INFLUENCE OF TIME IN VAPOR-PHASE CRACKING REACTIONS.

Time or duration of reaction is of high importance in the cracking or alteration of heavy oils into lighter products. The majority of organic reactions require time for their completion. In the present processes, the time factor may be controlled in various ways. The cracking apparatus may be lengthened, or the rate at which the oil is fed into the reaction chamber may be varied. It may be further effected by the employment of catalytic agents. The effect of a catalyzer is to accelerate the reaction.

The time factor is also intimately related to the temperatures and pressures employed. It is obvious that if a high temperature be employed, a lesser time is required than if a relatively lower temperature be used. A slow rate of feeding oil and a relatively low temperature will accomplish practically the same results as a relatively faster rate of feed and a much higher temperature, with the single difference that more time will be necessary.

In the processes under consideration it is preferable to maintain a given rate of feed for the favorable conditions of temperature and pressure established by experimentation for any particular oil. For example, the following conditions existed in the 8-inch tubes used in the commercial production of benzene and toluene from a fuel-oil distillate. With a feed of approximately 15 gallons per hour, temperatures of 650° to 675° C., and a pressure of 150 pounds per square inch, the results are satisfactory. If the temperature is increased to 750° C., a rate of feed of between 25 and 30 gallons per hour would be necessary in order to obtain similar results. The mechanical difficulties introduced by the higher temperatures, however, decrease their feasibility in commercial work. In the production of gasoline from high-boiling distillates, the rate of feed has been as high as 70 gallons per hour, under a pressure of 200 pounds per square inch, and a temperature of 600° C.

SPEED OF REACTION IN VAPOR-PHASE PROCESS.

The introduction of a small volume of petroleum into a highly heated chamber has a number of advantages as regards efficiency. All of the material is heated immediately and uniformly. At the same time the danger incident to blowouts or to receptacles giving way is much less than in a process in which large quantities of oil are heated cracking temperatures.

Likewise, as all the material to be treated at a given time is present in the reaction chamber in a gaseous form, and as all the constituents of an equilibrium system are present, it is possible for new hydrocarbon formations to occur almost simultaneously with the breaking up of the heavier gasified hydrocarbons.