

## Enrichment of trace elements in bottom ash from coal oxy-combustion: Effect of coal types

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### Abstract

In this study, the enrichment of trace elements in two coals under air and oxy-combustion conditions was studied. Twenty-one trace elements were evaluated. The two coal samples had a different concentration for the 21 trace elements, which was due to differences in the maceral composition. Based on the Relative Enrichment (RE) values calculated for the 21 trace elements in this study, 16 of them are non-volatile and the rest (5) are semi-volatile and volatile elements. The non-volatile elements are Li, Cr, V, Mn, Sr, Ba, Cu, Rb, Co, Ni, Ga, Pb, Be, Mo and U. The semi volatile and volatile elements are Ag, Cd, Te, Bi and Ti. In air combustion, only 9 of the 16 non-volatile trace elements have the same enrichment behaviour in the two coals when the temperature was increased from 900 °C to 1000 °C. The 9 trace elements are Cr, Mn, Cu, Co, Ni, Mo, V, Zn and Pb. In oxy combustion, only 5 of the 16 non-volatile trace elements and they are Cr, Sr, Rb, Ni and Mo. Only 3 of the 16 non-volatile trace elements have the same enrichment behaviour under both air and oxy-combustion conditions. The three elements were Cr, Mn and Mo. For the 5 semi-volatile and volatile trace elements, only 3 had the same enrichment behaviour in air combustion in both coal samples when the temperature was increased from 900 °C to 1000 °C. The three are Bi, Te and Ti. In oxy-combustion, Bi had the same enrichment behaviour when the temperature was increased from 900 °C to 1000 °C. The results show that the difference in the enrichment behaviour for both coal samples at different combustion temperatures is more significant under oxy-combustion conditions.