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VARIETY OF HEAVY RESIDUAL OIL APPLICATIONS

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Increase in production of ethylene and other lower olefins by thermal pyrolysis of hydrocarbonaceous raw puts forward a problem of effective schemas development to reprocess liquid pyrolysed species, in particular the fraction which is boiled out at above 180°C- heavy residual oil(HRO).

It is established that heavy residual oil which is formed during pyrolysis of different hydrocarbonaceous raw, have close characteristics – approximately identical elementary and group structures [1]. Principal components of these hydrocarbons are the bicyclic and tricyclic aromatic hydrocarbons and hydrocarbons containing a large number of cycles.

It is believed that HRO can be rationally used in two ways – as a fuel and as a chemical. In the first case HRO is a component of fuel oil, in the second case HRO serves as valuable petrochemical raw material for production of needle coke, carbon, soot, fiber-forming and electrode pitches, glass carbon, components of varnishes, impregnating, structural and other materials [2].

One of a HRO applications without its division into separate fractions is to produce softeners for concrete mixes (sulphonation reaction of concentrated sulfuric acid with the subsequent neutralization of the received sulfur weight by alkaline reagents [3]. Softeners allow to dilute concrete mix and to make further processing convenient. Use of softeners is quite universal: with their help it is possible to increase density (water tightness) and durability of concrete, having reduced the amount of water in mix when maintaining its mobility and to receive concrete with low contraction.

Surface-active substances can also be obtained from HRO by means of the reaction of alkylderivative polycyclic hydrocarbons which are contained in HRO with toxilic anhydride. For this residual oil is heated with toxilic anhydride and then the received product is sulphurized by concentrated sulfuric acid with the subsequent neutralization of sulfur weight by alkaline agents [4, 5].

Heavy residual oil is used as one of antiseptic components for wood steeping. Antiseptic impregnation compounds are used for protection against biodestructions [6].

Authors of work [7] suggested using HRO to receive oil naphthalene. For this purpose the long naphthalenic fraction which is boiled out within 205–230 °C has to be used.

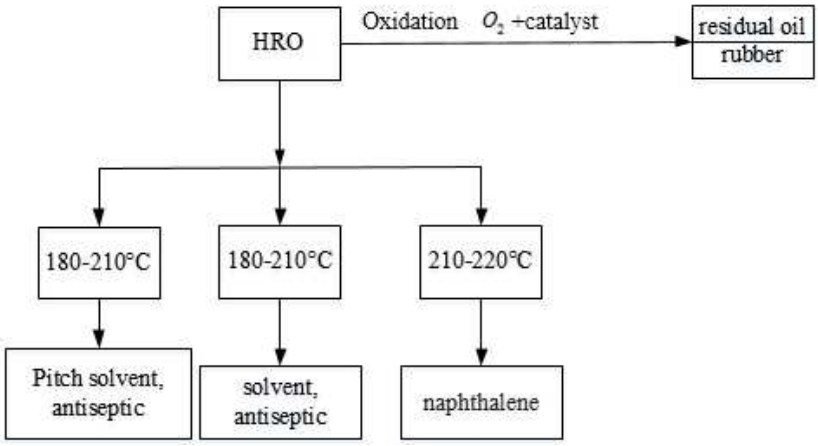

Figure 1. – At HRO distillation by Engler

Operational analysis of pyrolysis units allowed the authors of work [8] to reveal, that in a petrol column the intermediate fraction of HRO can be selected, which contains naphthalene (from 30 to 55% of mass) depending on the tapping point.

The way of receiving naphthalene without use of larger energy-intensive and resource-intensive processes is found [9–11]. This way allows receiving naphthalene of higher quality that positively affects use of HRO as raw materials for receiving naphthalene.

One of the current problems is the deficiency of needle coke at the refineries. Its production affects the development of electrode industry. Needle coke is used to obtain high-quality graphitized electrodes. Electrodes have to have high mechanical strength, an electrical conductivity, low content of sulfur and low critical temperature of dissolution.

To obtain needle coke from HRO the fraction which is boiled out at above 230 °C is used. The received pitch is diluted with solvent. At a temperature of 120–140 °C phase separation occurs into extract and raffinate. Solvent is released from extract and coking of extract is reached at temperature of 502 °C [12].

This short review shows that heavy residual oil has a wide variety of applications in petro-chemistry, electrode industry and other areas. Use of this resource is expedient as further processing of heavy residual oil becomes profitable and efficient.

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