

Platinum Ware for the VITRIOX® ELECTRIC



Introduction

Crucibles and casting dishes are needed for the production of fusion beads with the VITRIOX® ELECTRIC fusion machine. A special platinum and gold alloy with a composition of 95% Pt and 5% Au is used. This alloy is characterized by mechanical durability and, due to the gold content, low material adhesion. In addition, this alloy is also available as FKS platinum, i.e., by adding a trace of zirconium oxide, the useful life can be further increased. FLUXANA also offers quartz crucibles as an alternative to platinum crucibles.

Platinum Ware for the VITRIOX® ELECTRIC

Both crucibles and casting dishes are required to conduct the fusion. Both are available in different sizes and models.

Art.-No.	Model
FS-VIT01	Crucible standard 20 ml Pt/Au 95/5
FS-VIT02	Crucible large 30 ml for special applications
FS-VIT03	Crucible large 30 ml for ferro-alloys and slags
VU-Quartz	Crucible quartz 20 ml for special applications
FS-VIA4012	Casting dish 29/31mm Pt/Au 95/5
FS-VIA4011	Casting dish 32/34mm Pt/Au 95/5
FS-VIA4010	Casting dish 34/36mm Pt/Au 95/5
FS-VIA4009	Casting dish 39/41mm Pt/Au 95/5
FS-VIA4005	Casting dish 29/31mm Pt/Au 95/5 FKS
FS-VIA4007	Casting dish 32/34mm Pt/Au 95/5 FKS
FS-VIA4006	Casting dish 34/36mm Pt/Au 95/5 FKS
FS-VIA4008	Casting dish 39/41mm Pt/Au 95/5 FKS
FS-VID01	Cover for FS-VIT01 crucible

Table 1 Overview of platinum ware for VITRIOX® ELECTRIC

Standard Applications with the VITRIOX® ELECTRIC

For standard applications, 1 g sample and 8 g flux (e.g., FX-X65) are weighed into the FS-VIT01 crucible. The VITRIOX® ELECTRIC fusion machine has preset fusion programs so that the crucible with the sample and the corresponding casting dish must simply be placed into the machine and then the fusion is carried out fully automatically. When completed, it is only necessary to remove the finished fused bead from the casting dish and measure it in the X-ray fluorescence instrument.

Platinum Ware for the VITRIOX® ELECTRIC

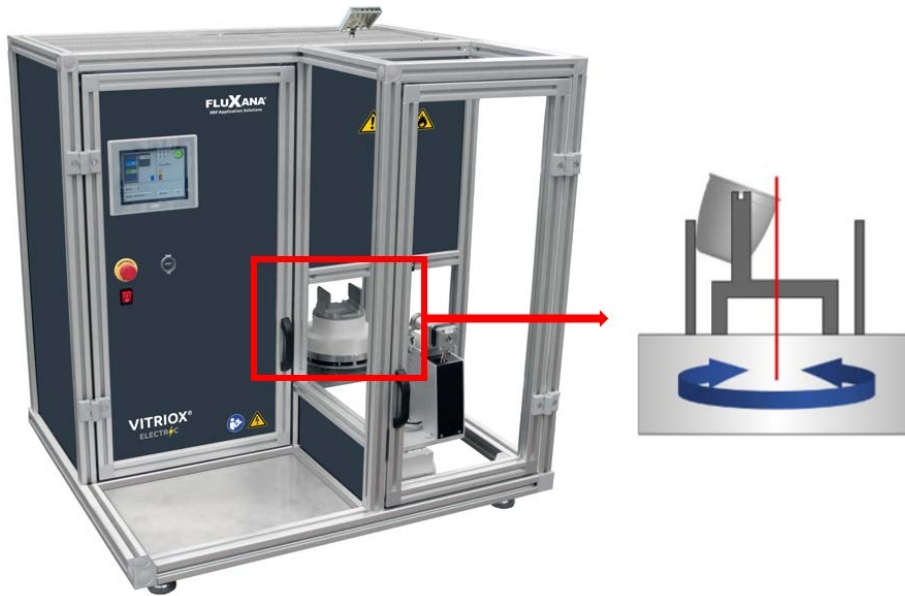


Figure 1: Rotation stirring principle in the VITRIOX® ELECTRIC

What makes the VITRIOX® ELECTRIC so special is the 3D stirring principle (Fig. 1). The crucible is rotated with high speed outside the axis of rotation. Acceleration and deceleration lead to the stirring effect as shown in Fig. 2.



Figure 2: Application of the rotation stirring principle in the crucibles with the VITRIOX® ELECTRIC

Platinum Ware for the VITRIOX® ELECTRIC

Special Applications with the VITRIOX® ELECTRIC: Ferro-Alloys and Slag

In addition to oxidic materials that can be simply mixed with a flux and then fused, there are other materials, such as ferro-alloys or slag with metallic components that require an extra oxidizing agent to prevent damage to the platinum ware.

In the VITRIOX® ELECTRIC, sample, oxidizing agent and flux can be weighed directly into the crucible at the start of the process for many of these materials. The FS-VIT03 crucible was developed especially because more volume for the oxidation reaction is required in the crucible (see Fig. 3).



Figure 3: FS-VIT03 crucible compared to the standard FS-VIT01 crucible

Platinum Ware for the VITRIOX® ELECTRIC

Special Applications with the VITRIOX® ELECTRIC: High Viscosity Fusions, e.g., Sand or Phosphate

Fusion with the VITRIOX® ELECTRIC is characterized by its high repeatability for XRF analysis. It is superior to all other commercially available fusion machines. The reason for this is the unique, patented stirring principle. Basically, the efficiency of the stirring depends on the viscosity of the fusion. If this is too high, the contents of the crucible cannot be homogenized. FLUXANA developed the special FS-VIT02 crucible to overcome this problem. This crucible is equipped with dents and a champagne bottle shaped bottom. The changes in the surface force the fusion to be well mixed. This new stirring principle was successfully developed during a comprehensive bachelor thesis (see Fig. 4). At this time, the minimum stirring speed required to achieve a homogeneous fusion with sufficient precision was also examined. As a result, the diagram below shows that the new FS-VIT02 crucible requires a much lower stirring speed than the standard FS-VIT01 crucible, thus making it especially suitable for high viscosity fusions.

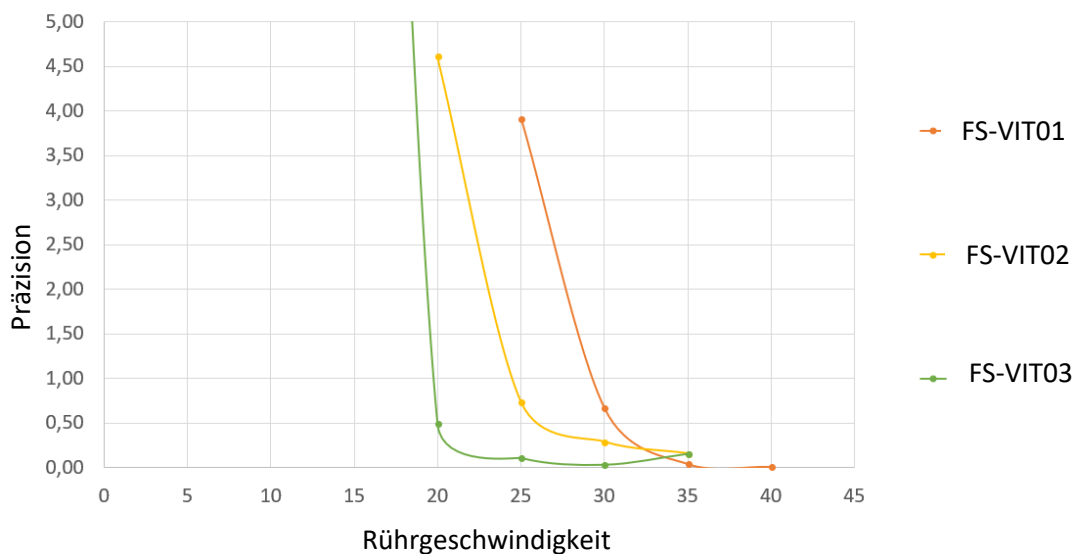


Figure 4: Stirring speed depending on the precision for different crucible forms.

Platinum Ware for the VITRIOX® ELECTRIC

Special Applications with the VITRIOX® ELECTRIC: Using Quartz Crucibles

It happens again and again that the fusion of samples containing so-called platinum poisons (sulfides, metals especially aluminum, carbides, nitrides) leads to considerable damage to the platinum/gold crucibles used. The use of quartz crucibles as an alternative to platinum crucibles is described in a separate whitepaper [2].

Literature

- [1] Rainer Schramm, Röntgenfluoreszenzanalyse in der Praxis, korrigierte Auflage II, FLUXANA (2017).
- [2] Whitepaper: Einsatz von Quarztiegeln als Ersatz für Platintiegel im elektrischen Schmelzgerät VITRIOX®.
- [3] Whitepaper: Einfluss des Rührmechanismus auf die Präzision des Schmelzaufschlusses bei VITRIOX® GAS und ELECTRIC.
- [4] www.fluxana.com