

STUDY OF SLAG DEPOSIT FORMATION USING SYNTHETIC COALS

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Abstract

Synthetic coals prepared from known minerals dispersed in a copolymer, consisting of polyester, styrene and divinyl benzene, were used to investigate the slag deposit formation in a laboratory drop tube furnace. Comparative morphology and chemistry of the collected deposits were examined using SEM, SEM-EDS and XRD analysis.

Preliminary results of tests using synthetic coals containing individual or binary mineral mixtures showed that the deposits produced were similar in morphology to deposits produced from coals. Both synthetic coals containing pyrite and pyrite plus clays (illite or kaolinite) formed a strong initial deposit layer as well as a build-up of deposit. On the other hand, synthetic coal containing illite grew a deposit with weak initial adherence. Synthetic coals containing quartz particles did not melt and adhere to form a deposit.

The deposit from a synthetic coal which contained pyrite, clays, quartz and calcite gave a structure and chemistry similar to the formed from the actual coal (Illionois #6), with the same mineral composition. The XRD analysis of the deposit mass showed that there were phases containing anorthite [$\text{Ca Al}_2 \text{ Si}_2 \text{ O}_8$] and augite [$\text{Ca}(\text{Fe, Mg})\text{Si}_2 \text{ O}_6$]. This indicated the role of calcite in assisting the fusion of pyrite and clays or quartz in a manner similar to that of the actual coal tested in this furnace.