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Raise Gasoline Efficiency by Operation Reforming Process

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ABSTRACT

Catalytic reforming is a major conversion process in petroleum refinery and petrochemical industries. The reforming process is a catalytic process which converts low octane naphtha into higher octane reformate products for gasoline blending and aromatic rich reformate for aromatic production. Basically, the process re-arranges or re-structures the hydrocarbon molecules in the naphtha feedstocks as well as breaking some of the molecules into smaller molecules. Naphtha feeds to catalytic reforming include heavy straight run naphtha. It transforms low octane naphtha into high-octane motor gasoline blending stock and aromatics rich in benzene, toluene, and xylene with hydrogen and liquefied petroleum gas as a byproduct. With the fast growing demand in aromatics and demand of high - octane numbers, catalytic reforming is likely to remain one of the most important unit processes in the petroleum and petrochemical industry. The products obtained in the process of one-shot transfer, catalytic reforming, gasoline fractions obtained in the process of catalytic cracking and coking are usually used to get marketable high-octane motor gasoline. Aromatic hydrocarbons used in the chemical industry are generally obtained in the process of catalytic reforming of oil fractions. It will be possible to supply the demand on benzene and other aromatic hydrocarbons due to oil refining. In the result of gasoline fraction reforming output of benzene, toluene and xylene against oil can be 1.5 – 2%(mass). Fibers of caprone and nylon type, synthetic rubber and plastic material can be obtained on the basis of benzene. Highly resistant polyester fiber of lavsan type can be produced from P-xylene. O-xylene is considered to be a raw material for producing the phthalic anhydride, and isophthalic acid and isophthalic acid based alkyd resins can be produced out of m-xylene. Sterol can be obtained from ethyl benzene. The catalytic reforming unit which is designed to produce motor gasoline components, consists of assembly for hydro-cleaning of directly distilled gasoline fractions boiling within the limits of 85-180^{o}C(0r 105-180 ^{o}C)of raw material, reactor block of hydrogen circulated reforming, reforming stabilizer. The reactor block consists of 3 or sometimes 4 consecutively placed reactors, where the mixture gas and raw material is regularly heated, two reactors are parallel placed in some units at the final stage of the process. Reforming accelerator includes platinum and rhenium in the cylindrical from with diameter of 1.2 to 2.8 mm, absorbed in aluminum oxide as active components. Molybdenum and vanadium oxide were used to modify accelerator. As a rule, reforming raw material consists of 25-35%(mass)of naphthene, 10-15%(mass)of flavoring agent, up to 1%of olefine, the rest are ordinary and is structural paraffin hydrocarbons. Thus, at the same time the process of gasoline fractions by catalytic reforming method enables to produce in quantity high-octane gasoline components, aromatic hydrocarbons and technical hydrogen. As a result, it facilitates the sufficient increase in the flexibility of the process and the profitability of petroleum refineries.

Keywords: Reforming Process, High Octane number, Reforming.

1. INTRODUCTION

The process of catalytic reforming ranks high among the processes used to get marketable high octane motor gasoline This process provides the production of technical hydrogen which used for the hydro cleaning of high octane gasoline, individual aromatic hydrocarbons and fuels and for the getting of chemical semi-products. Used in the chemical industry, aromatic hydrocarbons are generally obtained in the process of catalytic reforming of oil fractions and it will

be possible to supply the demand on benzene and other aromatic hydrocarbons by the refining of crude oil. Apart from high octane gasoline and aromatic hydrocarbons, one can get hydrogenated gas in the result of the dehydrogenation and isomerization of naphtene hydrocarbons the cyclodehydrogenation of paraffin hydrocarbons. There is hydrogen in the content of this gas with 70-90% volume or 0.7-2.2% mass fraction for the processed raw material in the content of this gas. This gas is used for processing of hydrogenated oil fractions, as well as production of ammonia, methanol and other chemical products, because hydrogen concentration is more in the content of this gas obtained in great amount.

2. PURPOSE OF THE RESEARCH:

Conducting of catalytic reforming process of raw material taken in the laboratory condition, learning the method of absorption of Pt considering active component of catalyst to γ-Al_2O_3 is modifying catalyst with molybdenum and vanadium oxides and particularly ensuring the correspondence of aromatic hydrocarbons in the content of obtained benzene, benzol amount to the modern standards.

3. SCIENTIFIC INNOVATIONS OF THE RESEARCH:

New type modified Pt based catalyst is used in the process. Octane level of benzene obtained as a result of reforming conducted on the catalyst placing on this catalyst in stationary from is 85 by the engine method and 93 by the scientific research method. The amount of aromatic hydrocarbons is lower than 30% and amount of benzol is less than 1%.

CONCLUSION:

1-The process converts low-octane linear hydrocarbons (paraffins) into branched alkanes (isoparaffins) and cyclic naphthenic, which are then partially dehydrogenated to produce high-octane aromatic hydrocarbons. The dehydrogenation also produces significant amounts of byproduct hydrogen gas, which is fed into other refinery processes such as hydrocracking. A side reaction is hydrogen, which produces light hydrocarbons of lower value, such as methane, ethane, propane and butanes. It is also the conversion of straight chains of alkane catalytically.

2-In addition to a gasoline blending stock, reformate is the main source of aromatic bulk chemicals such as benzene, toluene, xylene and ethylbenzene which have diverse uses, most importantly as raw materials for conversion into plastics. However, the benzene content of reformate makes it carcinogenic, which has led to governmental regulations effectively requiring further processing to reduce its benzene content.

3-This process is quite different from and not to be confused with the catalytic steam reforming process used industrially to produce products such as hydrogen, ammonia, and methanol from natural gas, naphtha or other petroleum-derived feedstocks. Nor is this process to be confused with various other catalytic reforming processes that use methanol or biomass-derived feedstocks to produce hydrogen for fuel cells or other uses.

4-Technological scheme of catalytic reforming device is in the laboratory condition according to the modern requirements.

5-Octane level of benzene produced during the catalytic reforming process is 85 by the engine method and 93 by research method. The amount of aromatic hydrocarbons is lower than 30% and amount of benzol is less than 1%.

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