ON THE ANNIVERSARY OF THE “START-UP” TRUST

p-XYLENE PRODUCTION UNIT. STARTUP AND OPERATION

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A plant for production of p-xylene by license from UOP – the Parex process – has been started up at Naftan Industrial Association (Republic of Belarus’) with the participation of specialists from Orgneftekhimzavody IPT OJSC. Similar plants were previously started up and operated by specialists from the trust in startup of complexes for production of aromatic hydrocarbons in Ufa and Omsk.

The plant (Fig. 1) consists of sections: feedstock preparation, adsorption (“Sorbex” unit), raffinate, extract, final purification of p-xylene, repeated purification of desorbent, and auxiliary sections.

The feedstock – a mixture of xylenes, ethylbenzene, toluene, and nonaromatic hydrocarbons – enters vessel 1 from the o-xylene production plant and is pumped by pump 2 to heat exchangers 4 and 6, where it is heated by the departing raffinate and still product of tower 14.

Passing through filters 7 to remove particulate contaminants, the feedstock, heated to 177°C, is distributed by revolving valve 9 into seven streams entering and exiting adsorption chambers 3 and 10. The revolving valve consists of a device for switching the valve zone and position, a hydraulic oil system for controlling the valve position, a digital controller, and a closed automatic logical control system.

The adsorbent in the adsorbers is distributed in different amounts in 24 layers (12 layers in each one). Distributing grates are positioned between layers. The liquid at the bottom of adsorption chamber 3 is constantly fed by pump 5 to the top of adsorption chamber 10 and then to the top of chamber 3 from the bottom of chamber 10 by pump 11.

The desorbent – p-diethylbenzene – is fed from container 45 by pump 46 to reboiler 47, where it goes to filter 7 after cooling from 191 to 177°C. The desorbent goes into the top of the adsorption chambers through revolving valve 9 for desorption of p-xylene. Some of the desorbent goes out with the product – p-xylene – in the extract line, and the remaining desorbent is removed in the raffinate line.

Raffinate goes from the revolving valve into concentration equalization container 12, then to heat exchanger 16 where it is heated by the desorbent stream at the bottom of raffinate tower 14, and finally enters the top of this tower at 177-190°C. The vapors at the top of tower 14 are delivered to the bottom part of the second raffinate tower 17.

Each raffinate tower consists of upper and lower sections. The temperature in both columns is maintained by “hot stream” feed. The water, benzene, and toluene vapors from tower 17 are condensed in air condenser 19. The condensate enters reflux container 20 where it is separated into water and raffinate.

The raffinate from tower 17 is pumped by pump 22 through heat exchanger 23 for heating the feedstock and condenser 24 to an isomerization unit or tanks. The bottom product from tower 17 is pumped by pump 18 to the top of tower 14 as circulating reflux stream. The bottom product of tower 14 – desorbent – is

Fig. 1. Diagram of the p-xylene production plant: 1) feedstock tank; 2, 5, 8, 11, 15, 18, 21, 22, 27, 31, 36, 39, 40, 43, 46, 50, 53, 56, 58) pumps; 3, 10) adsorption chambers; 4, 6, 16, 23, 26, 33, 47) heat exchangers; 7) filter; 9) revolving valve; 12, 25) desorbent concentration equalization vessels; 13, 32, 51) tubular furnaces; 14, 17) raffinate towers; 19, 29, 37) air cooler condensers; 20, 30, 38) reflux tanks; 24, 34, 41, 48, 59) water coolers; 28) extract tower; 35) p-xylene final treatment tower; 42) reboiler; 44) desorbent treatment tower; 45) desorbent vessel; 49) desorbent repeat treatment tower; 52) flare tank; 54) desorbent collection tank; 55, 57) fresh desorbent tanks; *) feedstock; II) raffinate for isomerization; III) water; IV) wastewaters; V) toluene from plant; VI) steam; VII) p-xylene; VIII) chemically treated water; IX) resins; X) release to flare; XI) collection from desorbent collectors.