink.

Conclusion
The research has been carried out to assess the feasibility of making the practical ink which can be used in calligraphy. Four elements including soot, gall, gum, and alum were used in the production of samples. Soot, gall, and Arabic gum were fixed. However, as the kind of alum was not determined in the common instruction, two kinds of frequently discussed alums in calligraphy treatises were used: the white alum ($Al_2(SO_4)_3$) in making sample L1 and the green alum (Iron (II) sulfate: $FeSO_4$) in making sample L2. Therefore, the results suggested that these samples have the capability of writing in reed pens. The results of the practical writing test revealed that calligraphy with both samples on both handmade and glossy paper was possible. Thus, changing the sheet did not make any challenges for calligraphers. Also, conducting the practical writing test with different proportionalities, ranging from 3mm to 10mm, and different reed pens, such as Nastaliq, broken Nastaliq, Thuluth, and Muhaqqaq, showed both samples could be used with different proportionalities and reed pens. Although changing reed pens and proportionalities affected the writing quality of samples, both samples showed acceptable performance. Moreover, the results of the practical writing test demonstrated that the quality on ink taking and ink putting of sample L1 with white alum was better than sample L2 with green alum, but it had less elasticity. And, the darkness of sample L1 was purer than sample L2. In writing Shamarehs and Ersals, the first sample was higher in quality than the second sample.

Keywords: Calligraphy ink, Persian black ink, Making ink, Calligraphy treatises.