Fluid Salt Cracking – A new process for the production of aromatic compounds

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Recently a process has been discovered that uses molten salts at elevated temperatures to decompose organic materials into its basic constituents. The mixtures produced using the Fraunhofer ICT's newly-developed process contain numerous valuable aromatic compounds, as shown by a chemical analysis. The chemicals in the condensed product mixture are mostly benzene, toluene, ethylbenzene and para-xylene, but there occur also significant quantities of styrene and naphthalene. Gaseous by-products include hydrogen, alkenes and alkanes, which are also important in economic terms. They are the initial raw materials needed to fabricate further chemical products, such as plastics and medicines, and are in increasing demand. By variation of the process conditions such as reaction temperature, salt composition, reaction pressure and residence time the product distribution can be varied. The influence of these parameters is currently being investigated. Using the new process developed by the Fraunhofer ICT, many of the future challenges faced by the chemical industry as a result of the increasing scarcity and price of raw materials can be solved. The process using fluidic salts could also be implemented to other processes that face challenges of heat and mass transfer phenomena or feedstock that is not easy to handle with other technologies.

Background information

The research is based on special mixtures of fluid salts in which cracking reactions can be carried out. The initial compounds are introduced into the liquid salts, and the reaction generating the products takes place at 400°C in the presence of a catalyst. The reaction in the liquid salt produces a hot vapor which is cooled outside the reactor. This leads to the condensation of the aromatic compounds. These surprising reactions can be attributed in part to catalytic effects, but thermal decomposition is also thought to play a role. As the results are very recent, there are still many open questions, according to the research team.