

Extract from
THE SOCACHIM HANDBOOK OF FUSION METHODS

Copper materials

Copper Sulphide (Cu: 20-30%; S: 25-35%; Fe: 20-30%; SiO₂: 5-10%)

Copper Matte (Cu: 40-55%; S: 15-25%; Fe: 15-25%; Zn: 2-5%)

Flux: XRF Scientific LT100 G & LT66:MT34

Additives to flux:

Oxidizer: Lithium nitrate

Non-wetting agent: 8 drops of Lithium Bromide solution (250g/l).

Dilution: the sample/flux/oxidizer ratio is 0.4/8/2

Swirling: the mixture must be agitated strongly. Swirl speed: 65

Fusion: Weigh 0.4 grams of dried/grinded samples, 8g of lithium borate flux, 2 grams of oxidizer and mix them together. The mixture is rigorously mixed to be sure the contact between sample and flux/oxidizer is perfect. The mixture is transferred into the crucible and about 8 drops of lithium bromide is added on top of it. Start the fusion program. When the cooling is finished, remove the bead from the mould.

Fusion Program:

- Premelt (preheating step): 7 minutes at 850°C
- Melting (without swirling): 3 minutes at 1185 - 1225 °C (*temperature depending of the flux type*)
- Melting (with swirling): 4 minutes at 1185 - 1225 °C (*temperature depending of the flux type*)
- Mould control (mould preheating step): 1 minutes at 1150°C
- Cooling (bi-level cooling): T1= 0 minute — T2= 3 minutes
- TOTAL FUSION TIME: 17 minutes

Comments: Samples containing copper sulphide are prepared for XRF analysis by oxidising the weighed powder with the appropriate quantity of oxidant. The sample is mixed with the lithium nitrate and the flux.

Samples containing copper have the tendency to stick to the crucibles and moulds

The fused mixture must be cooled directly in order to avoid all crystallisation

The mould must be polished regularly. A small asperity can lead to crystallisation

Note: Better oxidation of the sample has been observed by using the « oxygen injection » available in option on the Phoenix Fusion Machines. Prevent the mixture of sticking to the walls of crucible. An oxygen injector, placed above the crucible, can further enrich the atmosphere within the mix

NB: For Copper sulphide (Cu: 65-70%; Fe: 5-10%)

Dilution: the sample/flux/oxidizer ratio is about 0.2/8/2