*Composition and phase analysis of raw slags*

The oxide composition of the CS and SS slags determined by XRF analysis is shown in table 1. As an indication of the activity of the slag, the alkalinity (*K*) was calculated according to the formula described as following: *k= w [CaO]/ [w (SiO2) +w (P2O5)]*. According to the alkalinity values, although both CS and SS are alkaline materials, CS is considered more alkaline and hence expected to be more active than SS. The major differences between these two materials were the contents of SiO2 and Fe2O3. The SiO2 content of SS is two times higher than that of CS. This may be due to the addition of Si to the melt during production process of stainless steel to protect Cr from oxidization. Fe2O3 content on the other hand is three times lower in SS than in CS sample. Furthermore, SS is characterized by the inclusion of some non-ferrous metal elements as Cr (0.95%). XRD phase composition of the slags samples is presented in figure 1(In the manuscript). Both types of slag contain RO phase (CaO- FeO- MnO- MgO solid solution). However, the major difference of the mineralogical composition between the two types of slag is that CS is characterized by the inclusion of hydraulic phases such as C3S, C2S, Ca2Al2SiO7, C12A7 and Al2O3, while for SS, the phases corresponding to β-C2S are the only phases which is considered to exhibit cementitious properties.

Table1. The chemical composition of CS and SS

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Type | SiO2 | CaO | MgO | Fe2O3 | Al2O3 | TiO2 | SO3 | P2O5 | Cr2O5 | MnO | K2O | Na2O | ZnO | L.O.I | CaO/[SiO2+P2O5] |
| CS | 13.40 | 37.50 | 4.61 | 23.82 | 9.90 | 0.84 | 0.78 | 0.87 | 0.02 | 3.52 | 0.36 | 0.25 | 0.85 | 3.28 | 2.63 |
| SS | 27.82 | 43.22 | 5.50 | 8.54 | 4.70 | 0.59 | 1.73 | 0.14 | 0.95 | 2.00 | 0.25 | 0.21 | 0.55 | 3.80 | 1.55 |