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Methods and Importance of Carbon Production

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Abstract: *The characteristics of raw materials, description of the equipment and methodology for conducting experiments, as well as methods for analyzing the porous structure and adsorption properties are presented. The results of assessing the adsorption activity of raw coal for iodine showed that for samples synthesized in an environment of superheated water vapor, this indicator is significantly higher than for samples obtained in a helium environment (32% and 16%, respectively).*

Keywords: *raw materials, carbon black, electrofilter, carbon, carbonization.*

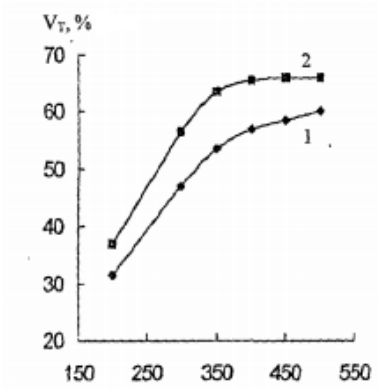
Regularities of the process of obtaining furnace carbon black P701 (N772) with incomplete combustion of natural gas are established. The interrelation of the main technological parameters of the soot formation process with incomplete combustion of natural gas (temperature, contact time) is substantiated, and the conditions for the maximum yield of the product at a fixed value of the carbon black specific surface are determined. The main factors for the use of composite gas-liquid raw materials in a macrodiffusion flame, which ensure the highest dispersion while maintaining a sufficiently high product yield, have been established. The conditions that determine and ensure the necessary fineness of spraying of raw materials are considered[1]. Hydrocarbon pollution of the atmosphere during carbon black production is considered negligible, and therefore its control is not provided. Since it was included in the research program, it was decided to estimate the level of hydrocarbon pollution based on the analysis of exhaust gases, comparing its composition with air quality at sampling points, and subsequent simple calculations. The fact is that the exhaust gases of electrostatic precipitators, i.e. the entire gas mixture, after the separation of carbon black, partially seeps into the air of working areas, changing its composition for the worse. This is obvious, since otherwise there would be no strictly regulated carbon monoxide in the air. Exhaust gas samples were taken from electrostatic precipitators, in parallel with air samples from the working area near the sampling points. Table 2 shows individual data on the composition of exhaust gases in comparison with analyzes of the content of carbon monoxide in the air of the working area at sampling points.

Table 2. The composition of the exhaust gases of electrostatic precipitators (calculation for dry gas)

Date	№	% Exchange									air in working areas
		CO_2	C_2H_4	C_2H_2	H_2	O_2	Ar	N_2	CH_4	CO	mg/m3 at sampling points
	1	4,01	0,15	0,21	17,42	0,86	0,79	66,32	1,32	8,94	81,3
	3	3,94	0,12	0,15	16,78	0,96	0,80	67,09	1,13	9,02	50,7
	4	4,03	0,09	0,18	17,34	1,02	0,79	66,44	1,39	8,72	56,3
	5	4,25	0,15	0,21	16,96	0,90	0,79	66,36	1,51	8,88	49,7
	6	3,80	0,07	0,25	17,71	1,20	0,78	65,79	1,61	8,79	54,7
	8	4,17	0,06	0,10	15,57	1,90	0,81	68,29	0,80	8,31	61,0
	10	3,76	0,07	0,13	15,22	1,99	0,83	69,69	0,99	7,33	49,0
	11	3,95	0,12	0,23	17,54	1,17	0,78	66,19	1,69	8,33	74,3
	12	3,85	0,09	0,17	16,38	1,95	0,80	67,80	1,34	7,62	38,0
	13	3,75	0,10	0,20	16,65	1,95	0,80	67,12	1,41	8,03	71,7

The calculation shows that the concentration of carbon monoxide is 1000-2000 times less in the air of the working area than in the exhaust gases, i.e. when seeping into the atmosphere, carbon monoxide is diluted in the same proportion. From here, it is easy to calculate the concentrations of other gases from the working zones exhausted in the air. In particular, the "increase" in the concentration of CO_2 is approximately 0.003% by volume, which is ten times less than its content in clean atmospheric air. Thus, it is true that gases, in particular saturated and unsaturated hydrocarbons (CH_4, C_2H_4, C_2H_2), whose content in exhaust gases is fractions of a percent, do not significantly affect the air quality of working areas[2].

The presence of PE carbonyl groups determines it's very important property-resistance to light. The initiators of photoaging of PE are hydroperoxides, which are formed during the processing of the primary material in the process of mechanochemical destruction. Their initiating action is especially effective in the early stages of aging, while carbonyl groups have a significant effect in the later stages[3]. This chapter presents the characteristics of raw materials, a description of the equipment and methodology for conducting experiments, as well as methods for analyzing the porous structure and adsorption properties. The results of assessing the adsorption activity of raw coal for iodine showed that for samples synthesized in an environment of superheated water vapor, this indicator is significantly higher than for samples obtained in a helium environment (32% and 16%, respectively). Thus, the effect of superheated water vapor makes it possible to obtain AC instead of raw charcoal already on the stage of carbonization, which is not inferior in adsorption characteristics to industrial AC of the DAK brand. Table 1 illustrates the influence of the carboxylation medium on the formation of a porous structure in the gas-vapor activation process.



Rice. 1 Dependence of the yield of volatiles in various gaseous media on temperature: 1-in a helium environment 2- in a war vapor environment.

The activation temperature corresponded to the conditions for the industrial production of DAU - 8500C. As the data in Table 1 show, the atmosphere of water vapor at the stage of carbonization has a positive effect on the estimated adsorption characteristics of AC. The parameters of the porous structure and adsorption characteristics of AC carbonized in water vapor are significantly higher at low burnout levels compared to samples obtained in an inert helium atmosphere, which on an industrial scale will reduce the material index of production, reduce the ash content and increase the strength of the product.

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