PYROLYSIS ANALYSIS OF OIL RAW MATERIALS

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Abstract. *This article talks about the pyrolysis process and its mode of operation, as well as newly synthesized substances. The thermal stability of the obtained substances was analyzed. The structure of the pyrolysis apparatus and the main steps performed in it are shown.*

Keywords: *cracking, n-butylene, pyrolysis, tar, reaction, technology, kotyolutilizer, scrubber, column, separators, coolers.*

Thermal cracking of raw materials in the form of oil and gas, another form is called pyrolysis, it is a form of thermal cracking carried out at high temperature. In order to obtain a large number of unsaturated hydrocarbon gases, the process is mainly carried out at temperatures from 670^0C to 1200^0C. A pyrolysis unit is also commonly referred to as a primary ethylene recovery unit. The process can be directed to the maximum output of propylene, butadiene and acetylene. Along with pyrolysis gases, a small amount of liquid product - tars is formed. The composition of resins is mainly a large number of monocyclic (benzene, toluene, xylenes) and polycyclic (naphthalene, anthracene, etc.) aromatic hydrocarbons. Ethylene polymers obtained by pyrolysis, ethyl alcohol and ethylene oxide are sent to production. The propylene produced in the process is mainly used in the production of polypropylene, acrylonitrile and butadiene. Hydrocarbon gases, light gasoline fractions, gas condensates, catalytic reforming raffinates, kerosene and gas oil fractions serve as raw materials of the pyrolysis process. In recent years, research has been conducted on the pyrolysis of oil and oil residues. The purpose of pyrolysis is determined by the selection of process raw materials. The output of pyrolysis products depends on the quality of raw materials and the technological mode of the device. In the pyrolysis of ethane, the amount of ethylene output is high. As raw materials become heavier, ethylene output decreases, and at the same time, pyrolysis tar and coke output increases. By increasing the process temperature and reducing the reaction time, the yield of ethylene increases. In order to increase the yield of unsaturated hydrocarbons and reduce the formation of coke, various additives are added to the reaction mixture, for example: steam, hydrogen, methane or hydrogen-methane mixture.

There are various well-known options for pyrolysis: with a solid heat carrier, in superheated water vapor, in electric discharge tubes, in voltage arcs, Pyrolysis in tubular furnaces is widely used in the catalyst system and in industry. The main products of modern pyrolysis devices are 99.9% (wt.) pure ethylene, 99.9% (wt.) pure propylene, butane-butadiene fraction with 30–40% (wt.) butadiene, 25–30% (wt.) isobutylene and 15–30% (wt.) n-butylene and pyrolysis tar. Pyrolysis tar is fractionated according to various options, that is, aromatic hydrocarbons, gasoline and residue are extracted from it. When ethane and propane are pyrolyzed, research results show that increasing the pressure actually increases the yield of liquid polymers formed from unsaturated gaseous reaction products. The amount of methane in the initial raw material has a positive effect according to the analysis of pyrolysis results. The construction of pyrolysis furnaces is almost no different from the furnaces used in oil refineries. Vertical ovens with double-chamber, double-heated side screens, and radiant-convection type ovens are widely used. The optimal (optimal) conditions for the pyrolysis process are high temperature during a short collision. The

average time of the product in the reaction zone is 0.7-1.5 seconds. In order to ensure a short-term collision, a high speed of steam movement is required in zmeevik pipes. In ethane and propane pyrolysis, according to practical data, the gas velocity at the entrance to the furnace is 10-17m/s, and at the exit it reaches 150-200m/s. At such a high speed, the pressure difference along the length of the zmeevik should not be large. In a spiral furnace, the pressure difference is usually 0.7–2 at. is In order to reduce the harmful effects of increased pressure, at least 10% by weight of furnace pipes and raw materials. water vapor is supplied. Crude oil pyrolysis in a tube furnace is shown in Figure 1 below. In the cooling of pyrolysis products, one of the important equipment of the device is a heating device, an additional steam generating boiler (kotyolutilizer) and a scrubber. For rapid cooling of pyrolysis products, heated water is supplied to the boiler mixer, which reduces the temperature of the vapors to 400-6000C. Further cooling of the steam is done from an additional steam generating boiler (kotyolutilizer) and water passes through the scrubber. The scrubber consists of two parts, the lower part is without a nozzle, and the upper part is a nozzle. Water is poured into both parts from above, and the pyrolysis cooled to 60-620C comes out from the top of the scrubber, and the tar condensate and water vapor comes out from the bottom. Condensate goes to the separator, tar is separated from the bottom, water from the middle part and light distillate from the upper layer. A circulation system is used for the reuse of distilled water. The constant temperature for obtaining ethylene from ethane in industrial pyrolysis is in the range of 750-800^{0}C.

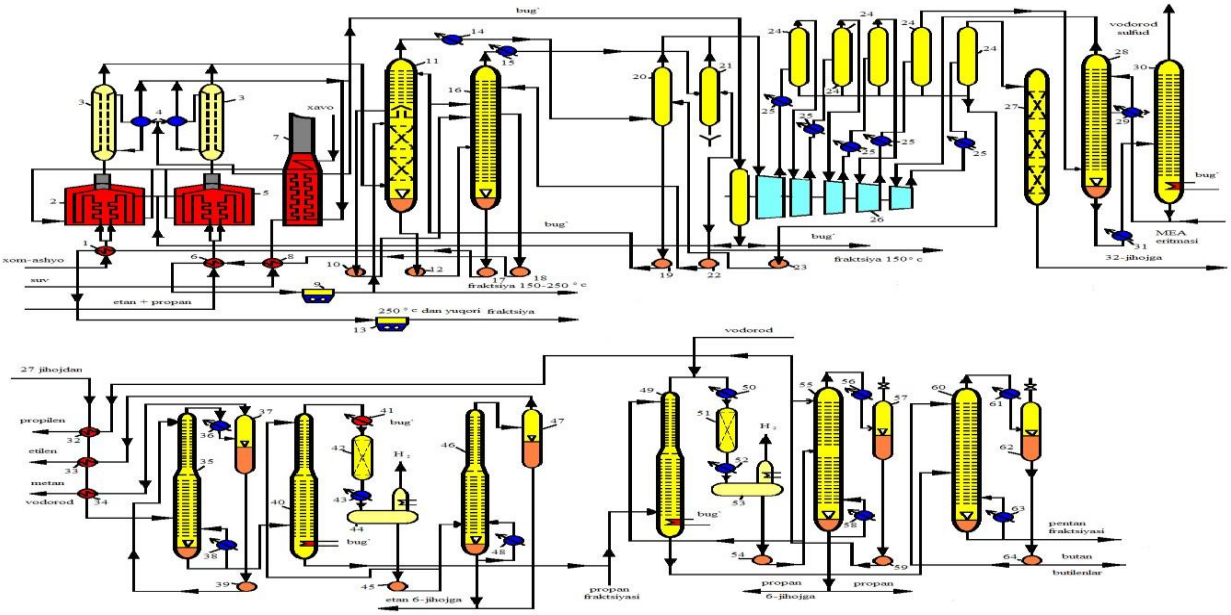

Figure 1. Technological scheme of the pyrolysis device:

1, 6, 8, 32-34 - heat exchangers; 2, 5 - pipe furnaces; 3 – a search device; 7 - suction chimney; 11, 16, 27, 28, 30, 35, 40, 46, 49, 55, 60 - columns; 9, 13 – air coolers; 10, 12, 17-19, 22, 23, 39, 45, 54, 59, 64 – pumps; 14, 15, 25, 29, 43, 52, 56, 61- water coolers; 20, 21, 24, 27, 44, 47, 53 – gas separators; 31, 41, 50 - steam heaters; 26 – turbocharger; 36 – propane cooler; 38, 48, 58, 63 - boilers; 42, 51 – hydrogenation reactors; 57,62 - collectors.

REFERENCES

1. E.A. Bakirov, V.I. Yermolkin, V.I. Larin and dr. Geological oil and gas Uch. Pos. Nedra 1989.
2. V.G. Kanalin, M.G. Ovanesov, V.P. Shugrin. Neftegazopromislovaya geology and hydrogeology Moscow. Nedra 1985.

3. I.X. Abrikosov, S.N. Gutman. Obshaya, neftyanaya and neftepromislovaya geology. Moscow. Nedra 1982.
4. M.A. Zhdanov. Neftegazopromislovaya geology and podschet zapasov oil and gas. Moscow. Nedra 1986.
5. N.G. Sereda, V.M. Muravyov. The basis of the oil and gas industry. Moscow. Nedra 1980.
6. A.V. Mavlanov. Oil and gas field geology. Tashkent 1992.
7. N.A. Sidorov. Drilling and exploitation of oil and gas wells. Moscow. Nedra 1982.
8. V.M. Muravev. Development and operation of oil and gas wells. Moscow. Nedra 1986.
9. Oil and Gas Journal. Tashkent 1997.