We are good in flying starts.

Aviation and space travel, automotive industry, mountain bikes, speedskating, wind power, Formula 1. Nowhere else the speed depends more on weight, material and performance. For several decades, our team is actively working with the impressive chemical compounds of polymers as an initial material for carbon fibers. Therefore, we are able to tailor each planning and start-up of a PAN / Carbon fiber plant to our clients requirements.
PAN and carbon fiber production
Polymerization of Polyacrylonitrile for precursor production and complete infrastructure for carbon fiber factories

With regard to the polymerization, two different processes are generally applied for producing a polyacrylonitrile (PAN) polymer. For the solution polymerization a solvent is used dissolving the monomer but also keeping the polymer in solution. However, the removal of the remaining monomer and undesired side products is complex. The most advantageous alternative is the precipitation polymerization where the monomer acrylonitrile is solved in water and the insoluble PAN polymer is thus precipitating during chain growth.

In water based polymerization a redox system is used to initiate this interfacial process. It is important for the desired polymer properties to ensure the correct reaction temperature and a short polymerization time in order to avoid long- and short-chain branching side reactions. The reaction is carried out in special, multi-stage continuously stirred tank reactors designed by EPC Group.

Since water is used in the liquid phase for dissolving acrylonitrile the need for poisonous, explosive, and inflammable organic liquids used in the solution polymerization process is eliminated and thus environmental pollution will be avoided. Since the radical polymerization never reaches full conversion, the monomers must be removed and recovered. For this purpose EPC offers a suitable stripping column. After the monomer removal the solid polyacrylonitrile will be separated and dried. A subsequent continuously operating spinning solution preparation system with kneading, filtration and degassing steps ensures a high level of consistency and homogenization. This so-called dope is then pumped at a uniform flow rate to the spinning bath of the precursor spinning system, manufactured by Fleissner.

The solvent-water mixture from the spinning bath will be sent to the solvent recovery where water and solvent will be separated. The recovered solvent will be used in the dope preparation again to save operating costs.

Beside the process design and equipment delivery for PAN polymerization plants, EPC Group is offering the complete design of carbon fiber factories including infrastructure, utilities and civil engineering.

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