

4-4. Modeling of Ash Formation, Deposition and Sintering Behavior in Entrained-Bed Coal Gasification

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A numerical simulator on coal gasification has been being developed to analyze and predict the thermal, chemical and physical phenomena of pressurized entrained-bed coal gasifier in the Brain-C project. This simulator is expected to minimize technical and financial burdens required to scale-up and commercialize the coal gasification process. Devolatilization, char reactions and ash deposition on the wall occur simultaneously in the gasification reactor. In particular, ash deposition at gasifier causes serious problems for a stable operation and adhesion at heat exchanger have a significant impact on the heat transfer performance. A modeling of ash behavior in gasifier is one of the key issues for developing the computer simulator.

In this study, a development of numerical models for ash formation and deposition behavior at gasifier and heat exchanger were carried out through several laboratory-scale tests. The ash behavior sub-models for coal gasification based on mineral transformation and ash viscosity was newly incorporated into the coal gasification simulator. The calculated results were compared with the data measured in a 50 ton/day "HYCOL" gasification pilot plant. The modified simulator predicted the ash deposition profiles fairly accurately with actual plant.

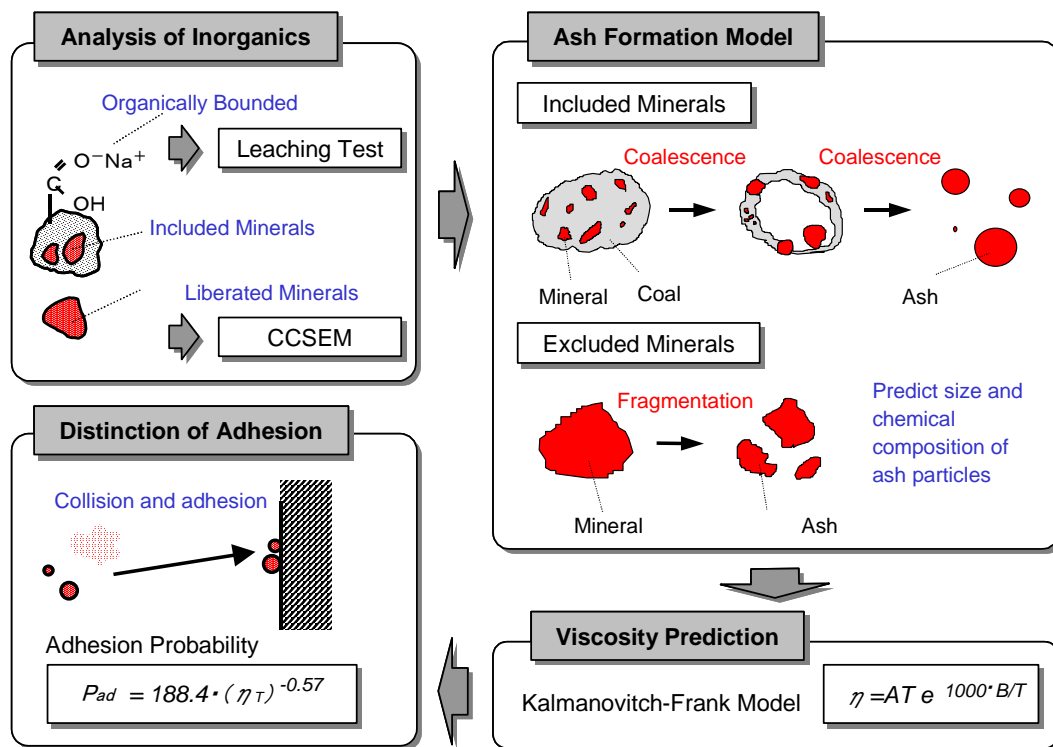


Figure. Distinction of ash adhesion based on ash formation and deposition model