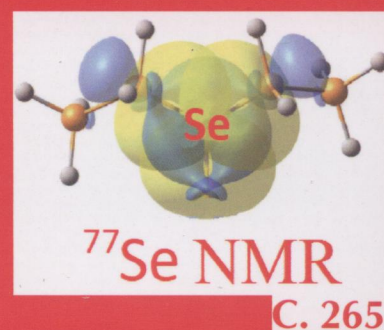
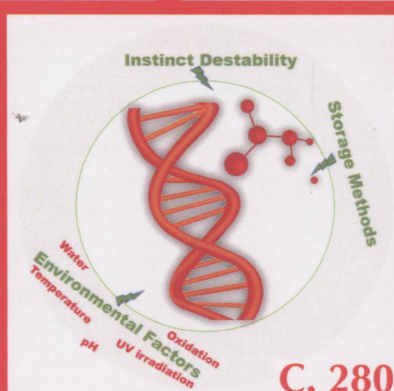
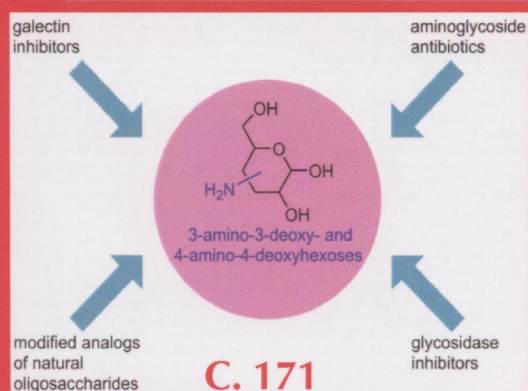
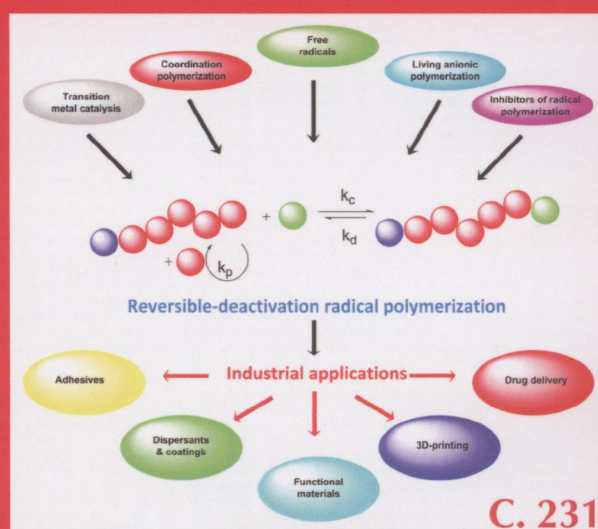
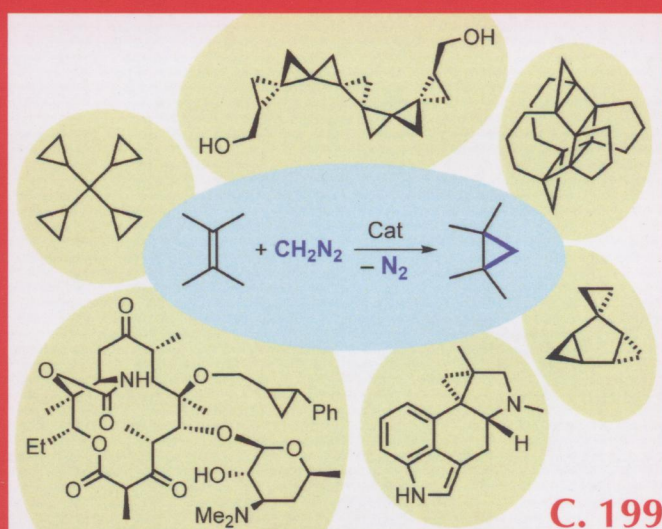


# Успехи химии



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**3-Amino-3-deoxy- and 4-amino-4-deoxyhexoses in the synthesis of natural carbohydrate structures and their analogues** 171

Yu.E.Tsvetkov, O.N.Yudina, N.E.Nifantiev

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The review addresses general methods for the preparation of 3-amino-3-deoxy- and 4-amino-4-deoxyhexoses and their derivatives, including the nitromethane condensation, reduction of 3- and 4-hexosulose oximes, epoxide opening under the action of azide ions and nucleophilic substitution of sulfonates. An account is given of the application of this type of amino sugars in the synthesis of natural carbohydrate compounds and their analogues, including aminoglycoside antibiotics, glycosidase inhibitors, substrate analogues, inhibitors of enzymes involved in glycan biosynthesis, inhibitors of galectins and so on. Bibliography — 89 references.

**Recent advances in the catalytic cyclopropanation of unsaturated compounds with diazomethane** 199

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The main achievements and development trends of the past 10–15 years in the field of catalytic cyclopropanation of unsaturated compounds with diazomethane are integrated and analyzed. The attention is focused on the most efficient catalysts based on palladium compounds. Data on the effects of substrate structure and nature of catalyst components on the regio- and stereoselectivity of these reactions are systematized. Characteristic features of safe methods for diazomethane generation are considered, including the use of membrane technologies and in-flow and *in situ* preparation methods, which have prospects for industrial application.

Bibliography — 281 references.

**Modern trends in controlled synthesis of functional polymers: fundamental aspects and practical applications** 231

D.F.Grishin, I.D.Grishin

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Major trends in controlled radical polymerization (CRP), the most efficient method of synthesis of well-defined homo- and copolymers with specified parameters and properties, are critically analyzed. Recent advances associated with the three classical versions of CRP, *viz.*, reversible inhibition, degenerative transfer and atom transfer in the presence of metal complexes, are considered. Particular attention is paid to the prospects for the application of photoinitiation and photocatalysis in CRP. This approach, which has been intensively explored recently, brings synthetic methods of polymer chemistry closer to the light-induced processes of macromolecular synthesis occurring in living organisms. Examples are given of practical application of CRP techniques to obtain industrially valuable, high-tech, high-molecular-mass products.

Bibliography — 429 references.

L.B.Krivdin <sup>a, b</sup><sup>a</sup> *A.E.Favorsky Irkutsk Institute of Chemistry, Siberian Branch of the Russian Academy of Sciences, Russia*<sup>b</sup> *Angarsk State Technical University, Russia*

This review aims to highlight significant progress in the calculation of  $^{77}\text{Se}$  NMR chemical shifts and spin-spin coupling constants involving selenium substantiated with a vast amount of experimental data. The material is arranged in two basic sections: the first one dealing with the calculation of  $^{77}\text{Se}$  NMR chemical shifts and the second one dealing with the computation of spin-spin coupling constants involving  $^{77}\text{Se}$  nucleus, namely  $^{77}\text{Se}-^1\text{H}$ ,  $^{77}\text{Se}-^{13}\text{C}$  and  $^{77}\text{Se}-^{77}\text{Se}$  together with some more exotic types of couplings,  $^{77}\text{Se}-^{15}\text{N}$ ,  $^{77}\text{Se}-^{19}\text{F}$ ,  $^{77}\text{Se}-^{29}\text{Si}$  and  $^{77}\text{Se}-^{31}\text{P}$ . A special attention is focused on the stereoelectronic effects involving selenium atom and their manifestation in the  $^{77}\text{Se}$  NMR spectra of organoselenium compounds studied with the aid of the modern calculation of  $^{77}\text{Se}$  NMR parameters in combination with experimental results.

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### Preservation of DNA for data storage

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The preservation of DNA has attracted significant interest of scientists in diverse research fields from ancient biological remains to the information field. In light of the different DNA safekeeping requirements (*e.g.*, storage time, storage conditions) in these disparate fields, scientists have proposed distinct methods to maintain the DNA integrity. Specifically, DNA data storage is an emerging research, which means that the binary digital information is converted to the sequences of nucleotides leading to dense and durable data storage in the form of synthesized DNA. The intact preservation of DNA plays a significant role because it is closely related to data integrity. This review discusses DNA preservation methods, aiming to confirm an appropriate one for synthetic oligonucleotides in DNA data storage. First, we analyze the impact factors of the DNA long-term storage, including the intrinsic stability of DNA, environmental factors, and storage methods. Then, the benefits and disadvantages of diverse conservation approaches (*e.g.*, encapsulation-free, chemical encapsulation) are discussed. Finally, we provide advice for storing non-genetic information in DNA *in vitro*. We expect these preservation suggestions to promote further research that may extend the DNA storage time.

Bibliography — 99 references.