

Condensing Species from Flue Gas in Puertollano Gasification Power Plant (Spain)

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ABSTRACT

The occurrence and distribution of trace elements (Pb, Zn, As, Ge, Cd, Tl, Bi, Sn, and also Ni, Fe and V) in condensates arising from coal gasification was investigated through the study of samples physically deposited on the gas cooling system from the IGCC 350MW Puertollano power plant. These highly metal enriched samples are suitable for a comprehensive evaluation of the mode of occurrence of these elements in IGCC fly ash. Pb, Zn, Ge, and Fe sulfides, Ni-Fe arsenides, Ge and V oxides as well as traces of K chloride and Pb, Zn and Fe sulfates were determined as the major bearing phases for these elements. From the variations in the trace element concentrations in the deposited matter, it is deduced that the condensation of galena (PbS), sphalerite (ZnS), pyrrhotite (FeS) and nickeline (NiAs) take place at the highest cooling temperature. Ge sulfides and oxides mainly condense at intermediate temperatures, the condensation of wurzite (ZnS) is produced at the lowest temperatures. Chloride phases are distributed homogeneously among the different products arising from condensation from all temperature ranges. The sequential condensation of sulfides and chlorides from coal gasification on the heat recovery system at IGCC Puertollano power plant is similar to that described for volcanic fumaroles. We would like to thank the European Coal and Steel Community (ECSC) for supporting this study (ECSC 7220-PR145).