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COMPOSITE MATERIALS

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Abstract
Chemistry and technology of composite, varnish and rubber materials consists of the creation of composite materials, their composition and effective technology. Chemical technology (high-molecular compounds) covers the areas of technology of high-molecular compounds, production, processing of polymers, polymer composite materials, organization of modern and safe production and management of it in the field of production and technical knowledge.

Keywords: Chemical technology, polymer, plastics, thermosetting plastics, thermoplastics, composite materials and innovative technologies.

Introduction

Composites are engineering materials created by combining different components, such as glass fibers, with a matrix material. They can be several times stronger than the individual materials, offering improved properties such as durability and strength. The direction of the fibers, analyzed using techniques such as finite element analysis, affects the behavior and properties of the material, making them effective in a variety of applications.

In ancient times, people mainly used natural mirror materials (marble, stone, wood, etc.) to build houses. As a result of the development of various industries, the creation of various machines and mechanisms, the need for special materials necessary for their parts increases. On the other hand, research into the creation of mirror materials that meet the requirements of the time has led to the creation of new materials. Figure 1. [1, 2, 3, 4, 5, 6, 7].

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Figure 1. Composite Building Material

Composites can have isotropic or anisotropic properties, depending on the orientation of the constituent materials. They can include continuous fibers, metallic fibers, and other elements to achieve specific performance characteristics. In recent decades, plastics, rubbers, adhesives, composite materials, varnishes and other synthetic materials have been widely used in technology. Plastics are widely used in modern composite materials in technology and construction. The molding temperature of plastics reaches from 200°C (for eloxydidoplasts, etheroplasts) to 250-350°C (for polypropylene, photoplastics).

Composite materials are materials formed from a volumetric compound of chemically different components (mixtures) that interact little with each other, with the components separated from each other by a clear boundary. Since they embody the best properties of each component, composite materials are characterized by indicators that are not unique to any of them. Typically, composite materials consist of a plastic (metallic or non-metallic - inorganic or organic) base or matrix and additives: metal powders, fibers, fibrous crystals, thin fibers, gas, etc. Types of composite materials: fibrous (reinforced with fibers or crystals of threads), dispersed (reinforced with dispersed particles) and layered (pressed or rolled from various materials). Important technological methods for obtaining composite materials: impregnation of matrix material on reinforcing (reinforcing) fibers; molding of reinforcing and matrix tapes in a press mold; cold pressing of components, then welding, spraying of matrix on reinforcement, then clamping; diffusion welding of multilayer tapes of components; rolling of reinforcement elements together with matrix, etc. Polymers are the basis of all materials. Figure 2. [8, 9, 10, 11, 12]

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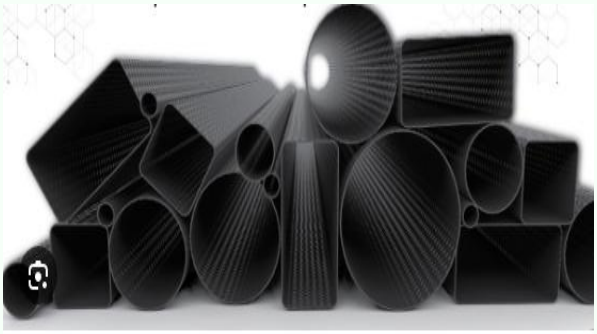

Figure 2. Examples of Composite Materials

Composite materials are made up of:

1. Reinforcement materials: including various types of fibres (e.g. glass fibre, carbon fibre, aramid fibre), particles or fillers that add strength and stiffness.
2. Matrix materials: such as polymers (e.g. epoxy, polyester, vinyl ester), metals (in metal matrix composites) or ceramics (in ceramic matrix composites) that bind the reinforcement materials together.
3. Other components: such as additives, adhesives and natural fibres (in natural composites) that contribute to specific properties and functionality.
4. Key terms: such as fibre orientation, material properties, isotropic and anisotropic behaviour and the number and type of constituent materials used in the composite.
5. Advantages: several times stronger than individual materials, provides tailored material properties and enables the creation of commercial composites for a variety of industries.

Polymers are substances consisting of large molecules of monomer molecules chemically linked into a long linear or branched chain - a large number of links.

Thermosets are plastics that acquire properties that do not change (irreversibly) when hardened. Usually, these plastics have a high modulus of elasticity and low elasticity.

Thermoplastics are plastics that acquire variable properties when hardened. They can be repeatedly liquefied and molded. Usually, the modulus of elasticity of such plastics is low, and the elasticity is high.

The cost of composite materials can vary compared to traditional materials depending on factors such as the type of material, matrix material, fiber orientation,

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and other properties. Although composites may have a higher initial cost due to factors such as continuous fiber reinforcement and specialized manufacturing techniques, they often offer advantages such as significantly greater strength, customizability, and improved performance. Factors such as the popularity of fiber use, fiber strength, and stress-strain ratio also affect cost. The use of organic matrices, natural composites, and metal fiber composites can affect the overall cost and performance of composite materials. [1, 2]

Conclusion:

Currently, composite materials are used in the aviation, aerospace, rocket, automobile, mechanical engineering, mining, construction, chemical, textile, household, radio engineering, energy and other industries.

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