

PATENT APPLICATION

PROCESS FOR THE REGENERATION OF CATALYSTS.

The following method serves to control the max. temperature which is reached during the regeneration of a used catalyst, especially a catalyst for the cracking of hydrocarbons, when the carbon deposited on the catalyst is removed by combustion. It has previously been proposed to remove the heat liberated during the regeneration of cracking catalysts by means of oxygen-containing gases by means of water or salt solutions which are circulated through pipes inside the catalyst bed.

It was found that for this method it is advantageous to use as coolants such materials which boil above the temperature used in the cracking operation but below the temperature required for regeneration of the catalyst.

When the temperature difference between cracking of the hydrocarbons and regeneration of the catalyst is, e. g., 180°F., coolants can be used whose boiling point at ordinary pressure lies less than 180°F. above the cracking temperature.

In case that the vapor pressure of the coolant is too high at the cracking temperature, the pressure in the cooling equipment should be adjusted so that the coolant does not evaporate. A substance which meets all these requirements is, e. g., sulfur.

The use of these coolants has the advantage that they do not evaporate during the cracking period but remain in the liquid phase and assume approximately the temperature prevailing in the reaction space; during regeneration, however, they begin to evaporate because the temperature exceeds their boiling point and, consequently, the heat of evaporation is used to cool the catalyst and dissipate the heat liberated during combustion of the carbon deposit.

The vapors of the coolant which leave the reaction and regeneration space are condensed in a condenser and the heat of condensation can be used for, e. g., preheating and evaporating the charge stock or for the manufacture of steam.

The condenser is advantageously arranged above the catalyst space so that the condensed coolant returns automatically to the catalyst space. This eliminates the necessity of using pumps which are often difficult to operate at the temperatures used. One condenser can be used for several reactors.

For catalytic cracking or reforming or any other endothermic reaction, it is advantageous to use 2 or more reactors and use the reactors alternately for conversion and regeneration. The vapors of the coolant leaving the regeneration zone can be passed through the coolant in the reaction zone and raise its temperature so that it can furnish heat for the cracking reaction.

Claims.

1. Process for regeneration of a catalyst used for cracking of hydrocarbons by a fixed-bed catalytic cracking process characterized by using as a coolant for controlling the regeneration temperature a substance which at the operating pressure boils above the temperature required for the cracking reaction but below the temperature required for regeneration of the catalyst.

2. Process according to Claim 1 characterized by condensing the vapors formed during regeneration of the catalyst in a condenser which is arranged in such a way that the condensate flows automatically into the cooling system of the catalyst space.
3. Process according to Claims 1 and 2 characterized by using 2 or more reactors in which, alternately, cracking of hydrocarbons and regeneration of the catalyst takes place and the vapors of the coolant leaving the regenerating zone are passed into the reaction zone and, subsequently, condensed.