Успехи химии

Том 94
Номер 5
2025

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Russian Chemical Reviews

Volume 94 Number 5 2025

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Alternative liquid fuels: achievements and prospects **RCR5162**

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The development of alternative liquid fuels based on renewable and secondary carbon-containing feedstocks is of strategic importance due to increasing shortage of fossil resources and more stringent environmental requirements. This review analyzes the current state of research in the field of alternative liquid fuels for engine and power systems. The most significant achievements and limitations that hinder the extensive practical use of biofuel compositions are outlined. The nomenclature of raw materials is defined. The requirements to the main properties of the components of alternative liquid fuels are formulated. The most promising production processes are characterized. The possibility of integration of hybrid engineering solutions at existing plants is substantiated, considering multicriteria selection of components and catalysts, which opens up new prospects for the development and scaling of sustainable fuel systems. The technical, economic, and environmental features of the thermal conversion of fuels in engine and power systems are identified.
Bibliography — 410 references.

Structural metal alloys: towards environmentally friendly materials **RCR5165**

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In today's world, environmental issues are becoming more and more pressing. The manufacture of structural materials such as metals, concrete, ceramics, and composites has a considerable impact on the environment. Therefore, the development and improvement of methods that minimize the adverse environmental impact and design of more sustainable production processes are fairly relevant. Currently, the concept of nature-inspired materials has been elaborated. A number of such materials have been already developed and some are being developed now. This review addresses, for the first time, the current state of research in the development of nature-inspired and safe materials based on titanium alloys and steels.
Bibliography — 144 references.

Catalysts for hydrodechlorination of chlorine-containing polymers and organic waste RCR5166

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The interest in hydrodechlorination (HDC) as a safe way to convert waste into high added value products is due to the significant amounts of chlorine-containing polymers in industrial and household waste plastics, a wide variety of liquid chlorine-containing wastes and their high environmental toxicity. The review analyzes the composition of chlorine-containing waste, including liquid products of pyrolysis, hydrocracking and hydrothermal treatment of polyvinylchloride and mixed waste plastics containing chlorinated polymers. The distinctive features of the HDC process are considered in comparison with hydrodesulfurization and hydrodeoxygenation reactions. The achievements of the last 15 years in the field of HDC catalysis are analyzed. Much attention is given to bimetallic noble metal catalysts and catalysts based on transition metal sulfides and phosphides. The prospects of sulfide and phosphide catalysts for processing complex mixtures of heteroatomic compounds, including products of pyrolysis of waste plastics mixtures, pyrolysis of polymer and biomass mixtures, hydroconversion of polymers in oil fractions are shown.
Bibliography — 294 references.