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Technology and Costs

TECH 2020S9: Carbon Black

Carbon Black is one in a series of reports published as part of NexantECA's 2020 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

Carbon black is the generic name given to a family of products composed of almost pure elemental carbon. Carbon black is a finely divided pellet or fluffy powder added to a range of materials to improve and enhance physical properties, such as increasing the durability of rubber goods (for example tires), improving the optical properties of pigments and providing electrical properties for use in electrical circuits coatings.

The feedstocks for carbon black are predominantly the residual, viscous, aromatic hydrocarbon oils derived from petroleum refining operations, from the distillation of coal tars and ethylene production throughout the world.

Historically, the bulk of the carbon black production capacity has been located outside of Asia. Over the last five years, the majority of capacity developments have been focused in Asia Pacific, due to the growth in demand and as manufacturers have relocated production to countries with lower operational costs. This trend is projected to continue as manufacturers establish operations closer to major tire manufacturers who have also relocated to, or expanded operations in the region.

Commercial Technologies

There are a number of processes for the manufacture of carbon black, all of which are based on thermal cracking or partial oxidation of hydrocarbon gases or liquids.

- Acetylene-black process (>99 percent purity).
- Bone Black
- Furnace-black process (>97 percent purity)
- Gas Black
- Lamp Black
- Thermal-black process (>99 percent purity)

The most important process in terms of tonnage is the furnace black process, accounting for the majority of total global carbon black production.

Process Economics

A typical world scale plant has multiple production lines, each line containing one or more reactors dedicated to a particular grade or grades of carbon black. The plant produces a mix of carbon blacks including pigment, hard and soft blacks, with individual production volumes that vary according to market demand.

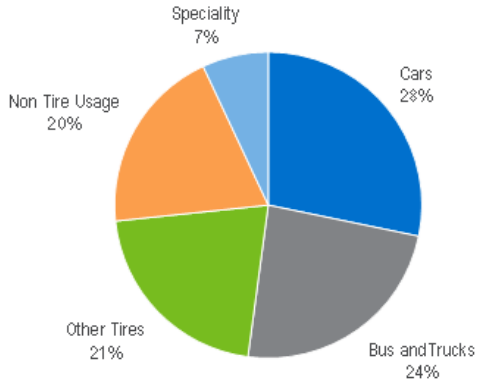
Raw material costs are mainly comprised of the carbon black feedstock oil. The most critical metric for the carbon black manufacturer is the yield.

This TECH report provides detailed cost of production estimates of various grades of carbon grades for plants located in the USGC, China and North Western Europe.

Commercial Overview

The major commercial applications in the global carbon black market is as a reinforcement and performance additive in rubber products, particularly tire components (the treads, inner liners, beads and sidewalls) and industrial rubber goods such as hoses, belts, gaskets etc. Specialty grades are produced for use in coatings, printing and as pigments.

Global Carbon Black Demand by Application



This report provides a global and regional overview of the supply, demand and trade of carbon black and a brief commercial analysis of applications by grade.

For more information. please contact
Technology@NexantECA.com or www.NexantECA.com

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- Chemistry
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- Process economics – comparative costs of production estimates for different technologies across various geographic regions
- Overview of product applications and markets for new as well as established products
- Regional supply and demand balances for product, including capacity tables of plants in each region
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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program, the Biorenewable Insights program (BI), and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

NexantECA serves its clients from over 10 offices located throughout the Americas, Europe, the Middle East, Africa, and Asia.

Americas
Tel: + 914 609 0300
44 S Broadway, 5th Floor
White Plains
NY 10601-4425
USA

Europe, Middle East & Africa
Tel: +44 20 7950 1600
1 King's Arms Yard
London EC2R 7AF
United Kingdom

Asia Pacific
Tel: +662 793 4600
22nd Floor, Rasa Tower I
555 Phahonyothin Road
Kwaeng Chatuchak
Khet Chatuchak
Bangkok 10900
Thailand

For more information. please contact
Technology@NexantECA.com or www.NexantECA.com