122a Hot Spots Formation in Packed Bed Reactors

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Local transversal hot spots may form in packed bed reactors. They have a deleterious impact on the yield of the desired product and in addition may pose safety hazards, when present next to the reactor walls. The mechanism causing these hot spots in commercial reactors is not yet established. We studied the evolution and dynamics of these hot spots in shallow fixed bed reactors, packed with several layers of spherical Pd on Al2O3 catalytic. Infrared thermography was used to capture the formation and dynamics of the hot regions. Non-uniform transversal temperature formed during the atmospheric oxidation of CO under conditions for which multiple steady state exist. Hot regions are separated from colder ones by sharp fronts (*f*xT~75,,aC). The hot zones exhibit characteristic motions such as back and forth (breathing), rapid transition from one side of reactor to another (anti-phase), and rotation around the bed. More intricate behavior due to interaction among these basic motions, has also been observed. The interaction of the gas phase (above the bed) with the top surface (global coupling) also plays an important part in the dynamics of the observed patterns. Linear stability analysis predicts that stable, stationary hot zones cannot form using common rate expressions when the reaction rate depends only on the reactant surface concentration and temperature. However, stable spatiotemporal patterns may form when the isothermal catalytic reaction rate may lead to oscillation in the rate.