

Успехи химии

C. 1204

Perimidine

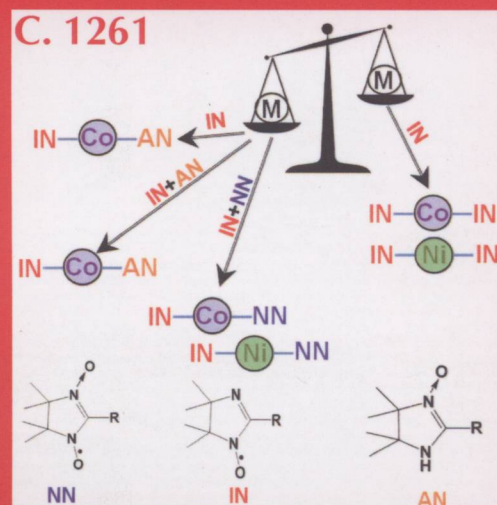
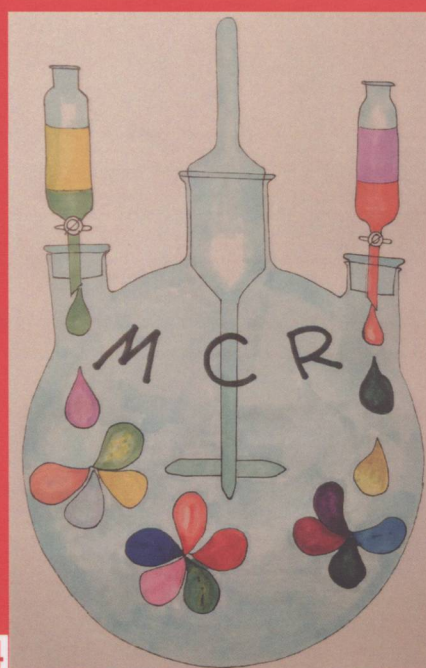
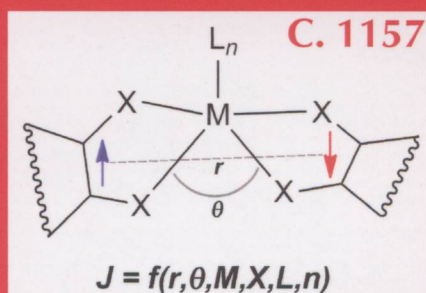
Structure

Physical properties

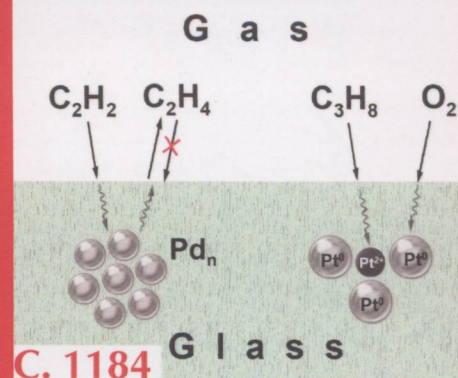
Reactivity

Synthesis

Applications



Catalysis by Pd or Pt clusters
confined in the bulk of glass fiber



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Содержание

И.В.Ершова, А.В.Пискунов, В.К.Черкасов	1157	Комплексы диамагнитных катионов с анион-радикальными лигандами
Б.С.Бальжинимаев	1184	Катализ частицами платины и палладия, стабилизированными в объеме стекловолокнистых материалов
A.F.Pozharskii, A.V.Gulevskaya, R.M.Claramunt, I.Alkorta, J.Elguero	1204	Perimidines: a unique π -amphoteric heteroaromatic system
В.И.Овчаренко, О.В.Кузнецова	1261	Новый метод синтеза гетероспиновых комплексов металлов с нитроксильными радикалами
В.Г.Ненайденко	1274	На пути к молекулярной сложности. Многокомпонентные реакции, включающие пять и более компонентов

Contents

- Complexes of diamagnetic cations with radical anion ligands** 1157
I.V.Ershova, A.V.Piskunov, V.K.Cherkasov
G.A.Razuvaev Institute of Organometallic Chemistry, Russian Academy of Sciences, Nizhny Novgorod, Russia
The review summarizes and analyzes the currently known data on the synthesis, molecular and electronic structure and magnetic properties of bi-, tri- and tetradical complexes containing a diamagnetic metal ion and redox-active ligands in the paramagnetic form. Bibliography 193 references.
- Catalysis by platinum and palladium species confined in the bulk of glass fibre materials** 1184
B.S.Bal'zhinimaev
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The results of studies on the application of silicate glass fibre materials in catalysis are integrated and analyzed. Despite the very low noble metal content, catalysts based on these materials showed exceptionally high activities and selectivities in some catalytic reactions. This is caused by specificity of the glassy state, which makes it possible, first, to stabilize highly dispersed palladium and platinum species in the bulk of glass fibres and, second, selectively absorb polar molecules, thus excluding the undesirable reactions involving non-polar molecules. The size dependences of the extensive oxidation of propane and selective hydrogenation of acetylene, the nature of the structure sensitivity of these reactions, and the reaction mechanisms are discussed. Ways for improving glass fibre catalysts are proposed and examples of successful application of Pt/glass fibre catalysts for purification of industrial gases from volatile organic compounds are given. Bibliography 175 references.
- Perimidines: a unique π -amphoteric heteroaromatic system** 1204
A.F.Pozharskii,^a A.V.Gulevskaya,^a R.M.Claramunt,^b I.AIkorta,^c J.Elguero^c
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Data on the physicochemical characteristics, theoretical calculations, reactivity and synthetic methods for perimidines are summarized. Although perimidine and some of its simple 2-substituted derivatives were obtained by Sachs back in 1909, their chemistry and key physical properties remained unknown until the early 1970s. Subsequent studies revealed many fundamental features of the perimidine system, previously not encountered in the heterocyclic series. The first comprehensive review on perimidines was published forty years ago. The period that has passed since 1980 led to the emergence of new directions and trends. Several hundred new publications have appeared, the generalization of which has become the main purpose of this article. This primarily concerns the obtaining of highly nucleophilic and stable perimidine carbenes, new methods of electrophilic substitution and oxidation, establishment of a close relationship between perimidines and proton sponges, and modern theoretical calculations. Based on perimidines, many different polycondensed systems have been obtained. Applied research has developed especially rapidly in recent years. Many new compounds based on perimidines related to chemosensors, analytical reagents, dyes, metal catalysts, electronic devices, nanotechnology, and medical chemistry have been proposed. Some information under review is presented as Supplementary Materials. It contains six tables, which include data on the basicity constants of perimidines, details of some synthetic methods for perimidines and fused analogs and also a list of biological activities of perimidines. Bibliography 387 references.

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A new approach was developed to synthesize transition metal complexes with nitroxide radicals based on the simultaneous involvement of both nitronyl nitroxide and imino nitroxide in the reaction with metal. It was shown that the reaction of a metal with nitronyl nitroxide can afford a metal complex containing two different radicals in the metal coordination sphere in the case when imino nitroxide is generated in the reaction medium *via* a redox process. The reaction of a metal with imino nitroxide also can afford mixed-ligand complexes, the coordination sphere of which contains both the starting imino nitroxide and its reduction product — the corresponding amidine oxide. This compound can be prepared by an independent synthesis using the reaction of metal with sterically hindered amidine oxide. Mixed-ligand coordination compounds are formed through the coordination of both the starting amidine oxide and its oxidation product — imino nitroxide. In the latter case, the following conditions have to be met: the reaction should be performed in the presence of oxygen and transition metal, which can easily change its oxidation state under ambient conditions (Co^{II}, Mn^{II}, Fe^{II}). To synthesize mixed-ligand complexes with transition metals, which are not prone to change its oxidation state under ambient conditions (Ni^{II}, Zn^{II}), a specially prepared mixture of nitronyl nitroxide and imino nitroxide should be added to the reaction mixture. It is worth noting that the reaction can be performed using nitronyl nitroxide and imino nitroxide belonging different series, which significantly widens the scope of the method. Bibliography — 156 references.

Access to molecular complexity. Multicomponent reactions involving five or more components

1274

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The evaluation of the significance of a chemical transformation addresses many factors, including such important characteristics as the number of chemical bonds formed in one step, the reaction time, labour intensity, the cost of reactants and catalysts and so on. The amount of waste produced in the reaction has also gained increasing importance in recent years. Multicomponent reactions (MCRs) occupy a special place as a synthetic tool in modern organic chemistry. These reactions allow the synthesis of target products with complex structures, minimizing labour costs. This review summarizes the literature on multicomponent reactions involving five or more components. The data in the review are classified according to the number of reactants participating in the reaction and the types of reactions. It is worth noting that in some cases, these transformations can be a part of a domino process, making this classification difficult, if not impossible. The structural diversity of the reaction products greatly increases with increasing number of components involved in the MCR, which becomes virtually unlimited when using combinations of MCRs. This review highlights the main trends of past decades in the field of MCRs. The last two decades have witnessed an explosive growth in the number of publications in this area of chemistry. Bibliography — 309 references.