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Reactors for catalytic alkylation

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Plan

Alkylation is the introduction of an alkyl substituent into the molecule of an organic compound. Typical alkylating agents are alkyl halides, alkenes, epoxy compounds, alcohols, rarely aldehydes, ketones, esters, sulfides, diazoalkanes. Alkylation catalysts are mineral acids, Lewis acids and zeolites.

According to the mechanism of alkylation reaction it belongs to two main groups:

- acid-catalytic alkylation reactions
- thermal alkylation reactions

THE RAW MATERIAL OF ALKYLATION

Butane-butylene fraction (BBF) must be purified from sulfur compounds, which are mainly represented by mercaptans. The method of purification of BBF from mercaptans consists in alkaline extraction of mercaptans from hydrocarbon fraction and the subsequent regeneration of alkali in the presence of homogeneous or heterogeneous catalysts by oxygen of air with release of disulfide oil. This process is called the ***Merox.***

The alkylation reaction of isobutane with olefins is accompanied by the release of a large amount of heat, which must be removed from the reaction zone. In industrial practice, two methods of heat removal have found application.

Two methods of heat removal

1. heat removal through the heat exchange surface located inside the reactor, in this case closed cooling cycles are used with the use of special refrigerants - ammonia, propane
2. heat removal by evaporation in the reaction space of the components involved in the reaction, for example, isobutane, in this case, the heat transfer surface is not needed, which greatly simplifies the design of the reactor.

Catalysts

The HFAU can be divided into three main sections:

- reaction;
- fractionation;
- defluorinating / alumina treating.

The SAAU can be divided into five major sections:

- reaction;
- Refrigeration;
- effluent treating;
- fractionation;
- blowdown.