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Activated Carbon from Texas Lignite

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Activated carbon has been manufactured from Texas lignite since 1922 at the Darco Corporation plant in Marshall, Texas. Lignite is the principal raw material for making the carbon, although sawdust and charcoal are also used. The plant is well situated with respect to convenient and adequate sources of both the necessary raw materials and natural gas, which is used for fuel.

The daily plant consumption of lignite at the present time is from 100 to 120 tons. Prior to 1931 the lignite was shipped from mines near Alba in Wood County. Since 1931 lignite has been obtained from a locality, now known as the Darco community, 12 miles southwest of the plant site in Harrison County. Mining at Darco has heretofore been underground, but a strip pit mine is now being opened up. While this change in mining methods is being made, lignite is being obtained from Rockdale in Milam County. The lignite bed worked at Darco has an average thickness of about 6 feet. At the site of the proposed open-pit operation, the bed underlies 30 to 40 feet of sand and clays. Former underground mining was at depth of about 80 feet. The full extent of this lignite deposit has not been defined, although large reserves have been proven by test wells and core drilling. This deposit, like those of the Alba and Rockdale localities, lies in the Wilcox group of strata of Eocene age.

Most of the lignite in the Coastal Plain region of Texas is of suitable quality for making activated carbon, with the exception that in some deposits sulphur is present in objectionably high quantities. The lignite used in the Darco plant has an average moisture content of about 31.6 per cent. The dried material contains about 11 per cent ash, 43.5 per cent volatile and combustible matter, and 45.5 per cent fixed carbon. The volatile and ash constituents are waste products of the operation. Attention is being given to possibilities of converting the waste into valuable by-products.

The primary steps in the process of making activated carbon consists of (1) burning the lignite in furnaces; (2) acid-water washing the burned product to remove residue; (3) grinding and air classifying; (4) packaging for shipment. In the course of plant treatment the carbon acquires the highly adsorptive properties which make the finished product an effective filtering agent. The word "activated" is in reference to this adsorptive property. Most of the carbon is marketed in finely powdered form, but some lump material is sold for use in water filtration plants. The powdered grades range from 70 to more than 80 per cent minus 300-mesh particles. Surface adsorption area, and consequently the effectiveness, is increased with increasing fineness of the grind.

Domestic and foreign markets have been established for the finished carbon products, and the demand has increased appreciably during the past decade. The carbon is sold under the trade names "Darco" and "Hydroadarco." Hydroadarco is used in water filtering and purification plants to remove suspended matter responsible for undesirable colors, tastes and odors. Darco is used as an adsorptive medium for decolorizing and purifying various liquids and solutions, including sugars, syrups, edible oils, solvents, chemicals, and pharmaceuticals. An interesting and important application of activated carbon has recently been developed in the manufacture of penicillin. The adsorptive properties of the carbon are utilized to remove the active penicillin ingredients from extremely dilute solutions. The carbon is similarly used in vitamin research. Activated carbon, being an adsorptive agent, does not compete in the markets with carbon black from natural gas which is used almost entirely in rubber goods and pigments.

Lignite deposits are extensively distributed in the Wilcox and Yegua formations (Eocene) of the Texas Coastal Plain region. Development of these deposits has been deterred by the inability of the lignite to compete as a fuel with natural gas which is also abundantly distributed in the same region. The use of lignite as a raw material for useful products, such as is practiced at the Darco activated carbon plant, deserves the attention of public and private research groups interested in utilization of lignite.