

Why CS-2000?

The CS-2000 employs 2 furnaces. An induction furnace which is the best for carbon and sulphur analysis in metals, cement and generally hard to burn inorganic materials due to the high temperature created by the induction furnace and a resistance furnace which is the best for organics analysis like for coal, coke, oil e.t.c. To use one type of furnace for inorganics and for organics is a very poor compromise. Therefore suppliers have separated analyzers for inorganics with induction furnace and for organics with resistance furnace. But if they don't have a combined analyzer they some times try to tell the customers that it is possible to analyse all materials with one furnace although they know very well why they have analyzers with different furnaces in their product line.

The sample weight of coal or coke you can take in the induction furnace is 10 times lower than that you can take in the resistance furnace. The reason is that the resistance furnace has a long hot zone while the heat in the induction furnace is created only by metal accelerators (grains) in the crucible. Coal and coke contain volatile material which must be completely burned otherwise will contaminate the whole gas flow system. When volatiles escape from the crucible they can not burn any more because only the crucible is hot but not the furnace. But also coal/coke powder can be launched out of the crucible by the very rapid combustion when the metal accelerators ignite. In order to reduce these effects, only a very small amount of organic sample can be taken. But even if you take a small sample you only reduce the above effects which influence the repeatability of the results. But the smaller the sample weight the higher the influence of inhomogeneity so that by reducing sample weigh to reduce the above problem, another problem becomes bigger. Therefore analysis of organics in an induction furnace is a poor compromise.

The CS-2000 is definitely the ideal analyzer for cement plants. The induction furnace is absolutely necessary to determine sulfur (SO₃) in cement. The temperature of a resistance furnace (although 1550°C max) is by far not enough for this application. The use of accelerators would be a poor compromise and not a suitable method for routine analysis. It would be also dangerous for the analyzer and mainly for the operator because mostly vanadium pentoxide is used for this purpose. Therefore for sulfur in cement the only option is the use of an induction furnace. We have lots of cement customers using our induction analyzers, a reasonable number of them are in automations for 24 hours per day / 7 days a week simultaneous CO₂ / SO₃ analysis.

For coal, **alternative fuels** and also for oil analysis, a resistance furnace is necessary. Coal analysis in an induction furnace is only possible with very limited sample weight (50mg only) resulting in relatively high deviation of results which can not keep specs provided by norms for coal analysis. Same situation with alternative fuels. Oil analysis in an induction furnace is even not possible at all.

For the above reasons the CS-2000 is the right analyzer for cement laboratories.

Regarding calibration, we always supply the right standards for the purpose of each analyzer we supply.

For an all-round CS analyzer we suggest 2 carbon and 2 sulphur ranges (IR detectors).