INCREASE OF THE ECONOMIC EFFICIENCY AT FACTORIES OF THE OIL REFINERY INDUSTRY BY REDUCING THE ENERGY EXPENDITURE

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Abstract: Sparingly usage of material resources has got the great importance for the state economy's all productions, particularly for material –and power-consuming to which is related the petrol production out from the crude oil. In prime cost of a receiving these petrol's, the expenses share for raw materials, auxiliary materials and various kind of power make up above 80%, approximately 35% of it is related to energy expenditure. In present article, with the object of increasing the economical efficiency and reduction of prime costs of the obtained product, is considered two ways: first one – utilizing the heat of outgoing petroleum products; and second – by applying a mathematical model far regulation coke burning in regeneration systems.

Keywords: *Economy, Refining, Industry, Technical-Economy*

1. Introduction

The optimal limit of regeneration of heat distillates and remains from the distillations of the oil for the heat of the raw material is determined by the profitability of the process. The more heat is regenerated the more the heat exchange surface and also the number of the regenerators, hydraulic resistance is higher, and consequently the consumption of energy for their overcoming. Besides, the more above the temperature of primary heating of the raw material, which is acting at firing heater, the more above the temperature of removing smoke gas should be and below the efficiency in furnaces (in absence of air heater). So, on the average increase of temperature of heating of oil on 1^0C corresponds with the increasing of the temperature of removing smoke gas on 6^0C. The comparison of costs stipulated by the amplification of regeneration of heat with the cost of the saved fuel allows to choose economically the expedient degree of regeneration of heat for the given technological installation.

Laying the scheme of utilization of heat of hot productive flows, it is necessary to get the maximum use of temperature potential of hot flows utilizing the heat in the system of regenerative heating. The excessive heat of hot oil products at the temperature of 110^0C and in consumption more 20 m^3/L It is necessary to use it for the manufacture of steam and hot water. The modern oil refining plant is the big consumer of thermal energy. Half tone and more a tone of steam is spent during an hour. The steam is necessary for the technological purposes; in rectifier columns it is used for the reduction of temperature of boiling products and in tubular furnaces it is used for the dust of fuel, for the extinguishing of a fire and cleaning of surface of pipes of convection in steam-jet ejectors for creation of vacuum. A lot of steam is also spent for power needs-as the drive for steam pumps and compressors.

Among the processes used in oil refining industry, the first place belongs to catalytic cracking for the seale of application. Catalytic cracking is the main process for producing high quality petrol. Cracking of petroleum fractions is accompanied by sediment of coke on the developed catalizator's surface. Coke, being formed in the kind which is non-concentrate and hard to remove from the unit, is a single product of the whole process, which has not been removed out of the unit, and is burned by monitoring the conditions in regenerator in air stream.

The bed's temperature in the regenerator is probably the most important variable in a fluid catalytic cracking (FCC) unit. While regenerator temperature is a major factor in qaz-oil cracking, it plays an even more important role in cracking of atmospheric and vacuum resids.

Both the mechanics and kinetics of burning coke were researched. The mathematic model of the acid regeneration process of the catalizator in a catalytic cracking was developped. We prevent harmful qaz from going into atmosphere. Thus, the level of environmental confamination is significantly reduced by regulating the burning process CO and CO_2.

The kynetics of CO oxidation of CO_2 in the regeneration of the catalytic cracking catalizator is explained as per the following assumed scheme:

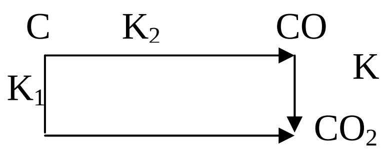

Figure 1.The assumed scheme of burning process of cokes

On the basis of scheme indicated in Figure 1, we write the reactions with the following stekhiometric proportion:

$$C + O_2 \xrightarrow{K_1} CO_2;$$
$$C + \frac{1}{2}O_2 \xrightarrow{K_2} CO;$$
$$CO + \frac{1}{2}O_2 \xrightarrow{K_3} CO_2.$$

Making use of the mechanism, we can write the following kynetic equations:

$$\frac{dC_1}{d\tau} = -K_1C_1C_2 - K_2C_1C_2{}^{0,5};$$
$$\frac{dC_2}{d\tau} = -K_1C_1C_2 - K_2C_1C_2{}^{0,5} - K_3C_3C_2{}^{0,5};$$
$$\frac{dC_3}{d\tau} = K_2C_1C_2{}^{0,5} - K_3C_3C_2{}^{0,5};$$
$$\frac{dC_4}{d\tau} = K_1C_1C_2 + K_3C_3C_2{}^{0,5}.$$
$$\frac{dC_1}{d\tau} = -K_1C_1C_2 - K_2C_1C_2{}^{0,5};$$
$$\frac{dC_2}{d\tau} = -K_1C_1C_2 - K_2C_1C_2{}^{0,5} - K_3C_3C_2{}^{0,5};$$
$$\frac{dC_3}{d\tau} = K_2C_1C_2{}^{0,5} - K_3C_3C_2{}^{0,5};$$
$$\frac{dC_4}{d\tau} = K_1C_1C_2 + K_3C_3C_2{}^{0,5}.$$

On the basis of the kynetic equation system, we can write the following heat balance equation for the regulation of the temperature regime of the fluid catalytic cracking regeneration:

$$(G_B C_B + G_K C_K + G_K C_K C_C)\frac{dT}{d\tau} +$$
$$(G_B\theta_1 + G_K C_K t)\frac{dC_C}{d\tau} - \frac{G_B}{12}\theta_2 K_3 C_{O_2} C_{\varpi}^2 \frac{P_2}{\varpi^2} = 0$$

2. Conclusions

As a result, the productivity and the technical-economical indices of the regeneration unit will be significantly wereased by means of applying the above mentioned methods. Thus, the usage of above mentioned methods allows to save material-technical means, to reduce the prime costs and capitalconsoming of petroleum products and to obtain the annval efficient.. By rational use of heat of secondary power resources it is possible to achieve the increase of an economic efficiency of an oil refining plant.

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