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MEMORABLE DATES

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The Contribution of Professor Esen Bekturov to Physical Chemistry of Polymers

The article is dedicated to the 90th anniversary of Academician Esen Abikenovich Bekturov, a prominent Kazakhstani chemist who has made an outstanding world contribution to the physical chemistry of polymers. His scientific interests focused on the study of water-soluble and water-swelling polymers, interpolymer and polymer-metal complexes, polymeric catalysts and associates, polymeric hydrogels, molecular complexes of polymers, nanomaterials and nanotechnology are summarized in numerous monographs published in Japan, Germany, Poland, and Kazakhstan. The essay briefly reflects the life path, creativity, scientific and pedagogical activity of Professor Esen Bekturov, as well as the most important and prominent publications. His role in the transfer of knowledge, training of high-qualified specialists, his contribution to Research and Development (R&D), recognized by numerous International and Republican awards and participation at International Conferences and Symposiums, are highlighted.

We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time

"Four Quartets"
T.S. Eliot, Nobel Laureate

The Kazakh proverb says: "The deep river flows noiselessly". The life and scientific philosophy of the Doctor of chemical sciences, Professor, Academician of the Kazakh National Academy of Sciences, Laureate of Kazakh State Prize, and Honored science worker of the Republic of Kazakhstan Esen Bekturov fully corresponds to this truth. Professor Esen Bekturov is a well-known specialist in the field of physical chemistry of polymers in the scientific community of Kazakhstan and abroad, an extremely modest and cultured person who sets high moral standards for himself and others, enjoys great authority in his family, among friends, colleagues and disciples. On December 14, 2021, he celebrated his 90th birthday. The winged and sarcastic phrase of the famous physicist, Nobel Prize winner P.L. Kapitsa: "... a scientist after 75 years is idolized, to whom everyone prays", is an exception for Professor Esen Bekturov, who is still active, works for the benefit of his beloved science, generates and distributes fresh ideas, prepares and guides the younger generation for independent Kazakhstan and leads an active lifestyle. Esen Bekturov was born in 1931 in the family of Abiken Bekturov, who later became one of the first founders and academicians of the Kazakh SSR Academy of Sciences and for 20 years was the first director of the Institute of Chemical Sciences (named after A.B. Bekturov in 1991), and followed his father's footsteps.

After graduating from the Faculty of Chemistry of the Kazakh State University in 1954, Esen Bekturov became an aspirant and in 1958 defended his candidate dissertation. His scientific advisor was the Academician of the Kazakh Academy of Sciences, Professor M.I. Usanovich, one of the founders of the acid-base theory.

Esen Bekturov spent his postdoctoral period at the Moscow State University and Institute of Elementoorganic Compounds under the patronage of Academician of the Academy of Sciences of the USSR, Professor V.A. Kargin and Corresponding Member of the Academy of Sciences of the USSR, Professor S.R. Rafikov. Preliminary, Esen Bekturov headed the group, and then in 1966, the laboratory of physical chemistry of polymers at the Institute of Chemical Sciences was organized under the auspice of the founder of the Kazakh school of polymer chemists, Academician of the Kazakh Academy of Sciences, Professor S.R. Rafikov.

The subject of E. Bekturov's doctoral thesis, which he defended in 1972, was devoted to the study of hydrodynamic, conformational and molecular characteristics of amphiphilic polymers in solutions. He summarized these results in the monographs "Ternary Polymeric Systems in Solutions", "Synthetic Water-Soluble Polymers in Solutions", "Catalysis by Polymers", and "Cationic Polymers" published in Kazakhstan, Germany, and Poland [1–7].

In early 1970s, Professor Bekturov's laboratory simultaneously with the research teams of the Moscow State University and Waseda University (Japan) began to develop the still promising scientific direction of the so-called interpolymer complexes as the products of interactions of two complementary macromolecules stabilized by cooperative hydrogen bonds. As a logical continuation of such studies, the complexation reactions of functional polymers with various low- and high-molecular-weight compounds (metal ions, surfactants, dyes, drugs, polyelectrolytes, proteins) were initiated to create effective metal sorbents, metal-supported polymeric catalysts, ion-conductive polymers, composite materials, ultrathin films. Investigations in the field of polymer-polymer and polymer-metal complexes, molecular complexes of polymers, catalysis by polymers and metal-supported catalysts have been published in the books and review articles by Springer-Verlag, Huttig & Wepf in Germany [8–13]. The review article of Professors E. Bekturov and L. Bimendina on Interpolymer Complexes, published in 1981 in the book "Advances in Polymer Science" (Springer), was cited 580 times [3].

In 1986, Professor E. Bekturov and coworkers were awarded by Kazakh State Prize in the field of Science and Technology for the cycle of monographs and books published on water-soluble polymers and their complexes.

At present, the research topics of Professor E. Bekturov cover the stimuli-responsive gels and networks of natural and synthetic polyelectrolytes, polymers for biotechnology, biomedicine, nanotechnology, and environmental protection [14–19].

In Soviet times, despite the existing "Iron Curtain", Professor E. Bekturov took the courage to break "the window to Europe". Due to his deep knowledge of English, he gave plenary and invited lectures at leading scientific Centers and Universities in Japan, Turkey, Germany, Switzerland, Italy, Iran, Canada, and the Czech Republic. Owing to his promotion of the achievements of Kazakh polymer chemists, the Laboratory of Physical Chemistry of Polymers became a "Mecca" for scientists from various regions of Kazakhstan and former Soviet Union countries and was recognized by foreign scientists.

For sixty-five years of scientific activity, Professor E. Bekturov has published about 950 articles and reviews, including more than 100 papers published in English in peer-reviewed journals. He is the author and co-author of 35 books published in Kazakhstan, Russia, Poland, Germany, and Japan, and 20 copyright certificates for patents of the USSR and Kazakhstan.

The transfer of knowledge and experience is one of the Life Credo of Professor E. Bekturov. He trained more than two dozen candidates of sciences and nine doctors of sciences for the Universities, Research Institutes and Industries of Kazakhstan. During 2010–2021 Professor Esen Bekturov gave the lecture courses on "Modern problems of polymer science" and "Physical chemistry of polymers" in English for Master and PhD students of the Abai Kazakh National Pedagogical University [20, 21].

Professor E. Bekturov always pays attention to scientific organizations. For example, he was a permanent member of the International Advisory Board of IUPAC Symposium on Macromolecule-Metal Complexes, the International Symposium on Specialty Polymers. Esen Bekturov's achievements in fundamental science have been recognized by numerous awards and certificates of honor, including the Al-Khorezmi International science and technique festival, the N. Bohr UNESCO gold medal (1997), the Kazakh State stipend for outstanding scientists who contributed to the development of science and technique (2000), Nation-

al Independent Prize “Tarlan” in the nomination of science, K.I. Satpayev Prize for the development of specialty polymers for application in petrochemistry and nanotechnology (2019). According to the Web of Science International Information and Analytical Platform, in 2019, Esen Bekturov, as a professor of the Abai Kazakh National Pedagogical University, was awarded the title “Leader in publishing activities in the Web of Science Core Collection over the past 5 years among pedagogical universities of the Republic of Kazakhstan”. He is Honorary Director of the Institute of Polymer Materials and Technology (1999), Honorary Professor of the Pavlodar State University (2001) and Semey Shakarim University (2005). For his contribution to the development of science in Kazakhstan, he was awarded the Medals “For Labor’s Heroism”, “Labor’s Veteran” and “10 Years of the Constitution of the Republic of Kazakhstan”. In 2018, Al-Farabi Kazakh National University published the book entitled “Өнегелі өмір” (“Exemplary Life”), dedicated to the life and creative activity of Professor Esen Bekturov [22].

The Polymer Society of Kazakhstan, former students, colleagues and friends congratulate Professor Esen Bekturov on his 90th birthday and wish him all the best in his scientific and personal life.

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С.Е. Құдайбергенов

Профессор Есен Бектұровтың полимерлердің физикалық химиясына қосқан үлесі

Мақала полимерлердің физикалық химиясына әлемдік үлес қосқан көрнекті қазақстандық химик, академик Есен Әбікенұлы Бектұровтың туғанына 90 жыл толуына арналған. Оның суда еритін және суда ісінетін полимерлерге, интерполимер және полимер-металл кешендеріне, полимер катализаторлары мен ассоциацияларына, полимер гидрогельдеріне, полимерлердің молекулалық кешендеріне негізделген, наноматериалдар мен нанотехнологияларды зерттеуге бағытталған ғылыми ізденістері Жапония, Германия, Польша және Қазақстанда жарық көрген ғылыми еңбектерде және монографияларда жарияланған. Сонымен қатар, мақалада профессор Есен Бектұровтың өмір жолы, шығармашылығы, ғылыми-педагогикалық қызметі, маңызды жарияланымдары да қысқаша берілген. Ғалымның білім берудегі, жоғары білікті мамандарды даярлаудағы рөлі, ғылыми-зерттеу және тәжірибелік-конструкторлық жұмыстарға (ҒЗТКЖ) қосқан үлесі туралы айтылған, бірнеше халықаралық және республикалық марапаттары, халықаралық конференциялар мен симпозиумдарға қатысқаны атап өтілген.

С.Е. Кудайбергенов

Вклад профессора Есена Бектурова в физическую химию полимеров

Статья посвящена 90-летию со дня рождения академика Есена Абикеновича Бектурова, выдающегося казахстанского химика, внесшего выдающийся мировой вклад в физическую химию полимеров. Его научные интересы, сосредоточенные на изучении водорастворимых и водонабухающих полимеров, интерполимерных и полимерно-металлических комплексов, полимерных катализаторов и ассоциатов, полимерных гидрогелей, молекулярных комплексов полимеров, наноматериалов и нанотехнологий, обобщены в многочисленных монографиях, изданных в Японии, Германии, Польше и Казахстане. В очерке кратко отражены жизненный путь, творчество, научная и педагогическая деятельность профессора Есена Бектурова, а также наиболее важные и значительные публикации. Показаны его роль в передаче знаний, подготовке высококвалифицированных специалистов, вклад в научно-исследовательские и опытно-конструкторские работы (НИОКР), отмеченные многочисленными международными и республиканскими наградами, участием в международных конференциях и симпозиумах.

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