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MAIN TYPES OF ARTIFICIAL RAW MATERIALS USED IN THE PRODUCTION OF CONSTRUCTION MATERIALS

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Abstract
The rapid development of modern industry and the construction sector has intensified the need for rational utilization of natural resources. Due to the limited availability of natural raw materials, there is an increasing demand for their conservation, recycling, and the development of alternative materials. As a result, the concept of artificial raw materials has emerged and is now widely applied across various industries.
This article presents an overview of artificial raw materials and analyzes their principal physical and chemical properties.

Keywords: Mineral, organic, construction materials, ceramics, glass, industrial waste, efficiency.

Introduction

Mineral Binding Artificial Raw Materials

Mineral binders represent one of the most significant categories of artificial raw materials in construction material production. When mixed with water or exposed to specific environmental conditions, these substances harden and form a solid, stone-like structure. A typical example is cement.
Cement is an artificial binder produced by grinding clinker and adding a controlled amount of modifiers.

Physical properties:
- Powdered form
- High fineness
- Hydraulic hardening capability

Chemical properties:
- Contains calcium silicates and aluminates
- Undergoes hydration reactions when interacting with water
- Exhibits a certain degree of resistance to aggressive environments

Ceramic Raw Materials

Artificial raw materials in ceramic production mainly consist of specially prepared clay mixtures. These materials are shaped and then fired at high temperatures to obtain durable products.

Physical properties:
- Plasticity before firing
- High mechanical strength after firing
- Low water absorption

Chemical properties:
- Based on silicate compounds
- Forms chemically stable structures under high temperatures
- Resistant to corrosion and chemical воздействия

Common ceramic products include bricks, tiles, and sanitary ware.

Glass Raw Materials

In glass manufacturing, artificial raw materials typically include mixtures of quartz sand, soda, and limestone. These components are melted at elevated temperatures to form an amorphous material.

Physical properties:
- Transparency
- Smooth surface
- Brittleness

Chemical properties:
- Chemically inert to most substances
- Impermeable to moisture and gases
- Resistant to aggressive environments

Polymer-Based Artificial Raw Materials

In recent years, the use of polymer materials in construction has increased significantly. These materials belong to the group of organic artificial raw materials.

Physical properties:
- Low density
- Elasticity
- High thermal and electrical insulation properties

Chemical properties:
- Resistant to moisture
- Stable against many chemical agents
- Susceptible to degradation under ultraviolet radiation

Polymer-based materials are widely used in pipes, thermal insulation products, and finishing panels.

Artificial Raw Materials Based on Industrial Waste

From both environmental and economic perspectives, the use of industrial waste in construction is highly important. Such materials include fly ash, slag, and metallurgical by-products.

Physical properties:

- Fine-grained structure
- Lightweight
- Good thermal insulation properties

Chemical properties:

- Rich in silicate and aluminate compounds
- Reacts with cement to form strong structures
- Can be used as an active mineral additive

Conclusion

Artificial raw materials play a crucial role in producing high-quality and competitive construction materials. A thorough understanding of their physical and chemical properties enables optimization of production processes, improvement of product performance, and efficient resource utilization.

The application of artificial raw materials in modern construction continues to expand, contributing to sustainable development, environmental protection, and the implementation of innovative technologies.

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