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Product Data Sheet

HF-200XP

Promoted Alumina Spheres for Improved Fluoride Scavenging

BASF HF-200XP promoted alumina spheres minimize carbon buildup and coking, resulting in higher fluoride loadings and greater conversion rates. An improved product which includes a promoter, BASF HF-200XP yields carbon pickup of 0.2-0.3%, compared to typical carbon pickup of 3-5% (wt.) on non-promoted aluminas. The surface area is maximized in pores of 30-100Å to aid accessibility of the surface active sites through bulk diffusion. This is accomplished by controlled pore size distribution development in the production of alumina. Conversion improvement of 10-30% is consistently seen in the field.

Product Background

Uniform ball size, low silica content and low dusting must also be characteristic of the activated alumina in order to ensure effective operation of the defluorinator. Uniform ball size results in lower pressure drop and less chance of fluid channeling, thus promoting maximum bed utilization. Low dusting reduces the likelihood of plugging valves downstream. Low silica content reduces the tendency of the silica to form silicon tetrafluoride, which can cause plugging and corrosion problems.

BASF HF-200XP promoted alumina spheres has all of these characteristics. The physical and chemical properties of HF-200XP are listed in the table on the next page. Its formulation is optimized so that the spent material is compatible with existing recycling applications. The 1/8” size is generally recommended for liquid applications and is preferred for gas phase applications. However, 3/16” size can be used if pressure drop is a concern.

Product Applications

The product streams leaving an alkylation unit are:

1. LPG grade propane
2. Normal butane
3. C5 and alkylate
4. Tar

The propane and butane streams contain trace amounts of organic fluorides and free HF acid; therefore, they must be treated in order to meet pipeline quality specification. Most units use adsorbent defluorinators, which utilize activated alumina to decrease the fluoride content of the propane and / or butane streams. Organic fluorides decompose in the presence of activated alumina to produce aluminum fluoride and water.

Defluorinators are typically set up in a lead / guard bed scheme. These units run at temperatures in excess of 350°F (177°C). The range of 400-500° (204-260°C) is recommended for optimum reaction and to assure lowest possible effluent specification. Operating pressures range from 200-260 psig.

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Fluoride concentrations of 25-50 ppm typically exit the primary defluorinator and effluent concentrations of 0-5 ppm are common from the secondary defluorinator. Once the concentration of the primary defluorinator exceeds 50 ppm, the bed is changed out and the secondary defluorinator becomes the lead bed.

HF-200XP

Standard Activated Alumina

Spent Samples from Defluorination Services

Typical Chemical Composition (wt %)	
Al_2O_3 plus Promoter	95.1
SiO_2	0.02
Fe_2O_3	0.02
LOI (250 – 1100ºC)	4.5

Typical Physical Properties	1/8" (3.2mm)	3/16" (4.8mm)
Surface Area (m^2/g)	325	300
Total Pore Volume (cc/g)	0.5	0.5
Alumina XRD Phase	Amorphous, Chi & Gamma	Amorphous, Chi & Gamma
Crush Strength, lbs (kg)	30 (14)	55 (25)
Abrasion Loss, wt %	0.1	0.1
Packed Bulk Density, lbs/ft^3 (kg/m^3)	48 lb/ft^3 (769 kg/m^3)	48 lb/ft^3 (769 kg/m^3)

Process Information

The HF alkylation process produces high octane feedstocks that are used for blending in motor gasoline and aviation fuels. The principal reaction is the conversion of propylene or butylenes and isobutane into an isoparaffin called alkylate. HF acid is used as the catalyst in this reaction. The important variables that affect the alkylation process are reaction temperature, acid strength, isobutene concentration and olefin space velocity. Typical reaction temperatures in the acid reactor range from 70-100°F (21-38°C) and the acid strength is normally between 86-90%. Isobutane ratios of roughly 10:1 seem to be most effective. These parameters are necessary to enhance alkylate quality and yield, and to suppress undesirable side reactions that produce heavy alkylate, acid soluble oils or polymers.

About Us

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All data represents typical product properties and are based upon BASF standard test methods. All test methods are available upon request.

BASF-9198 Rev.10/16