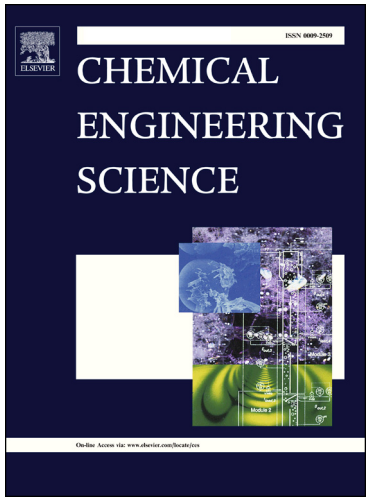

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THE ESTABLISHMENT OF A COKE-BURN KINETIC MODEL FOR ZEOLITE CATALYSTS

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1. ABSTRACT

The regeneration of coked samples of methanol-to-gasoline (MTG) catalyst applied in the commercial TIGAS (**T**opsoe **I**mproved **GA**soline **S**ynthesis) process was studied by kinetic investigations of the coke-burn rate from temperature programmed oxidation (TPO) analysis of coked catalyst from a pilot plant reactor. The spent catalyst was unloaded, and samples covering the catalyst bed from reactor inlet to exit were analyzed by means of TPO. A rigorous kinetic model was fitted to the measured evolutions of CO_2 and CO at the different catalyst bed heights. It was found that the diversity in oxidation reactivity of the coke observed along the axial reactor coordinate could be represented by lumping the various coke species into families characterized by having approximate the same oxidation reactivity. It was found that seven coke families were needed in order to obtain a satisfactory fit of the measured evolutions of CO and CO_2. These seven coke families can roughly be divided into two categories; low-temperature (reactive) and high-temperature (less reactive) coke. Model testing is accomplished by applying the model to reconstruct a complete catalyst regeneration performed in situ in the pilot reactor. Model application illustrates that during the first step in an industrial regeneration, there is a risk of obtaining temperature