

PARTITIONING OF TRACE ELEMENTS IN COAL GASIFICATION: INFLUENCE OF THE FEED CONDITIONS

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ABSTRACT

The implementation of IGCC plants at industrial scale is expected to growth in the forthcoming years. Studies on the fate of trace elements in gasification systems are then being necessities to advance on trace pollutants abatement. In this study the partitioning of trace elements and the influence of the feed conditions was investigated using feed fuel, fly ash and slag samples from the Puertollano IGCC power plant (Spain) collected under different operational conditions. The partitioning of elements in the Puertollano IGCC plant may be summarized as follows: a) High volatile elements (VE) (70->99 % in gas phase): Hg, Br, I, Cl and S, b) Moderately VE (up to 50% in gas phase and >60 % in fly ash): As, Sb, Se, B, F, Cd, Tl, Zn and Sn, c) elements with high condensation potential:(>90 % in FA): Pb, Ge, Ga and Bi, d) elements enriched similarly in FA and S 30-60 % in FA: Cu, W, (P), Mo, Ni and Na, e) low volatile elements (>75 % in slag): Cs, Rb, Co, S, K, Cr, V, Nb, Be, Hf, Ta, Fe, U, Ti, Al, Si, Y, Sr, Th, Zr, Mg, Ba. Mn, REEs, Ca and Li. The feed fuel geochemistry and the limestone addition as a fluxing agent were found as the main factors affecting volatility of As, Sb, and Tl and the slagging (fly ash/slag ratio) of S, B, Cl, Cd and low volatile elements, respectively.

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