…alternative to the other conversion process; for example, cycle oils, which cannot be recycled to extinction in the catalytic cracker, can be processed in the hydrocracker.

Notwithstanding many extensive comparisons between the various processes, the experience shows that generalization with respect to the optimum conversion route still cannot be made.

Process description

All hydrocracking processes are characterized by the fact that in a catalytic operation under relatively high hydrogen pressure, a heavy oil fraction is treated to give lower molecular weight products.

Hydrocracking covers widely different fuels, ranging from C3/C4 production from Naphta, on the other hand, to Luboil manufacture from Deasphalted oils, on the other.

Most hydrocrackers use fixed beds of catalyst with downflow of reactants. The H-Oil process developed by Hydrocarbon Research Corp and Cities Service R & D employs an ebullient bed reactor in which the beds of particulate catalyst are maintained in an ebullient or fluidized condition in up-flowing reactants.

When the processing severity in a hydrocracker increases, the first reaction that occurs is the saturation of any olefinic material in the feedstock. Next comes the reaction of desulphurization, denitrogenation, and de-oxygenation. These reactions constitute treating steps, during which, in most cases, only limited cracking takes place. When the severity is increased further, a hydrocracking reaction is initiated. They proceed at various rates, with the formation of intermediate products (e.g. saturation of aromatics), which are subsequently cracked into lighter products.

Process configuration

When the treating step is combined with the cracking reaction in one reactor, the process is called a SINGLE-STAGE PROCESS.

Single-stage process

In this simplest of the hydrocracker configuration, the layout of the reactor section generally resembles that of a hydrotreating unit. This configuration will find application in cases where only a moderate degree of conversion (say 60% or less) is required. It may also be considered if full conversion, but with a limited reduction in molecular weight, is aimed at. An example is the production of middle distillates from heavy distillate oils. The catalyst used in a single-stage process comprises a hydrogenation function and a strong cracking function. The hydrogenation function is provided by sulfide metals such as cobalt, molybdenum, and nickel. An acidic support, usually alumina, attends to the cracking function. Nitrogen compounds and