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Russian Chemical Reviews

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Ambient ionization mass spectrometry

665

A.T.Lebedev

Department of Chemistry, M.V.Lomonosov Moscow State University, Russia

Ambient ionization mass spectrometry appeared as a new line of research only 10 years ago and since then, it has become the subject of numerous publications. While maintaining the sensitivity, speed and information capacity of classical mass spectrometric techniques, new methods completely eliminated the laborious sample preparation procedure and triggered the development of miniaturized mass spectrometers to work directly in the field. The theoretical grounds and basic flow charts of ambient ionization methods are considered. Their advantages and drawbacks are considered and prospects of their application in chemistry, biology, medicine and other fields are discussed.

Bibliography — 194 references.

Spatial networks in solutions of worm-like aggregates: universal behaviour and molecular portraits

693

A.I.Victorov, M.A.Voznesenskiy, E.A.Safonova

Institute of Chemistry, Saint Petersburg State University, Russia

The structure, phase behaviour and viscoelastic properties of solutions in which the growth of worm-like aggregates results in the formation of a spatial network are considered. The general regularities of equilibrium and dynamic characteristics of these solutions that do not depend on the molecular nature are considered and the mechanisms of manifestation of chemical individual portraits of particles are discussed. For solutions of worm-like micelles, the achievements of molecular kinetic theory are summarized. The potential applications of systems with controllable viscoelasticity are discussed.

Bibliography — 146 references.

Controlled synthesis of homo- and copolymers based on acrylonitrile upon radical initiation

712

D.F.Grishin, I.D.Grishin

N.I.Lobachevsky Nizhniy Novgorod State University, Russia

Data on controlled synthesis of polyacrylonitrile and acrylonitrile copolymers with other (meth)acrylic and vinyl monomers upon radical initiation and metal complex catalysis are analyzed. Primary attention is given to the use of metal complexes for the synthesis of (co)polymers based on acrylonitrile with specified values of molecular mass and polydispersity in living chains by atom transfer radical polymerization mechanism. The prospects for using known methods of controlled synthesis of macromolecules for the preparation of acrylonitrile homo- and copolymers as carbon fibre precursors are estimated. The major array of published data analyzed in the review refer to the last decade.

Bibliography — 175 references.

Recent advances in the chemistry of Rh-carbenoids: multicomponent reactions of diazocarbonyl compounds

737

J.J.Medvedev, V.A.Nikolaev

Institute of Chemistry, Saint Petersburg State University, Russia

The multicomponent reactions of diazo compounds catalyzed by Rh^{II} complexes become a powerful tool of organic synthesis. They enable three- or four-step processes to be carried out as one-pot procedure (actually as one step) with excellent stereoselectivity to give complex organic molecules including biologically active compounds. This review addresses the recent results in the chemistry of Rh-catalyzed multicomponent reactions of diazocarbonyl compounds with intermediate formation of N-, O- and C=O-ylides. The diastereo- and enantioselectivity of these reactions and the possibility of using various co-catalysts to increase the efficiency of the processes studied are considered.

Bibliography — 120 references.

Ruthenium-catalyzed intramolecular metathesis of dienes and its application in the synthesis of bridged and spiran azabicycles

758

N.Yu.Kuznetsov,^a Yu.N.Bubnov^{a, b}

^a *A.N.Nesmeyanov Institute of Organoelement Compounds, Russian Academy of Sciences, Moscow, Russia*

^b *N.D.Zelinsky Institute of Organic Chemistry, Russian Academy of Sciences, Moscow, Russia*

The review presents a historical excursion into the catalytic alkene metathesis covering the history of the process discovery and studies of the properties, structure and reactivity of the most widely used ruthenium catalysts of metathesis, mechanism of their action and decomposition. The main body of the review is concerned with publications devoted to the preparation of bridged azabicyclic and 1-azaspirocyclic compounds comprising the intramolecular diene metathesis reactions as the key steps. The formation of the bicyclic cage for some natural bridged (cocaine, ferruginin, calystegine, and anatoxin-a) and spiran (pinnaic acids, halichlorine, histrionicotoxin, cephalotaxine) azabicycles and their analogues and compounds with large rings is demonstrated. The methods for the synthesis of the precursor dienes and conditions for the final assembly of bicyclic compounds are considered in detail. The integration of the published data will allow efficient conduction of the process with allowance for its most important features.

Bibliography — 129 references.