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KARACHACHANAK DEPOSIT GAS CONDENSATE – PERSPECTIVE RAW MATERIAL FOR PETROCHEMISTRY

Abstract. Any condensate is obtained after a gaseous substance passes into a liquid due to a decrease in pressure or temperature. In the bowels of the earth there are not only gas, but also gas condensate deposits. When pressure and temperature decrease as a result of well drilling, gas condensate is formed - a mixture of liquid hydrocarbons separated from gas.

Knowing amount sloppy cheese, delivered Karachaganak processing complex on consequent conversion in accordance with passport quality cheese with brought on contents faction before C_{19} and the other factor, on under development methods possible to calculate output base faction, used for reception of the goods products on full scheme to conversion cheese.

Keywords: gas condensate, oil and gas chemistry, gas and condensate fields, product pipelines, field, raw materials.

INTRODUCTION

The main raw materials of petrochemical enterprises for the production of a whole range of products: ethanol, solvents, polymers, synthetic rubber, components of high-octane gasolines are a wide fraction of light hydrocarbons and liquefied hydrocarbon gases.

Gas condensate is a natural liquid mixture of hydrocarbons with a high boiling point, the chemical formula of which contains five or more carbon atoms in the molecule, located in the bowels of the Earth and contained in the composition of the extracted natural gas, oil fields, and also in the form of independent gas condensate deposits. Gas condensate is also formed as a by-product during the operation of gas equipment during the processing and transportation of natural gas, and also accumulates in the equipment of internal combustion engines operating on gaseous fuels. Gas condensate raw materials are used for the production of motor fuels, as well as in the chemical industry.

Gas condensate obtained directly from the well is unstable, but after deep cleaning of any kind of impurities and degassing, it will eventually become stable. As for unstable gas condensate, it is characterized by high pressure of saturated vapors of light hydrocarbon fractions, and this gas condensate is delivered to the consumer via special condensate lines by means of its own high pressure.

By its qualities and application, gas condensate is similar to oil, and in some aspects even surpasses it. An important advantage of gas condensate feedstock, affecting the cost of commercial products, is the lack of the need to dispose of heavy residues, and these are expensive processing processes that require significant capital and operating costs.

Gas condensate can be used as a raw material for the production of gasoline, diesel and jet fuel, and in the petrochemical industry producing high value-added goods [1].

An important role belongs to light hydrocarbons of the C2 - C5 fraction, which are contained in natural and associated gas, as well as in gas condensate fields in sufficient quantities for their processing. Previously, these fractions were considered a by-product after stabilization of the gas condensate and were not always widely used.

MAIN PART

The analysis of the raw materials from the Karachaganak gas condensate field revealed a number of unique properties of gas condensate.

The gas condensate of the Karachaganak field is characterized by a very heterogeneous fractional and chemical composition. As the pool deepens, gas condensate becomes heavier and, in the plantar zone (about 5,200 m), the fractional composition practically corresponds to the product mixture of sulfur oils.

During the development of the field, an interesting pattern has been revealed of changes in the composition and properties of gas condensate along the height of the reservoir, which poses certain difficulties in its processing and in predicting the yield of marketable products. In addition to the noted anomalies in the change in the component composition of the condensate along the height of the productive zone, anomalies are also characteristic of the Karachaganak condensate in the chemical composition of the base fractions. For example, gasoline fractions of Karachaganak gas condensate are characterized by a low content of naphthenic and a high content of paraffin hydrocarbons, which makes it difficult to use them as feedstock for catalytic reforming. In the head gasoline fractions, an unusually high content of total sulfur (up to 1% wt.), Including up to 0.6% by weight of mercaptan. In naphtha and kerosene-gas oil fractions, the total sulfur content gradually increases, while the mercaptan content decreases [2].

Anomalies were also noted in the distribution of aromatic (alkyl aromatic) hydrocarbons, which indicates the impossibility of producing aviation kerosene due to the high aromatics content in fractions 120-2300C [1]. However, the low aromatics content in the heavy fractions suggests that the Karachaganak condensate vacuum gas oil fractions are good raw materials for catalytic cracking. The use of this installation allows you to get additional volumes of gasoline and diesel fuel.

The distribution of aromatics and total sulfur in kerosene-gas oil fractions (CGF), which are abnormal compared to conventional oils, showed that CGF fractions from Karachaganak condensate have cetane numbers of 52-54 points, while the content of aromatic hydrocarbons is 21-22%, while in conventional oils - 30-35% of the mass. When using conventional hydrotreating technology, diesel fuel grades of environmentally friendly and export conditions are quite achievable, in which the aromatic content is strictly standardized to no more than 20%.

In the initial period of operation of the complex for processing stable Karachaganak gas condensate, a number of problems have been identified, caused by the peculiarities of its composition, in particular its instability. The main problems encountered in the processing of mercaptans containing gas condensates are due to the high reactivity of mercaptans and the instability of the fractional composition [3].

These features must be considered when sorting, mixing and developing stabilization schemes, preparing and processing various types of raw materials. Considering the prevailing circumstances, a number of technological installations for the preparation and processing of the gas condensate of the Karachaganak field have undergone changes and improvements.

As studies and experience show, the following indicators are recommended for processing Karachaganak gas and condensate feedstock: the content of gas components (C4) is no more than 2%; hydrogen sulfide content - not more than 0.01%; saturated vapor pressure at 380 ° C - not more than 33.25 kPa.

Due to the instability of the raw materials, it is necessary to include stabilization units in the preparation scheme; these requirements are quite feasible while observing the process technology.

Studies [4,5], including pilot plants, provided the creation of a scientific basis for the development of integrated schemes for preparing (stabilizing) gas condensate for transportation at a refinery and processing it to produce a wide range of high-quality motor fuels and valuable petrochemical raw materials.

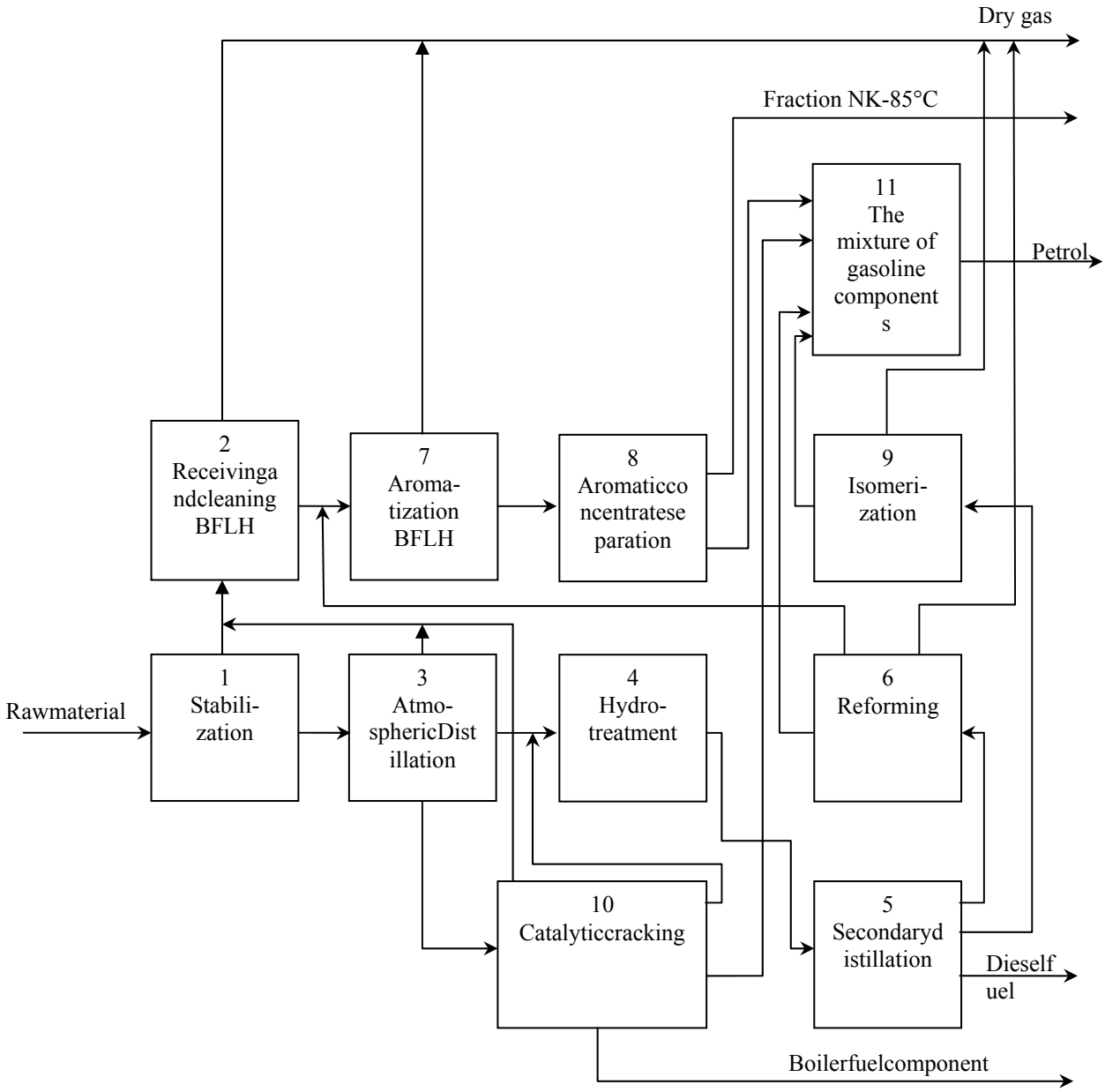

Figure 1 - The scheme of processing gas condensate field Karachaganak

Unstable gas condensate (feedstock) (1) is stabilized in a stabilization column. The stabilization gases are purified (2) from sulfur compounds and stripped by oil absorption method to produce fuel gas and a wide fraction of light hydrocarbons (NGL). Atmospheric distillation of (3) stable condensate is carried out in a distillation column to obtain n.k. fractions. - 230, 230-3500C and residue boiling above 3500C. A mixture of fractions - 230, 230-3500C is subjected to (5) hydrotreating at a pressure of 2.3-3.5 MPa and a temperature of 310-3800C. From hydrotreating products in the column of secondary distillation (5) fractions of n. - 70, 70 - 180, 180 - 3500C. Fraction n. - 700C is subjected to isomerization (6) at a pressure of 2.0 MPa, a temperature of 2700 ° C in an environment of hydrogen-containing gas, a space feed rate of 1.5 h at the catalyst containing 0.28 - 0.32% of platinum to produce a component of high-octane gasoline. A wide fraction of light hydrocarbons is subjected to aromatization (7) on a high-silicon zeolite catalyst containing elements of the VIII, IIB, IIIB groups, at a pressure of 0.3-0.7 MPa, a temperature of 500-6000C, the flow rate of the feed of 1.5-2.0 h -1 to obtain a concentrate of aromatic hydrocarbons, which is divided into faction n. - 850C, and 85 -kk [5].

Hydrotreated gasoline fraction 70-1800C is directed to catalytic reforming (9) in a hydrogen-containing gas at a pressure of 2.0 - 2.2 MPa, temperature 480-4900C on catalysts containing 0.33 - 0.52% platinum, 0.03- 0.08% tungsten, 0.01-0.02% rhenium, 0.28-0.32% fluorine, to obtain a component of gasoline and a component of a broad fraction of hydrocarbons, which is mixed with the raw material of stage (7).

Catalytic cracking (10) of the residue from the distillation of gas condensate boiling above 3500 ° C is carried out in a fluidized bed of a zeolite-containing catalyst at a temperature of 500-510 ° C and a pressure of 0.09-0.10 MPa. The cracking products are separated in a fractionation column into dry and liquefied gas (a component of the broad hydrocarbon fraction entering stage 2), gasoline (fraction n. -1950 C), light catalytic gas oil (fraction 195-3500C) and heavy catalytic gas oil (fraction above 3500). Light catalytic gas oil is fed to the Hydrotreating in a mixture with diesel fractions from the stage of atmospheric distillation (3).

Target products are prepared as follows. Mix (11) in the balance of the product (isomerization) (9) fraction n. -700C, fraction 85 –kk. the product of aromatization (7) of a broad fraction of light hydrocarbons, the product of catalytic reforming (6) of fraction 70-1800C, the gasoline fraction of catalytic cracking (10). And get high-octane gasoline with an octane rating of 94-97 by the research method. A hydrotreated 180-3500C fraction is used as a commercial low-sulfur diesel fuel. Heavy catalytic cracking gas oil is used as commercial fuel oil. The fraction n.k.85 with stages of separation of products of aromatization of a wide fraction of light hydrocarbons (8) is directed to the production of benzene [6].

CONCLUSION

In oil refineries, gas condensate is used as a raw material for the production of low-octane types of gasoline and special anti-knock additives are used to increase the low octane number. In addition, this product is characterized by a very high pour point and cloud point, in connection with which it is used mainly in the production of fuel "summer" species. Much less often gas condensate is used as diesel fuel, since in this case additional dewaxing is required. As a result of gas cleaning, condensate is pumped through special pipelines, and placed in special tanks, where it will wait for its transportation.

In the process of gas condensate processing, the main directions are petrochemical and fuel. High-quality gasoline, diesel, jet and boiler fuel are made just from gas condensate. As a result of petrochemical processing of gas condensate, olefins, aromatic hydrocarbons and other monomers (small molecules) are obtained, which are used in the production of synthetic rubbers, fibers, plastics and various types of resins.

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КАРАЧАХАНАК ЖАБДЫҚТАРЫНЫҢ ГАЗ КОНДЕНЦИЯСЫ – ПЕТРОХИМИЯ ҮШІН ПЕРСПЕКТИВТІ ШЕШІМ МАТЕРИАЛДАРЫ

Аннотация. Кез-келген конденсаттан газ тәрізді зат қысыммен немесе температураның төмендеуіне байланысты сұйықтыққа түскеннен кейін алынады. Жер қойнауында газ ғана емес, газ конденсаты да бар. Ұңғыманы бұрғылау нәтижесінде қысым мен температураның төмендеуі кезінде газ конденсатын пайда болады - газдан бөлінетін сұйық көмірсутектердің қоспасы.

C_{19} дейінгі фракциялардың және басқа көрсеткіштердің келтірілген құрамы бойынша шикізат сапасының құжатына сәйкес Қарашығанақ өңдеу комплексінің кезекті өңдеуге шығаратын тұрақсыз шикізатының мөлшерін біле отырып, толық сызба бойынша тауарлы өнім алу үшін қолданылатын базалық фракциялардың шығымын есептеуге болады.

Түйін сөздер: газ конденсатын, мұнай және газ химиясы, газ және конденсат кен орындары, өнім құбырлары, кен орындары, шикізат.

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ГАЗОКОНДЕНСАТ МЕСТОРОЖДЕНИЯ КАРАЧАГАНАК – ПЕРСПЕКТИВНОЕ СЫРЬЕ ДЛЯ НЕФТЕХИМИИ

Аннотация. Любой конденсат получается после перехода газообразного вещества в жидкое из-за снижения давления или температуры. В недрах земли существуют не только газовые, но и газоконденсатные залежи. Когда давление и температура снижаются в результате бурения скважины, образуется газовый конденсат - смесь жидких углеводородов, отделившихся от газа.

Зная количество неочищенного сырья, доставленного Карачаганакскому перерабатывающему комплексу при последующей конвертации в соответствии с паспортным качеством сырья с доведенной по содержанию фракции до С19 и другим фактором, по разрабатываемым методам можно рассчитать выходную базовую фракцию, используемую для получения схемы конверсии товарной продукции в полном объеме.

Ключевые слова: г*азовый конденсат*, нефтегазохимия, газоконденсатные *месторождения*, продуктопроводы, *месторождение, сырье*

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