UDC 543.544:547.652

BLEND COMPOSITION OF HEAVY PYROLYSIS GAS OIL

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The paper presents the experimental study of possibility of heavy pyrolysis tar refining to get a naphthalene fraction. According to the experimental data which was got with the help of the gas-liquid (GLC) chromatographic method of component composition of the heavier cut of pyrolysis gas oil of plant "Polymir"JSC "NAFTAN" is determined.

Introduction. In order to maintain competitiveness in the ethylene business for European steam crackers, more emphasis must be placed on upgrading all of the byproducts that are generated by liquid crackers. Producers who do not upgrade these by-products will face increasing pressure on plant margins due to competition from the low-cost regions of the world.

Naphthalene is produced commercially from either coal tar or petroleum [1, 2].

In the heavier cut of pyrolysis gas oil (PGO), naphthalene can be recovered. When a cracker size crosses the 1000 KTA mark, naphthalene recovery is economically feasible. The method of choice is a static-melt crystallisation process, such as that used at the largest North American producer's site. This operation produces refined naphthalene with a MP of 80°C, along with aromatic solvents and speciality fuel products. Various product derivatives can further increase the profitability of naphthalene recovery. The generic flow scheme of heartcut fractionation followed by crystallisation is shown in Figure 1 [3].

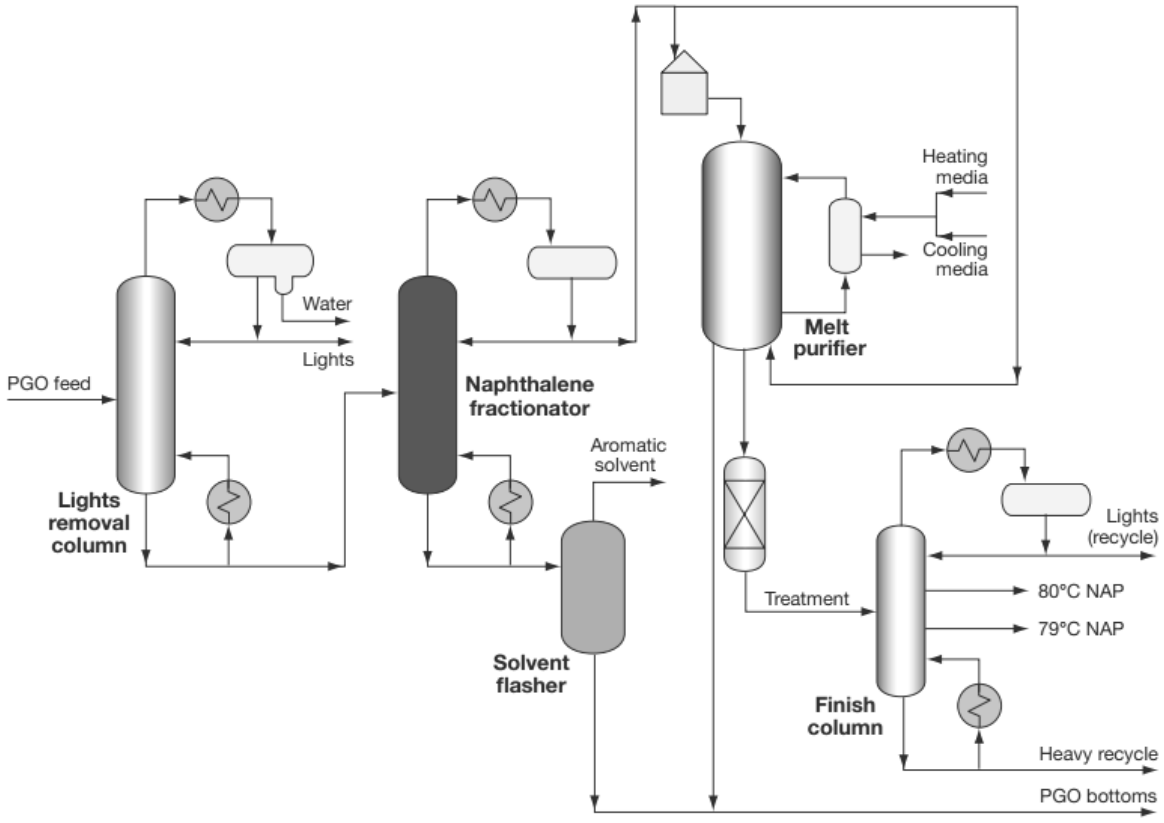

Fig. 1. Naphthalene separation process

Methodology. The PGO of the plant «Polymir» of JSC «Naftan» was distilled into three liquid fractions of b.b. –180 °C, 180–210°C, 210–230°C, and the solid residue – pitch. The research of three liquid fractions of heavy pyrolysis gas oil was carried with the gas-liquid chromatography method. NAS UniChtom gas chromatograph with a computing integrator was used.

Results, discussion and conclusion. Fractional yield b.b. –180 °C was 1.89 wt%, fr .. 180–210 °C – 18.76% by weight .. fr 210–230 °C – 14.45% by weight. and semi-solid residue of polymer nature – pitch – 64.9

wt%. Thus, the PGO of the plant «Polymir» of JSC «Naftan» contains about 35% liquid concentrate. In Table 1 there are data about the group hydrocarbon composition of separate fractions of heavy pyrolysis gas oil of the plant «Polymir» of JSC «Naftan». The data are obtained with the result analysis of each fraction gas-liquid chromatography.

Table 1. – Group hydrocarbon composition of PGO fractions

Hydrocarbon groups	Fractions, % Wt.			
	b.b.–180°C	180–210°C	210–230°C	total fraction (b.b.–230°C),
Paraffin	2,04	0,94	0,43	0,79
Isoparaffins	10,96	13,29	14,04	13,47
Aromatics	62,82	66,30	70,47	67,82
Naphthenes	7,30	5,26	1,94	4,00
Olefins	13,09	5,26	3,43	6,70
Unknown	3,79	5,64	9,69	7,22

Thus, the PGO liquid concentrate is a mixture of different hydrocarbon groups, first, aromatic ones, such as monocyclic or polycyclic groups. Also there are isoparaffins, unsaturated, naphthenic and paraffinic hydrocarbons in all fractions. More than 225 individual substances are identified in the PGO liquid concentrate of the plant "Polymir" of JSC "Naftan". The aromatic hydrocarbons with a compound chemical structure take first place by being in the PGO liquid concentrate (about 68 wt.%) among the hydrocarbon groups. More than 75 members of this group have been discovered and their being is increasing with the weightning of the PGO fractional composition. The main component of the product is a liquid PGO naphthalene and its alkyl derivatives (methylnaphthalenes and dimethylnaphthalenes), which have the total content of 27.3 wt%.

Naphthalene is a valuable raw material for the chemical industry. It is used for the synthesis of mono- and polysulfonic, nitro and numerous further processing products, in the production of phthalic anhydride and for the preparation of explosives and dyes, in medicine and etc. Methylnaphthalene is used as insecticides, solvents and initial products in the synthesis of dyes, for sulphonic acids and mono- dimethylnaphthalenes, used in surfactants. Besides, 2-methylnaphthalene is a valuable raw material for the synthetic vitamin K3 production; 1-methylnaphthalene is the standard in determining a cetane number of diesel fuel; 1,4-dimethylnaphthalene is used to inhibit a vegetable germination; 2,6-dimethylnaphthalene are oxidized to 2,6-naphthalene dicarboxylic acid, using in the polyesters and polyamides production. We should also pay attention to the cymene PGO liquid product (1-methyl-2-isopropylbenzene, 1-methyl-3-isopropylbenzene, 1-methyl-4-isopropylbenzene), which can be widely used for the synthesis of cresols, highly efficient antioxidants, phthalic acids (preferably isophthalic and terephthalic acid), flavors, etc. The PGO distillation residue is expedient to use as a raw material for the carbon fibers and pitches production.

The results of the chromatographic analysis reveals that the PGO concentrate is a mixture of different hydrocarbon groups, preferably aromatic ones, and there are various ways of rational and effective ways to its subsequent efficient usage.

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