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METHOD FOR OBTAINING CARBON BLACK AND STUDYING ITS ASH CONTENT

ANNOTATION:When producing acetylene, the resulting waste contains low molecular weight substances and salt ions. Salt ions are purified by processing in the form of an aqueous solution with a 5% acid solution. Low molecular weight substances are purified with a 1% surfactant solution. After such processing, carbon black is obtained. The purified substance was dried at a temperature of 120 °C and its ash content was examined according to GOST 55661-2013.

Key words: acetylene, ash content, X-ray diffraction analysis, surfactants, GOST 55661-2013, GOST 25699.8-90, technical carbon.

Introduction. Graphite layers of condensed aromatic systems are usually called basal planes. The distance between the graphite planes is strictly defined and amounts to 0.335 nm. All layers are located parallel to each other. The density of graphite is 2.26 g/cm³ [1]. Unlike graphite, which has three-dimensional order, carbon black has only two-dimensional order. Data obtained by X-ray diffraction show that carbon black consists of well-developed graphite planes located approximately parallel to each other, but displaced with respect to adjacent layers, that is, the carbon black planes are arbitrarily oriented with respect to the normal (Fig. 1.) [2].

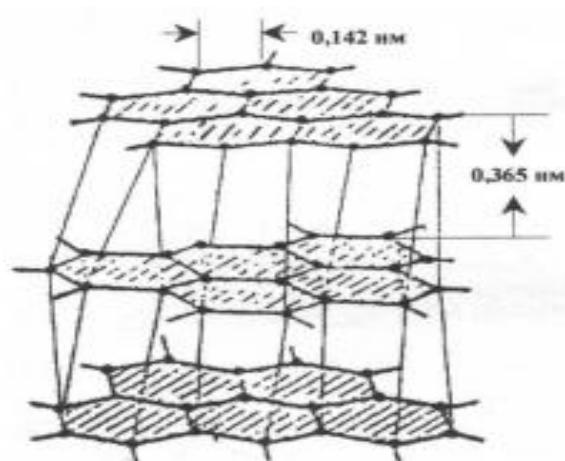


Figure 1. Image of a carbon black plane.

In carbon black, the interplanar distance is greater than that of graphite and amounts to 0.350 - 0.365 nm. Therefore, the density of carbon black is lower than the density of graphite and is within the range of 1.7 – 1.9 g/cm, depending on the grade of carbon black (most often 1.8 g/cm³) [3].

The carbon black lattice becomes similar in appearance to the graphite crystal lattice, although complete analogy is not achieved. Carbon black particles consist of individual primary formations - crystallites. On average, a crystallite includes from three to five layered planes (Fig. 2.). The crystallite, which has four layered planes, consists of 375 carbon atoms. A carbon black particle with a surface area of 100 m²/g contains more than 4000 crystallites. Figure 2 shows a typical crystallite [4].

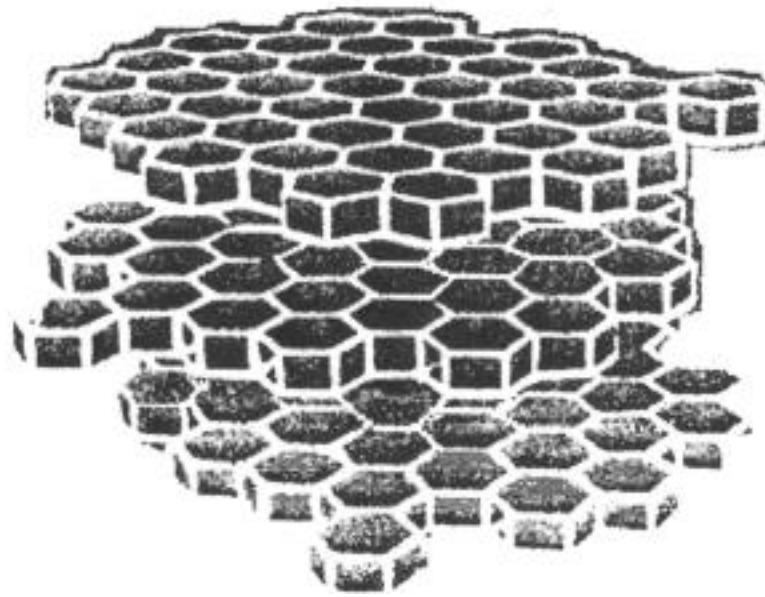


Figure 2. Typical crystallite

According to modern concepts, layered planes of carbon black in a particle are located concentrically near the surface and around it. Particle models carbon black are shown in Fig. 3 [5] .

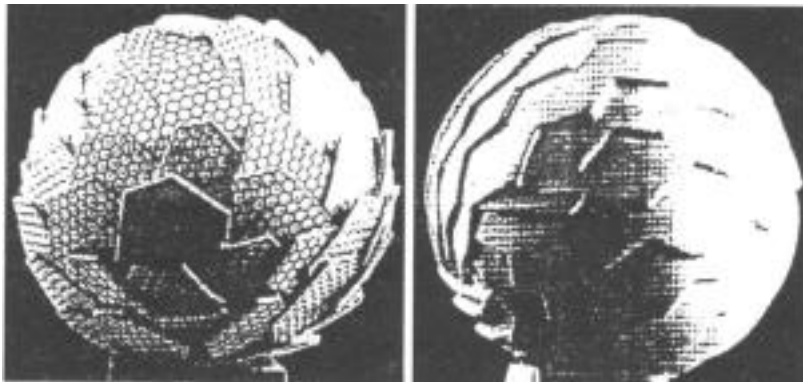


Figure 3. Carbon black particle models

Experimental part. Carbon black, obtained by processing acetylene production waste, contains low molecular weight substances and salt ions. 15% of the salt ions are purified as an aqueous solution. Low molecular weight substances are purified with a 1% surfactant solution, and salt ions are separated with a 5% acid solution. The purified substance was dried at a temperature of 120 °C and its ash content was examined. It has been established that the ash content of carbon black obtained by this method meets the requirements of GOST 55661-2013 and GOST 25699.8-90.

Table 1
Removal of metal ions from raw materials

The name of indicators	Sulfuric acid	Hydrochloric acid	Nitric acid	Orthophosphoric acid	Method tests
Ash content (%)≤,	0.7	1.5	1.7	2.5	ASTM D1506
Iodine absorption value (g/kg)	89	95	98	106	ASTM D 1510

According to the results obtained, the sample obtained from sulfuric acid complied with the ASTM standard D 1506 with the lowest ash content. Our next experiment was to study the ash content of the first dry raw material obtained based on the results of X-ray fluorescence analysis. This is one of the modern spectroscopic research methods for determining the elemental composition of a substance.

Table 2
Results analysis ash content

Analyte	Result	[3-sigma]	Proc.-Calc.	Line	Int. (cps/uA)
Fe	53.092 %	[0.207]	Quan-FP	FeKa	299.4562
Ca	16.998 %	[0.152]	Quan-FP	CaKa	6.6091
S	12.882 %	[0.201]	Quan-FP	S Ka	2.1756
Si	8.559 %	[0.389]	Quan-FP	SiKa	0.2425
Al	2.812 %	[0.619]	Quan-FP	AlKa	0.0238
K	2.197 %	[0.057]	Quan-FP	K Ka	0.5707
Zn	1.158 %	[0.049]	Quan-FP	ZnKa	6.4150
Ru	1.046 %	[0.069]	Quan-FP	RuKa	7.2818
Ti	0.563 %	[0.052]	Quan-FP	TiKa	1.2092
Mn	0.265 %	[0.033]	Quan-FP	MnKa	1.2240
Cu	0.253 %	[0.040]	Quan-FP	CuKa	1.1821
Sr	0.176 %	[0.022]	Quan-FP	SrKa	2.2615

When determining the amount of ash in the feedstock, most of the metal ions correspond to Fe , Ca , S, Si , Al , K. This was studied based on the results of X-ray fluorescence analysis. These metal ions react with acid solutions in different proportions and are separated from the raw material.

Conclusion. Purification of raw materials from low molecular weight substances and metal ions makes it possible to obtain new local carbon black.

References:

1. E. Duck . Plastics and rubber. "Mir", M., 1976. Translation from English.
2. Carbon Black. Science and Technology. (Carbon black . Science and Technology), New York, Basel, Hong Kong. 1993.
3. JB/ Donnet . Du we need more research in the carbon black field? (Is it required to give the latest research in the field of carbon black ?).
4. V. Mendel. (Degussa). Carbon black and aerosil for car repair paints and varnishes. Paint and varnish materials and their application. No. 4, 2003.
5. Ivanovsky V.I. Technical carbon. Processes and devices. Tutorial. Second edition. Revised and expanded. – Omsk: “Printing house BLANKOM”, 2019. – 256 p .