ADSORPTION PROPERTY OF ACETYLENE IN BLACK CARBON

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Abstract: *The black carbon is produced on an industrial scale and is also produced in large quantities as a by-product in the high-temperature processing of carbon sources. It is used in the production of rubber, various cables, ebonite, insulating materials. It is also used in adsorption purification of aqueous solutions, in medicine as a drug to prevent poisoning and as a source of combustion. The composition of the black carbon, especially its properties, varies, and its properties depend on the process of formation of the structure, the raw material, technological processes and temperature*

Key words: *carbon black, isotherma, adsorption heat, entropy, thermokinetics, ion-molecular complexes, water adsorption, adsorptional calorimeter.*

Currently number of developed countries are conducting researchs on the production of sorbents used in the purification and drying of natural gas and petroleum products. In particular, many scientific and practical innovations are being achieved in the production of effective sorbents, investigation of their adsorption and active properties, the carbon black of pores, determination of the number active centers, strength and nature of the adsorption using microcalorimetric device.

In the development of technology for obtaining adsorbents with high adsorption properties it is necessary to solve following problems solutions, including: determination of the nanostructure of adsorbents and analysis of adsorption processes between them; study of the chemical structure of adsorbents using non-polar, polar and aromatic molecules; identification of functional groups in the sorbents, investigation of the thermodynamics of adsorption of ion-molecular complexes formed during adsorption.

On the base of black carbon a broad group of materials, including graphite, coke, pyrocarbon, activated carbon and materials, alloy carbon materials, carbon fibers and composites, fibrous carbon, diamond, intercalated graphite, glass carbon, were elborated. The shift in scientific researchs from graphite, popular in the 1960s, coincided with relatively recently discovered carbon compounds - thermally expanded graphites, fullerenes, single-layer and multilayer carbon nanotubes, and graphene [1], many of which are used as a sorbents in the separation of molecules of different sizes including organic compounds. In addition, as a result of the replacement of active-focused functional groups within the structure, a form that is different in specificity is selected. Therefore there is a growing interest in studying the adsorption and catalytic properties of this types of carbon black. At the same time, small-sized carbon atoms increase the amount of branched chain carbons due to the interconnection of long and thin channels in the structure and their intersections, resulting in a high number of micropores. In particular invertigation of adsorption can explain the reason of presence of such properties in the carbon black as hydrophobic-hydrophilic bifunctionality [2].

Carbon black crystallites as have consisted from 3-5 parallel hexagonal layers. In which slide high chaotically toward each other, forming crystalical irregular three-dimensional structure k. In this case, they are called crystal lattice, two-dimensional synthesis or turbostratic, methods that is, at this these layers are at a certain angle around the vertical axis [3].

Pyrolysis of hydrocarbons results in the formation of carbon black [5]. which also formed during the combustion of hydrocarbon raw materials in furnaces at temperature of ~ 1400 0C at limited air flow.

Carbon black widely used product, has a special surface (1500 m2 / g) and porosity, and widely produced in industry [4], it is used as a conductive filler for various types of batteries and electrodes of condensate [5]. A carbon nanotube is a cylinder formed by a seamless layer of flat hexagonal graphite mesh. The upper ends of the tubes are covered with multi-layered hemispherical caps. Each of their layers consists of pentagons resembling six and half of a fullerene molecule, which in a sense is also reminiscent of part of its carbon black composition.

It is known [6] that carbon nanotubes can absorbite both liquid and gaseous substances. Under the influence of external pressure or owing to capillary forces, the penetrating substances can be placed inside the tube, for example liquids with surface tension less 200 mn / m.

The energy of adsorption interactions is the sum of energies of specific (special-electrostatic polarization, dipole and quadrupole interactions) and nonspecific (non-specific-dispersion) interactions. Adsorption of water vapors is energetically favorable only in the presence of hydrophilic groups (cations, OH-groups, Luce centers) in carbon black. Hydrocarbons are adsorbed nonspecificaly and therefore the presence of strong adsorption centers is not necessary for their adsorption. At present time a main problem is studying the adsorption of various substances on carbon black, which depends on the functional groups presented in the carbon black: anions and cations. Because the distance between the adsorption centers is large, carbon black is very suitable as model for investigation of adsorption properties [7] of subsanus of different nature.

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