

Boris Kamenar*Curriculum vitae*

Dr. Boris Kamenar, professor of inorganic chemistry at the Faculty of Science and a member of the Croatian Academy of Sciences and Arts, was born on February 20th, 1929 in Sušak (Rijeka) where he finished elementary school and then grammar school. In 1953, he graduated from the Department of Chemical Technology of the Technical Faculty, University of Zagreb. In 1953, he founded the Laboratory for Chemical and Mechanical Examinations at the Crane Factory and Foundry »Vulkan« in Rijeka, serving as the head of the laboratory until 1956. From 1956 to 1962, he worked as an assistant in the Department of Structural and Inorganic Chemistry at the Ruđer Bošković Institute. He defended his Ph.D. thesis *Nova metoda za dobivanje čistog silicija i bora* (A New Method for Obtaining Pure Silicon and Boron) at the Faculty of Science in 1960 under the guidance of Professor Drago Grdenić. In 1962, he was appointed assistant professor, in 1966, associate professor and in 1972, he became full professor at the Laboratory of General and Inorganic Chemistry, Faculty of Science. As a member of the Linacre College and a postdoctoral fellow he spent the 1964/1965 academic year in the Chemical Crystallography Laboratory at the Oxford University in the research group of Professor Dorothy C. Hodgkin. In the period 1971/1972, as a Visiting Fellow of All Souls College, he joined the same research team. He was appointed visiting professor three times at two different universities in New Zealand. In 1980, he spent six months at the Auckland University and during the 1989/1990 academic year and for one term of the 1995/1996 academic year he was engaged by the Massey University at Palmerston North.

Boris Kamenar's scientific interest is inorganic chemistry and the X-ray structural analysis of the new inorganic, coordination, and organometallic compounds, as well as compounds of pharmacological importance. Especially noteworthy is his research in preparing pure silicon and boron for semiconductor use and determination of the structures of tin(II), arsenic(III) and antimony(III) compounds to elucidate the function of the unshared electron pair. Furthermore, he has been involved in the synthesis and X-ray structure determination of a large number of mercury compounds and coordination compounds of iron, nickel, copper, niobium and other transition metals. However, he has been mostly engaged in investigations of the molybdenum complex compounds that can serve as models for understanding the struc-

ture and function of molybdenum enzymes and also as catalysts in a vast number of chemical processes. He also undertook to solve the crystal structure of biologically and pharmacologically relevant organic compounds. Mention should be made of his work on the class of new azalide macrocyclic antibiotics (azitromycin) and potential antihyperglycemics from the class of dioxepino-azirines. This research is the result of B. Kamenar's long lasting cooperation with the Research Institute of the PLIVA pharmaceutical company.

Forty-five years of Boris Kamenar's scientific career coincides with the development of the research field to which he has dedicated himself – the X-ray structure analysis. This period was characterized by introduction of new diffraction techniques and computational methods aimed at solving the chemical problems through recognising the molecular structure. Since the time when experimental diffraction data were recorded on photographic film and their relative intensities were measured visually, when structure determination of small molecules, regardless of the heavy atom presence, took a year or more, Boris Kamenar has been one of the structural chemists that witnessed and participated in the developments when automatic diffractometers, electronic computers and new methods of calculation were introduced into determination of molecular and crystal structures.

So far, Boris Kamenar has published 125 original scientific papers in prominent international journals, the most outstanding of them being *Journal of Chemical Society* (London), *Inorganica Chimica Acta*, *Polyhedron*, *Zeitschrift für Kristallographie* and *Acta Crystallographica*, and 19 articles in technical journals and periodicals. During his career he has given 14 plenary lectures at scientific meetings and 23 lectures at foreign universities as invited speaker. With about 210 contributions he attended with his co-workers a large number of domestic and foreign scientific conferences. He participated in organizing several dozens of international and national scientific meetings. He was also invited to write review articles and chapters for books in the area of his scientific interest. Two of them are: C. K. Prout and B. Kamenar, *Crystal Structures of Electron-Donor-Acceptor Complexes* (a chapter in the book *Molecular Complexes*, ed. R. Foster, Paul Enke Scientific Books Limited, London, 1973) and B. Kamenar and B. Kaitner, *The Crystal and Molecular Structure of Oxo-bridged Binuclear Iron(III) Complex Containing the Methoxide Derivative of the Tetrabenzo-[b,f,j,n][1,5,9,13]-tetraazacyclohexadecine* (an article in the book *Structural Studies on Molecules of Biological Interest: A Volume in Honour of Professor Dorothy Hodgkin*, eds. G. Dodson, J. P. Glusker and D. Sayre, Clarendon Press, Oxford, 1981). The former comprises earlier knowledge about the structures of charge-transfer complexes, and the latter offers a complete review of the biologically interesting molecular structures containing an iron-oxygen-iron bridge.

For many years Boris Kamenar attracted a large number of coworkers to different scientific projects. He was supervisor to numerous undergraduate as well as 16 M.Sc. and 12 Ph.D. graduate students, who successfully defended their theses. As a member of the Laboratory of General and Inorganic Chemistry of the Department of Chemistry, he delivered lectures in almost all courses for undergraduate students: General Chemistry, General and Inorganic Chemistry, Inorganic Chemistry, Crystal Chemistry and Inorganic Stereochemistry and the Chemistry of Organometallic Compounds. As part of graduate studies, he taught courses in Modern Methods of Inorganic Chemistry, Selected Chapters of Crystal Chemistry and Single Crystal and Powder X-ray Diffraction.

He has held many different positions at the Faculty of Science and the University of Zagreb. He served as the head of the Chemistry Department in 1965–1966, vice-dean of the Faculty of Science (1968–1970), head of the University of Zagreb Graduate Studies in Chemistry in 1972–1980, dean of the Faculty (1976–1978), and head of the Laboratory of General and Inorganic chemistry of the Faculty of Science (1982–1984). From 1976–1980, he was the president, and in the period from 1980–1982, the vice-president of the Croatian Chemical Society. In 1978, he was elected to chair the European Crystallographic Committee as its vice-president (1978–1981) and president from 1981–1984. Since 1992, he has chaired the Croatian Crystallographic Association. He is a member of the Croatian Chemical Society, Royal Chemical Society (London), American Chemical Society and the European Crystallographic Council and the representative of the Croatian crystallographers in the International Union of Crystallography. He served on the Editorial Board of the *Kemija u industriji* (Chemistry in Industry) technical journal, was assistant editor of the *Godišnjak Jugoslavenskog centra za kristalografiju* (Annual of the Yugoslav Centre of Crystallography) and he has been a member of the Advisory Board of the journals *Croatica Chemica Acta* and *Bulletin of the Chemists and Technologists of Macedonia*. He was awarded the Republic prize Ruđer Bošković (1970), and the City of Zagreb award for scientific work (1980). Since 1975, he was an associate member and since 1991 he has been a full member of the Croatian Academy of Sciences and Arts.

Životopis

Dr. Boris Kamenar, redoviti profesor anorganske kemije Prirodoslovno-matematičkog fakulteta i član Hrvatske akademije znanosti i umjetnosti, rođen je 20. veljače 1929. godine u Sušaku (Rijeka), gdje je završio osnovnu školu i klasičnu gimnaziju. Godine 1953. diplomirao je na Kemijsko-tehnološkom odsjeku Tehničkog fakulteta Sveučilišta u Zagrebu. 1953. godine u Tvornici dizalica i ljevaonici »Vulkan« u Rijeci osniva Laboratorij za kemijska i mehanička ispitivanja i njegovim je voditeljem do 1956. godine. Od 1956. do 1962. godine asistent je Odjela strukturne i anorganske kemije Instituta »Ruđer Bošković«. Doktorirao je 1960. godine na Prirodoslovno-matematičkom fakultetu disertacijom *Nova metoda za dobivanje čistog silicija i bora*, a izradio ju je pod vodstvom profesora Draga Grdenića. Od 1962. godine docent, 1966. izvanredni profesor, a od 1972. redoviti profesor u Zavodu za opću i anorgansku kemiju. Godine 1964/65. kao član Linacre College-a i postdoktorand boravi u Laboratoriju za kemijsku kristalografiju Sveučilišta u Oxfordu u grupi profesorice Dorothy C. Hodgkin, a 1971/72. ponovno je u istoj sredini kao gostujući član All Souls College-a. U tri je navrata gostujući profesor u Novom Zelandu: 1980. šest mjeseci na Sveučilištu u Aucklandu, a školske godine 1989/90. i jedan semestar 1995/96. na Massey sveučilišta u Palmerston Northu.

Područje znanstvenog interesa Borisa Kamenara su anorganska kemija i rentgenska strukturna analiza novih anorganskih i kompleksnih spojeva, organometalnih spojeva i organskih spojeva od farmakološkog značenja. Posebno se ističe njegovo gotovo pionirsko istraživanje čistog silicija i bora za poluvodičku upotrebu, rješenje struktura spojeva kositra(II), arsena(III) i antimona(III) radi utvrđivanja stereokemijske funkcije nepodijeljenog elektronskog para, zatim sinteza i rješenje struktura većeg broja živinih spojeva, te kompleksnih spojeva željeza, nikla, bakra, niobija i drugih prijelaznih metala. Međutim, najveći dio tih istraživanja odnosi se na kompleksne spojeve molibdena koji mogu poslužiti kao modeli za bolje razumijevanje strukture i funkcije molibdoenzima i kao katalizatora u mnogim kemijskim procesima. Ističu se tu i radovi na rješavanju struktura organskih spojeva od biološkog i farmakološkog interesa, posebno novih makrocikličkih antibiotika iz reda azalida (azitromicin) i potencijalnih antihiperглиkemika iz reda dioksepino-azirina. Ova posljednja istraživanja plod su dugogodišnje suradnje B. Kamenara s Istraživačkim institutom PLIVA.

Četrdeset i pet godina znanstvenog rada Borisa Kamenara podudara se s razvitkom područja kojim se bavi – rentgenskom strukturnom analizom. To je razdoblje označilo razvitak difrakcijske tehnike i novih metoda računanja, a sve radi rješavanja kemijskih problema poznavanjem strukture. Od doba kada su se eksperimentalni difrakcijski podaci sakupljali na fotografskom filmu i fotometrirali, a strukture malih molekula rješavale godinu i više dana, i to najčešće ako je kemijski spoj sadržavao teški atom, B. Kamenar pripada generaciji strukturnih kemičara, koja je svjedokom i sudionikom vremena kada se u određivanje strukture molekula i kristala uvode automatski difraktometri, elektronska računala i nove računske metode.

B. Kamenar je do sada objavio 125 znanstvenih radova u svjetski poznatim časopisima, te oko dvadesetak stručnih radova. Ističu se časopisi kao što su *Journal of the Chemical Society (London)*, *Inorganica Chimica Acta*, *Polyhedron*, *Zeitschrift für Kristallographie* i *Acta Crystallographica*. Na znanstvenim je kongresima održao 14 plenarnih predavanja, a na inozemnim sveučilištima 23 pozivna predavanja. Na velikom broju znanstvenih skupova u zemlji i inozemstvu sa suradnicima sudjeluje s oko 210 priopćenja. I sam je organizator više desetaka međunarodnih i domaćih znanstvenih skupova. Pozivan je da iz područja kojim se bavi piše i pregledne članke i poglavlja u knjigama. Treba spomenuti sljedeće: C. K. Prout and B. Kamenar, *Crystal Structures of Electron-Donor-Acceptor Complexes* (poglavlje u knjizi *Molecular Complexes*, ed. R. Foster, Paul Enke Scientific Books Limited, London, 1973), te B. Kamenar and B. Kaitner, *The Crystal and Molecular Structure of Oxo-bridged Binuclear Iron(III) Complex Containing the Methoxide Derivative of the Tetrabenzo-Šb,f,j,nČŠ1,5,9,13Ć-tetraazacyclohexadecine* (članak u knjizi *Structural Studies on Molecules of Biological Interest: A Volume in Honour of Professor Dorothy Hodgkin*, eds. G. Dodson, J. P. Glusker and D. Sayre, Clarendon Press, Oxford, 1981). U prvom je sistematizirano tadašnje znanje o strukturama kompleksa s prijenosom naboja, a u drugom dan cjelovit pregled biološki zanimljivih molekulskih struktura s mostom željezo-kisik-željezo.

Tijekom svih tih godina B. Kamenar je na različitim znanstvenim projektima okupio veliki broj suradnika. Bio je voditeljem brojnih diplomskih radova i mentorom 16 magistarskih i 12 doktorskih disertacija. Predavao je ili predaje mahom sve kolegije Zavoda za opću i anorgansku kemiju: Opća kemija, Opća i anorganska kemija, Anorganska kemija, Kristalokemija i anorganska stereokemija i Organometalni spojevi na dodiplomskom studiju, te Moderne metode anorganske kemije, Izabrana poglavlja kristalokemije i Difrakcija rentgenskih zraka na monokristalnom i polikristalnom uzorku na postdiplomskom studiju.

Na Prirodoslovno-matematičkom fakultetu i Sveučilištu obnašao je velik broj različitih dužnosti: pročelnik Kemijskog odjela (1965/66), prodekan

Fakulteta (1968–70), voditelj sveučilišnog postdiplomskog studija iz kemije (1972–80), dekan Fakulteta (1976–78), te predstojnik Zavoda za opću i anorgansku kemiju (1982–84). Od dužnosti u znanstvenim društvima ističu se: predsjednik (1976–80) i podpredsjednik (1980–1982) Hrvatskog kemijskog društva, podpredsjednik (1978–81) i predsjednik (1981–84) Europskog kristalografskog vijeća, od 1992. predsjednik Hrvatske kristalografske zajednice. Član je Hrvatskog kemijskog društva, Kraljevskog kemijskog društva (London), Američkog kemijskog društva, te Europskog kristalografskog savjeta i predstavnik hrvatskih kristalografa u Međunarodnoj kristalografskoj uniji. Bio je član Savjeta časopisa *Kemija u industriji*, pomoćni urednik *Godišnjaka Jugoslavenskog centra za kristalografiju*, a sada je član savjeta časopisa *Croatia Chemica Acta* i *Bulletin of the Chemists and Technologists of Macedonia*. Dobitnik je Republičke nagrade za znanstveni rad »Ruđer Bošković« (1970) i Nagrade za znanstveni rad grada Zagreba (1980). Od 1975. član suradnik, od 1988. izvanredni, a od 1991. godine redoviti član Hrvatske akademije znanosti i umjetnosti.