Editorial

This issue of Croatica Chemica Acta is dedicated to Boris Kamenar on the occasion of his 70th birthday. Many of his former and present co-workers, colleagues, and friends have contributed papers dealing with the topics related to Boris Kamenar's research. In this way they have expressed their appreciation.

Boris Kamenar has published 125 scientific papers, many of them dealing with X-ray structure determination of transition metal complexes and organic compounds. In addition to his research activities as crystallographer, Boris Kamenar has played a major role in the promotion of X-ray structure determination in Croatia. With his enthusiasm Boris Kamenar has motivated and inspired many of his students and collaborators, who have spread the significance of X-ray structural determination as a powerful, and in many cases irreplaceable, method in many fields of chemistry.

For many years he has been involved in organizing international and domestic scientific, notably crystallographic, conferences and symposia. Boris Kamenar has had responsible duties as a member of national and international chemical and crystallographic societies and institutions. He was two times elected president of the Croatian Chemical Society. His role as a member of the Advisory Board of Croatica Chemica Acta and the Bulletin of the Chemists and Technologists of Macedonia should be pointed out as well. Boris Kamenar has collaborated with many institutions and scientists in Croatia and worldwide. The most fruitful and lasting is his collaboration with the Research Institute of the PLIVA pharmaceutical company, Zagreb, and the Massey University at Palmerston North, New Zealand.

During his career Boris Kamenar has received many honours and rewards for his scientific achievements. In 1970, he received the national science award Ruđer Bošković and in 1980 he was awarded the City of Zagreb Prize for Scientific Work.

We should like to thank the authors for their contributions and we highly appreciate the referees' assistance by making prompt and helpful reports.

Branko Kaitner
Guest-Editor

Nenad Trinajstić
Editor-in-Chief

Foreword

The Editorial Board should be praised for their decision to dedicate this volume of *Croatica Chemica Acta* to Professor Boris Kamenar on the occasion of his seventieth birthday. By this decision he has not only been recognized as an eminent scientist and professor of inorganic chemistry at the Faculty of Science of the University of Zagreb, but scientists all over the world have been attracted to join in the celebration of Kamenar's birthday by sending their communications to *Croatica Chemica Acta*.

The numerous contributions to this volume show that Professor Kamenar is well-known and appreciated as a scientist and as a colleague. To many he has become a dear friend, Boris, over the years of international conferences, visits and correspondence. He is also Boris to his Croatian colleagues, who regard him highly not only for his scientific achievements, but also for his efforts aimed at advancement of scientific research and education in Croatia.

More than forty years have passed since Boris became my assistant in the Ruđer Bošković Institute in Zagreb. I learned to know him as a young man devoted to research either to get at the scientific truth or to advance its application. With his pioneer research on semiconductors in Croatia, the research which was in vogue in inorganic chemistry at the time, Boris acquired his doctor's degree in chemistry from University of Zagreb in 1960. But crystal chemistry was more promising as regards contribution to science. Being familiar with crystallography, Boris quickly got acquainted with crystal structure analysis by X-ray diffraction.

With his first crystal structure determinations, Boris confirmed stereochemical activity of the lone electron pair on the tin and antimony atoms in bivalent tin and tervalent antimony compounds, and started his scientific career. Boris found great pleasure in doing crystal structure analysis by determining interatomic distances, bond angles and coordination polyhedra, thus answering the questions of theoretical chemists. He also determined structural formulae, only upon request of organic chemists.

At that time, many complicated structures became solvable thanks to the progress in X-ray structure analysis, as proved by Dorothy Hodgkin, at whose Chemical Crystallography Laboratory at Oxford University I spent some time in 1955/56.

We in Zagreb wanted to catch up with these new developments, and our Laboratory of General and Inorganic Chemistry of the Faculty of Science was equipped for X-ray structure analysis under my guidance. Dorothy met my wishes and kindly accepted Boris in her Oxford Laboratory in 1964/65 and again in 1971/72. Boris's knowledge and experience from his Oxford years were decisive for the progress of X-ray structure analysis in Zagreb.

A new era in the crystal structure analysis began thanks to the final solution of the phase problem by the so-called direct methods. Their application was made possible by the use of both electronic computers and automatic X-ray diffractometers. For us in Zagreb, the new era began in 1974, when the University gave us a grant to purchase the Philips PW 1100 diffractometer which is still in use. The UNIVAC 1110 of the University Computing Centre that we used at the time is now past. Under Boris's guidance, our laboratory reached the contemporary level of the crystal structure analysis.

Boris successfully participated in my field of research, crystal chemistry of mercury. Mention should be made here of the remarkable structures of three basic mercurous nitrates, which remained unsolved for a long time, and the refinement of the structure of diphenylmercury to $R = 0.023$. It was with diphenylmercury that I began to learn crystal structure analysis in Moscow in 1947 under Professor A. I. Kitaigorodsky.

Among the structures of transition metal complexes, it is important to note the structure of Eschenmoser's pseudo-corrin, solved by Boris and C. K. Prout in Oxford in 1965. Among those solved in Zagreb, the structure of the iron complex with TAAB, a tetradentate macrocyclic ligand, stands out as particularly important. The complex was prepared by Professors D. H. Bush and V. Katović at Ohio State University. It consists of two cores analogous to porphyrin, connected by an Fe–O–Fe bridge, as it was shown by Boris and B. Kaitner in 1981. With its 127 symmetrically independent atoms, it was the largest molecule structurally determined up to $R = 0.048$ in Zagreb until then.

Visits to New Zealand were very important for Boris's scientific and teaching activities. He was guest professor of inorganic chemistry at the University of Auckland (1980), and at the Massey University in Palmerston North on two occasions (1989/90 and 1995/96), where he also took part in structure analysis with Professor T. N. Waters, with whom he had previously worked on the structure of the perchlorate of Eschenmoser's pseudocorrin in Oxford in 1967.

Twenty years ago, with a group of younger people, Boris began working on the synthesis and structure of oxomolybdates. The first group of these compounds belong to mono-, bi- and tetra-nuclear molybdenum(V) com-

pounds with ligands containing oxygen or sulphur as donors. The complexes of this kind were supposed to be the cause of catalytic properties of the so-called molybdoenzymes. Indeed, Boris established that his oxomolybdates containing the Mo–S–Mo bridges had catalytic properties. The octa-nuclear molybdenum(VI) complexes belong to the second group. Among them remarkable for their catalytic properties are those containing vanadium in the oxydation state four or five. Having published about thirty papers on this subject, Boris became one of the leading chemists in this field.

Boris's assistance was valuable in determination of the structural formula of a new antibiotic discovered by chemists in the Research Institute of the PLIVA pharmaceutical factory in Zagreb. By Beckmann's rearrangement of the erythromycin oxime, they obtained a substance that was antibacterially more active than erythromycin itself. By crystal structure analysis, Boris confirmed the supposed expansion of the ring from 14 to 15 members by one nitrogen atom entering into the ring. The complete structural data obtained by Boris and co-workers were more than necessary for PLIVA to register its new semisynthetic antibiotic azitromycin as Sumamed. Four molecules $C_{38}H_{72}N_2O_{12} \cdot 2H_2O$ within the unit cell of a non-centrosymmetric space group, without a heavy atom, are the best evidence of Boris's contemporary achievements in organic chemistry. A huge progress has been made since 1953 when I and A. Bezjak solved the molecular structure of phthalyl urea, the first crystal structure analysis of an organic compound made in Zagreb.

Progress has not been made only in the instrumental and computing facilities, but also in participation of young people. Under Boris's influence many young people have developed an interest in inorganic chemistry and X-ray crystal structure analysis. Our Laboratory has become a school as well as a centre of structural chemistry with a wide reputation. It gives me great pleasure, for this is what I wished for when I founded it in 1952.

Boris has been my devoted and longtime co-worker and fellow scientist; his assistance was equally valuable in research and everything that made research possible, such as taking care of money, equipment, personnel, scientific journals, public relations, all that was needed for the benefit of our Laboratory. With time, Boris became my successor. With great pleasure I am joining in the celebration of his seventieth birthday and wish him many happy returns of the day.

Drago Grdenić