The Use of the Trace Elements in the Study of the Ancient Glass

Sonia Conte [a], Rossella Arletti [b], Francesca Mermati [c]

[a] *University of Modena and Reggio Emilia, Department of Chemical and Geological Sciences, Modena, Italy, sonia.conte@unimore.it*
[b] *University of Torino, Department of Earth Sciences, Torino, Italy*
[c] *University Federico II of Naples, Department of Humanistic Studies, Napoli, Italy*

The archaeometrical data on a set of 38 glass beads coming from two ancient necropoleis, situated near the modern city of Sarno (Napoli), are reported in this work. The glass samples are dated from the 9th to 6th century BC. The chemical analyses were obtained by Electron Microprobe (EMPA), for major and minor elements, and by LA-ICPMS for trace elements. The chemical data indicate that both natron and plant ash glass are present in the sample set. The natron glass beads are mainly copper blue and turquoise, cobalt blue and iron black. The cobalt blue samples show very high Al_2O_3 (~6.60%) and MgO (~4%) levels associated to trace elements such as Ni and Zn, that indicate the use of cobaltiferous alums as source of colorant [1]. Furthermore they exhibit a very low amount of CaO (1.3-3%), K_2O and P_2O_5 (0.2-0.6% and 0.03% respectively). These chemical characteristic strongly suggested the use of natron. The Sarno cobalt blue glasses were hence probably produced with natron and the high amount of MgO can be related to the use of cobaltiferous alums. The iron black samples exhibit similar chemical characteristics as regards CaO, K_2O and P_2O_5, consistent with the use of natron, as also observed for coeval black glass from France [2] and Italy [3]. Moreover, these beads are rich in FeO (10-14%), responsible for the black coloration. The majority of the plant ash samples are colorless and an high antimony levels are found (Sb_2O_3 ~ 0.40%). The trace elements analysis show that the plant ash and the natron samples (excluding the cobalt blue and the iron black) are characterized by high Sr concentrations, introduced along with the plant ashes for the plant ash glass and along with the sand for the natron glass (lime source) [4]. The natron cobalt blue and iron black samples exhibit the lowest amounts of Sr (~75 ppm), associated to low levels of lime too (≤3%), that could indicate the use of a diagenetically altered shells, which have lost part of their Sr contents.

References

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