



К 80-летию профессора Бориса Дмитриевича Берёзина

Дорогой читатель!

Этот выпуск журнала «Макрогетероциклы» посвящен 80-летию юбилею академика Российской академии естественных наук профессора Бориса Дмитриевича Берёзина – основателя Ивановской научной школы порфиринов и фталоцианинов. Трудно переоценить научный вклад Бориса Дмитриевича в изучение координационной химии этих важнейших классов макрогетероциклов и его заслуги в организации их широких систематических исследований.

Первая научная статья Б.Д. Берёзина появилась в 1954 году,^[1] когда он был ещё студентом Ивановского химико-технологического института. Продолжив обучение в аспирантуре под руководством проф. К.Б. Яцимирского он выполнил цикл исследований в области меркуриметрии.^[2,3] А уже в 1959 году Б.Д. Берёзиным были опубликованы первые результаты исследований комплексов фталоцианинов.^[4] С тех пор им было опубликовано более 620 экспериментальных статей и 44 обзора (главным образом в ведущих отечественных академических журналах) – большинство по химии порфиринов и фталоцианинов. Изучение комплексов фталоцианинов стало темой его докторской диссертации.^[5] Б.Д. Берёзин – автор научной монографии «Координационные соединения порфиринов и фталоцианина»,^[6] соавтор монографии «Металлопорфирины»,^[7] а также монографий по сольватоккомплексам переходных металлов^[8] и реакциям диссоциации комплексных соединений.^[9] Он был вдохновителем издания 2-х томника по синтезу, строению, свойствам и применению порфиринов^[10] и соавтором еще нескольких коллективных монографий по фталоцианинам,^[11] порфиринам,^[12] проблемам химии растворов^[13] и биологически активным соединениям.^[14] Им получено 39 авторских свидетельств на изобретения и патентов.

Иллюстрацией плодотворной деятельности Бориса Дмитриевича как научного педагога является обложка этого номера журнала, рисунок на которой составлен из фотографий большинства из учеников – всего им было подготовлено 70 кандидатов химических наук, из которых 13 стали впоследствии докторами наук.

Нельзя не отметить и активную деятельность Б.Д. Берёзина по проведению всесоюзных и международных конференций по химии порфиринов и их аналогов (см. посл. стр. обложки). Он являлся председателем оргкомитета шести из этих конференций, а также XIV и XIX Чугаевских совещаний по химии координационных соединений (1981 и 1999 гг.), III конференции по макроциклам (1988), I конференции по биокоординационной химии (1994). С 1985 года действует организованный Б.Д. Берёзиным Всероссийский семинар по химии порфиринов и их аналогов (состоялось 30 сессий).

Dedication to Professor Boris Dmitrievich Berezin on Occasion of his 80th Birthday

Dear Reader!

This special issue of the journal “Macroheterocycles” is dedicated to Academician of Russian Academy of Natural Sciences Professor Boris Dmitrievich Berezin – the founder of Ivanovo scientific school on porphyrins and phthalocyanines – on the occasion of his 80th birthday. It is difficult to overestimate the scientific contribution of Boris Dmitrievich in coordination chemistry of these extremely important classes of macroheterocycles and his services to organisation of their wide and systematic research.

The first scientific paper of B.D. Berezin appeared in 1954,^[1] when he was the undergraduate student at Ivanovo Institute of Chemical Technology. As a post-graduate student under the supervision of Professor K.B. Yatsimirsky he made a contribution to the development of the mercurimetry method.^[2,3] And already in 1959 he has published first results of his study of phthalocyanine complexes.^[4] Since then he has published more than 620 experimental papers and 44 reviews (mainly in the leading russian academic journals), most of them are on his research in porphyrin and phthalocyanine chemistry. Study of phthalocyanine complexes became the item of his dissertation for the Degree “Doctor of Chemical Sciences”.^[5] Professor Berezin is author of the scientific monograph “Coordination compounds of porphyrins and phthalocyanine”,^[6] co-author of the popular-science book “Metalloporphyrins”,^[7] and also of the monographs on solvate complexes of transition metals^[8] and dissociation reactions of coordination compounds.^[9] He was inspirer of publication of the 2-volume set on synthesis, structure, properties and application of porphyrins,^[10] and co-author of the several other collective monographs on phthalocyanines,^[11] porphyrins,^[12] problems of solution chemistry^[13] and biologically active compounds.^[14] He has also received 39 invention certificates and patents.

The front cover of this issue illustrates the fruitful activity of Boris Dmitrievich Berezin as a teacher of young scientists – the collage displayed on the cover is composed from photos of his PhD students – he has trained and supervised 70 Candidates of Chemical Sciences (see list below), among whom 13 have later accomplished their habilitation and received the Degree “Doctor of Chemical Sciences” (Dr.Sc.)

One should also mention the activity of Professor Berezin in organisation of the All-Union and International Conferences on chemistry of porphyrins and their analogues (see back cover of this issue). He was the chairmen of the Organising Committees during six of these conferences and also of the XIVth and XIXth Chugaev Conferences on coordination Chemistry (1981 and 1999), III^d Conference on Macrocycles (1988), Ist Conference on Biocoordination Chemistry (1994). Professor Berezin has also organised the All-Russian Seminar on Chemistry of Porphyrins and their Analogues (30 sessions since 1985).

Б.Д. Берёзин – член редколлегии нашего журнала «Макрогетероциклы», а также журнала «Известия высших учебных заведений. Химия и химическая технология».

Много внимания уделяет Борис Дмитриевич научно-методической работе по совершенствованию преподавания химии. Он является соавтором книги «Основные понятия современной химии»,^[15] им написан учебник «Курс современной органической химии».^[16]

Этот специальный выпуск журнала открывается биографическим обзором многогранной научной деятельности Б.Д. Берёзина и составлен из обзорных и экспериментальных статей его учеников, ставших руководителями самостоятельных научных направлений в химии тетрапиррольных макрогетероциклов. В каждой статье дана краткая информация о научной биографии и достижениях учеников Б.Д. Берёзина.

Professor Berezin is a member of the Editorial board of our Journal “*Macroheterocycles*” and also of the Journal “*Izvestia Vysshikh Uchebnykh Zavedenii. Khimiya i Khimicheskaya Tekhnologiya*”.

Professor Berezin gives also considerable attention to science-methodical work in order to improve teaching of chemistry. He is co-author of the book “Main Definitions (Laws) of Modern Chemistry”,^[15] and of the text-book “Course of Modern Organic Chemistry”.^[16]

This special issue of “*Macroheterocycles*” is opened by biographic review of versatile scientific activity of Professor Berezin and is composed from the reviews and experimental articles of his former students, who became now the leaders of independent research directions in chemistry of tetrapyrrole macroheterocycles. In each paper short information is given about academic carrier and achievements of the disciples of professor Berezin.

Первые научные труды и монографии

First scientific works and monographs

1. Berezin B.D., Frolov S.S., Pakshver A.B. *Zh. Prikl. Khim.* **1954**, 27, 907-914. (in Russ.)
2. Berezin B.D. *Study in the field of mercurimetry*. Diss. Cand. Chem. Sci. Ivanovo, **1955**, 142 p. (in Russ.)
3. (a) Yatsimirsky K.B., Berezin B.D. *Zh. Obshch. Khim.* **1956**, 26, 356-365. (in Russ.) (b) Yatsimirskii K.B., Berezin B.D. *Izv. Vyssh. Uchebn. Zaved. Khim. Khim. Tekhnol.* **1958**, 1(2), 43-50; **1958**, 1(4), 35-42; (d) *ibid.* **1958**, 1(6), 28-33. (in Russ.)
4. (a) Berezin B.D. Investigation of metal phthalocyanines in solution. 1. Stability of phthalocyanines of some metal from the middle of the fourth period. *Izv. Vyssh. Uchebn. Zaved. Khim. Khim. Tekhnol.* **1959**, 2(1), 10-14. (in Russ.) (b) Berezin B.D. Investigation of metal phthalocyanines in solution. 2. Acid-base interaction of some metal phthalocyanines in sulfuric acid solutions. *Izv. Vyssh. Uchebn. Zaved. Khim. Khim. Tekhnol.* **1959**, 2(2), 165-172. (in Russ.)
5. Berezin B.D. *Study of physicochemical properties of complex compounds of phthalocyanine*. Diss. Dr. Chem. Sci. Kiev, **1966**. (in Russ.)
6. Berezin B.D. *Coordination compounds of porphyrins and phthalocyanine*. Moskva: Nauka, **1978**, 280 p. (in Russ.) [New York: Wiley, **1981**. 286 p. (Engl. transl.)]
7. Berezin B.D., Enikolopyan N.S. *Metalloporphyrins*. Moskva: Nauka, **1988**, 280 p. (in Russ.)
8. Berezin B.D., Golubchikov O.A. *Coordination chemistry of*

transition metal solvatocomplexes. Moskva: Nauka, **1992**. 236 p. (in Russ.)

9. Berezin B.D., Lomova T.N. *Dissociation reactions of complex compounds*. Moskva: Nauka, **2007**, 278 p. (in Russ.)
10. (a) *Porphyrins: structure, properties, synthesis*. (Enikolopyan N.S., Ed.) Moskva, Nauka, **1985**, 336 p. (in Russ.) (b) *Porphyrins: spectroscopy, electrochemistry, application*. (Enikolopyan N.S., Ed.) Moskva: Nauka, **1987**, 384 p. (in Russ.)
11. *Phthalocyanines: Properties and applications. Vol. 4*. (Leznoff C.C., Lever A.B.P., Eds) New York: VCH Publishers, **1996**, pp.19-77.
12. *Uspekhi khimii porfirinov [Advances in porphyrin chemistry]* (Golubchikov O.A., Edr) S.Peterburg: NII Khim. SPGU, **1997**, Vol. 1; **1999**, Vol. 2; **2001**, Vol. 3; **2004**, Vol. 4. (in Russ.)
13. *Problemy Khimii rastvorov [Problems of solution chemistry]* (Kutepov A.M., Ed.) (a) *Biologically active substances in solutions*. Moskva: Nauka, **1999**. (b) *Concentrated and saturated solutions*. Moskva: Nauka, **2002**. (in Russ.)
14. *Chemical processes with participation of biological and related compounds*. Leiden: Brill, **2008**.
15. (a) Krestov G.A., Berezin B.D. *Osnovnye ponyatiya sovremennoy khimii [Basic definitions of modern chemistry]* Leningrad: Khimiya, **1983**, 96 p. (in Russ.); 2nd corrected Edition, Leningrad: Khimiya, **1986**, 104 p. (b) Berezin B.D., Krestov G.A. *Osnovnye zakony khimii [Basic Laws of Chemistry]* Moskva: Nauka, **1999**, 95 p. (in Russ.)
16. Berezin B.D., Berezin D.B. *Kurs sovremennoi organicheskoi khimii [Course of modern organic chemistry]* Moskva: Vysshaya Shkola, **1999**, 756 p. (in Russ.); 2nd corrected Edition, Moskva: Vysshaya Shkola, **2001-2003**, 768 p. (in Russ.)

Биография

Biography

- **2 July 1929** – born in Ivanovo, USSR.
- **1947-1952** – Study at Ivanovo Institute of Chemical Technology (ICTI).
- **1955** – Candidate of Chemical Sciences (Ph.D), ICTI.
- **1955-1965** – Assistant and associate professor at ICTI.
- **1966** – Doctor of Chemical Sciences (Dr.Sc.), Institute of General and Inorganic Chemistry, Ukrainian Academy of Science.
- **1967-1972** – Professor at ICTI (analytical chemistry).

- **1973-1995** – Head of the Organic Chemistry Department at ICTI.
- **1980-2005** – Head of the laboratory and the department (1981-1989) at the Institute of Chemistry of Non-aqueous Solutions of Russian Academy of Science.
- **1991** – Academician of the Russian Academy of Natural Sciences (RANS). 1995 – Chairmen of Ivanovo Branch of RANS. 2008 – Presidium Member of RANS.
- **1995** onward – Professor at Ivanovo State University of Chemical Technology (organic chemistry)
- **2005** onward – Principal researcher at the Institute of Solution Chemistry of Russian Academy of Sciences.



Студент Ивановского химико-технологического института (ИХТИ), Сталинский стипендиат (1948 год).



Аспирант кафедры аналитической химии ИХТИ (1955 год).



Заведующий кафедрой органической химии Ивановского химико-технологического института (1973 год).



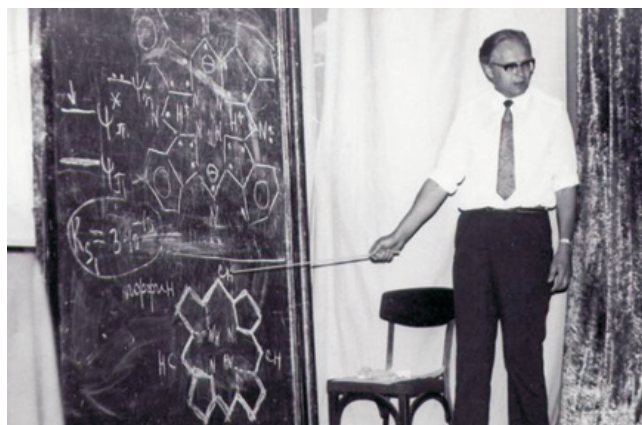
В проблемной лаборатории с о своими учениками Н.И. Сосниковой и О.И. Койфманом (1975 год).



Б.Д. Берёзин читает лекцию по органической химии для студентов ИХТИ (1980 г.)



С женой Розой Алексеевной и сыновьями Михаилом и Дмитрием – будущими докторами наук в области химии порфиринов (1974 год).



«О строении фталоцианина». Лекция на Школе молодых ученых по бионеорганической химии (Алушта, 1975 год).



На 70-летнем юбилее
с женой Розой Алексеевной
(1999 год).



Со своими учениками – докторами химических наук
А.С. Семейкиным, В.Г. Андриановым, О.И. Койфманом,
О.Г. Хелевиной, О.А. Голубчиковым и Т.Н. Ломовой
(1999 год).



Б.Д. Берёзин открывает традиционную 9-ю
Международную конференцию по химии
порфиринов и их аналогов (Суздаль, 2003 год).



С участниками 9-й Международной конференции по химии
порфиринов и их аналогов (Суздаль, 2003 год).



С профессором Дитером Вёрле и О. И. Койфманом
на 4-й Международной конференции по химии
порфиринов и фталоцианинов (Рим, 2006 год).



С наградой Международного общества порфиринов и
фталоцианинов на 4-й Международной конференции по
химии порфиринов и фталоцианинов (Рим, 2006 год).

Награды



Awards

- **1976, 1986** - State Awards the Order "Znak Pocheta" ("Badge of Honour").
- **1979** - Meritorious Science Worker of the Russian Soviet Federal Socialist Republic.
- **1985** - Memorable Medal "Academician Kurnakov"
- **1985** - Memorable Medal "L. A. Chugaev"
- **1986** - Silver Medal of the All-union Exhibition of National Economy.
- **1987** - Laureate of the State Prize of the USSR.
- **1999** – State Award the Medal "Za Zaslugi pered Otechestvom" ("For Merits to Fatherland").
- **2003** - Laureate of the Prize of the Government of Russian Federation in Science and Technics.
- **2006** - Award of the Society of Porphyrins and Phthalocyanines.

Ученики Бориса Дмитриевича Берёзина
– кандидаты химических наук и темы их
диссертаций



PhD Students of Professor Berezin and Titles of
Their Dissertations[§]

1. Smirnova G. I. "Influence of organic solvents on the state of pheophytine in solutions and its reactivity on reactions with metal salts". 1968.
2. Drobysheva A. N. "Investigation of stability of chlorophyll and its metal analogues in solution using kinetic method". 1968.
3. Shormanova L.P. "Synthesis and properties of complex compounds of polymeric phthalocyanine". 1969.
4. Volkova N.I. "Influence of the cation nature and structure of its coordination sphere on kinetics of formation of chlorophyll metal analogues". 1969.
5. **Koifman O.I.** "Influence of the structure of porphyrin molecules on their complex formation ability in reactions with metal salts". 1970.
6. Shlyapova A.N. "Synthesis and catalytic properties of the phthalocyanines of the platinum group metals". 1971.
7. Leonova N.A. "Study of the dye fixation on cellulose fibres in the conditions of thermal method of painting". 1971.
8. Akopov A.S. "Study of physicochemical properties of polymeric and monomeric phthalocyanines of silicon, germanium and cobalt". 1972.
9. **Golubchikov O.A.** "Kinetic regularities of metal porphyrin formation in the individual and mixed solvents". 1974.
10. **Andrianov V.G.** "Study of acid-type ionization of porphyrins". 1974.
11. Karmanova L.P. "Kinetics and mechanism of metal porphyrin dissociation in organic proton-donating media". 1974.

[§] Those who accomplished later also the habilitation and received the Degree "Doctor of Chemical Sciences" (Dr.Sc.) are indicated in bold.

12. **Lapshina O.B.** "Spectroscopy and kinetics of transformation of the enol form of chlorophyll acid and its complexes". 1976.
13. **Lomova T.N.** "Synthesis and study of properties of complex compounds of polymeric phthalocyanines with bridge groups" 1976.
14. Korzhenevsky A.B. "Synthesis and physicochemical properties of tetrapyrazinoporphyrazine and its complex compounds". 1977.
15. Klopova L.V. "Regularities of formation kinetics of the chlorophyll acid complexes in binar solvents". 1977.
16. Karavaeva E.B. "Study of formation conditions, stability and properties of complex compounds of tetraben-zoporphine". 1978.
17. **Kalinnikov Yu.A.** "Study of the state of disperse dyes in mixed solvents". 1978.
18. Golubchikova N.L. "Regularities of formation and some properties of the porphyrin associates". 1979.
19. Koroleva (Ageeva) T.A. "Comparison study of kinetics and thermodynamics of formation of stable and labile porphyrin complexes". 1979.
20. Tsvetkov G.A. "Synthesis and physicochemical properties of the functional derivatives of tetraphenylporphine". 1980.
21. Venediktov E.A. "Influence of the molecular structure on physicochemical interaction of porphyrins and metal porphyrins with molecular oxygen". 1980.
22. Popkova I.A. "Study of regularities of formation of unhydrous sulfonic acids – acid catalysts". 1980.
23. Sviridov A.V. "Influence of the composition, stability of some mixed organic solvates of the cobalt and zinc salts on formation of metal porphyrins". 1980.
24. Bykova V.V. "Study of the influence of azasubstitution in benzene rings on properties of phthalocyanine and its complexes". 1981.
25. Sheinin V.B. "Study of acid-base ionization of some natural and synthetic porphyrins". 1981.
26. Ocheretovyi A.S. "Regularities of sulfonation of aromatic hydrocarbons in the system sulfuric acid – water – sulfonic acid". 1981.
27. Kharitonov S.V. "Synthesis and physicochemical properties of functional derivatives of tetrabenzoporphine". 1982.
28. **Semeikin A.S.** "Synthesis and study of functional derivatives of tetraphenylporphine". 1983.
29. Rashidova S.T. "Processing of chlorophyll from secretions of *bombyx mori* to metal porphyrins and study of their physicochemical properties". 1983.
30. Morozov. V.V. "Synthesis and physicochemical study of the sulfoderivatives of tetraphenylporphine". 1983.
31. **Kazakova I.M.** "Study of stability of the solvatocomplexes of transition metal salts and their coordination ability in reactions with porphyrins". 1983.
32. Kuvshinova E.M. "Influence of the individual and mixed solvents nature on kinetics of the reaction between the cadmium and copper solvatocomplexes and tetraphenylporphyrins". 1983.
33. Bagrovskaya N.A. "Study of the regularities of the hydrolysis reactions of the aromatic sulfonic acids". 1983.

34. **Stuzhin P.A.** "Acid-base and donor-acceptor properties of tetraazaporphine, its functional derivatives and their complex compounds". 1985.
35. Karmanova T.V. "Regularities of extracoordination of nitrogen- an oxygen-containing organic molecules by metal porphyrins". 1985.
36. Surov I.V. "Synthesis and coordination properties of tetra-2,3-pyridinoporphyrazines of the IV group elements". 1986.
37. Kadykov V.V. "State and solubility of manganese, nickel and vanadium acetates in binar organic solvents on the basis of acetic acid". 1986.
38. Milyukova N.P. "Acid-base properties of natural and synthetic porphyrins in non-aqueous solvents". 1986.
39. **Syrbu S.A.** "Elaboration of new methods of synthesis and chemical modification of oxysubstituted tetraphenylporphines". 1987.
40. Berezina G. R. "Synthesis and comparison study of physicochemical properties of conjugated macroheterocycles and their complexes". 1987.
41. Glazunov A. V. "Synthesis, stability and coordination properties of azaporphyrins". 1988.
42. Andrianova L. G. "Synthesis and kinetic stability of the porphyrin complexes with REE in non-aqueous solutions". 1988.
43. Kadykova E. L. "Coordinating ability of bi- and polynuclear solvato complexes of copper(II) and nickel(II) in the reactions of metal porphyrin formation". 1988.
44. Malkova O. V. "Basic ionization of synthetic porphyrins in acetonitrile". 1988.
45. Korovina S. G. "Physicochemical and coordination properties of the linear and cyclophane dimers of tetraphenylporphine". 1988.
46. **Klyueva M. E.** "State in solutions and stability of the complex compounds of manganese(III) with natural and synthetic porphyrins". 1988.
47. Vinogradov S. V. "Solubility of copper(II) and nickel(II) carboxylates in mixed solvents on the basis of carbonic acids and their reactivity in coordination with tetra(p-methoxyphenyl)porphine". 1989.
48. Shushin S. A. "Synthesis and physicochemical properties of the protonated forms of natural and synthetic porphyrins". 1989.
49. Trofimenko G. M. "Thermodynamics of dissolution and solvation of azaporphyrins in organic solvents". 1989.
50. Chizhova N. V. "Reactions of electrophilic substitution in aromatic azaporphyrin macrocycles". 1989.
51. Shchukina M. V. "Solvolysis of the sulfonyl derivatives of arens and porphyrins in sulfuric acid". 1990.
52. **Mamardashvili N.Zh.** "Synthesis, spectral and coordination properties of monomeric and dimeric porphyrins on the basis of β -octaalkyl-*ms*-diphenylporphyrin". 1990.
53. Daniyarov D.D. "Regularities of complexation kinetics between some *d*-metal salts and porphyrins - derivatives of chlorophyll and heme of blood". 1990.
54. Klyuev S.A. "Electron-acceptor properties of the manganese(III) porphyrin complexes". 1991.
55. **Petrov O.A.** "Influence of the solvent nature on formation kinetics of tetraazaporphyrin complexes". 1992.
56. Sokolova T.N. "Synthesis and kinetics of the dissociation reactions in sulfuric acid of sandwich phthalocyanines of the rare earth elements with different structures". 1992.
57. Ivanova Yu.B. "State and chemical interactions if the protonated forms of mesoporphyrin IX d.m.e. in acetonitrile". 1993.
58. Migalova I.S. "Coordination properties of iron complexes of aryl substituted porphyrins". 1993.
59. Timofeeva S.V. "Reaction of sulfonation and conversion of sulfonated derivatives of tetraazaporphine". 1994.
60. Tsvetkova I.V. "Acid-base properties of azaporphyrins in dimethylformamide". 1994.
61. Hamdush Mahmud. "Synthesis, study of structure and properties of the μ -dimers of Fe-porphyrins". 1995.
62. **Berezin D.B.** "Influence of electronic, solvating and steric factors on chromophoric properties of porphyrins and their protonated forms". 1997.
63. Bazlova I.Yu. "Coordination properties of non-symmetrically substituted alkylporphyrins in the dissociation and complexation reactions in acetonitrile". 1998.
64. Gromova T.V. "Properties of porphyrins with chemically active NH-bond". 2000.
65. Mal'chugina O.V. "Metalloorganic metal complexes of porphyrazines". 2001.
66. Simonova O.R. "Acid-base and coordination interactions in solutions of porphine derivatives". 2001.
67. Shukhto O.V. "Peculiarities of the dissociation reactions of Mg, Cd, and Zn complexes with tetra-*tert*-butyl-phthalocyanine and non-traditional porphyrins". 2002.
68. Toldina O.V. "Complex formation of *meso*-substituted tetrabenzoporphyrins with metal salts in organic solvents". 2003.
69. Repina N.V. "Reactivity of functional derivatives of tetraazaporphyrins using manganese complexes as an example". 2004.
70. Osipova G.V. "Reactivity of β -substituted and β,β -annellated porphyrazines in the processes of acid-base interaction". 2005.