The Chemist's Oath

by Ehud Keinan

Although the COVID-19 pandemic will continue affecting every aspect of our life, it seems that we have crossed the worst phase and have gradually resumed all professional and personal activities of pre-COVID times. International travel is back, and academic activities and scientific meetings are back to in-person mode. I feel fortunate to serve IUPAC as Vice President during this biennium of revamping period. I wish to share my observations and potential opportunities for IUPAC, and I'll appreciate your help and response.

IUPAC's Enthusiastic Volunteers

Following IUPAC Bureau's request to assess how the pandemic affected the Union's activities, our Evaluation Committee conducted a survey in March 2022. As the Committee Chair, I've sent a questionnaire to 425 IUPAC volunteers, including all members of Divisions, Committees, and NAO delegations. The short survey included questions answered by numerical values, allowing for statistical analysis. Remarkably, we achieved a high response rate of over 28% within 24 hours.

The survey results I presented to the IUPAC Bureau and Council this year provided valuable insights. The critical conclusion relates to the apparent change in conference culture. When attending scientific conferences during the pre-pandemic times, most people divided their time between lectures, posters, mingling, networking, social events, receptions, exhibition, and other activities. By contrast, participants of virtual conferences focus on formal presentations. For example, participants of the 2021 IUPAC World Chemistry Congress (WCC) attended lectures, and very few visited the poster sessions. The time-zone variability adversely affected the participants' involvement.

Most survey responders miss the face-to-face interaction, and too many admitted that they may skip the 2023 WCC and Council meetings if held online. Activities of all Divisions and Committees suffered greatly during the pandemic without in-person gatherings. The same trend was observed with most projects whose progress slowed down significantly.

Nevertheless, it was encouraging to see that the volunteers' enthusiasm, motivation, and entrepreneurial spirit remained high. We sensed the desire for increased involvement by young people, as indicated by suggestions to expand their engagement and representation in the Divisions and Committees activities.

Interestingly, we received mainly positive comments when asked about IUPAC. Very few offered some criticism, mainly concerning missed networking and in-person activities. Most people are happy with the Divisions and Committees' activities, the WCC, General Assembly, Symposia, and projects. Many people like IUPAC's global initiatives, such as the Global Women Breakfast, the International Year of Periodic Table, and the Top Ten Emerging Technologies in Chemistry.

COVID taught us a fundamental lesson about the need for personal contacts, which is essential to all our activities. Although IUPAC is a scientific organization, its human component and personal relations are crucial to motivating our thousands of volunteers.

IUPAC Restructuring

The special Council meeting of 4 June 2022 marked a significant milestone in the Union's history. With a sweeping majority, the Council approved the proposed restructuring scheme, which will equip IUPAC with better organizational tools and mechanisms to address our challenges and opportunities in leading the global world of chemistry. It took nearly three years to crystallize the changes to the Statutes, Bylaws, and Standing Orders, first by the IUPAC Organizational Structure Review Group, then by the IUPAC Bureau and the Executive Committee, and finally by the National Adhering Organizations (NAOs).

The key restructuring element was reshaping the Union's leadership Boards, replacing the 103-year-old Bureau and Executive Committee structure with an Executive Board and a Science Board, thus separating administrative matters and science issues.

The Executive Board would be responsible for decisions and execution of the administrative matters of the Union, overseeing adherence to the IUPAC Statutes and Bylaws, and ensuring efficient administrative and financial operations. The Science Board would be responsible for the scientific direction, activities, and contributions of the Union, setting the scientific priorities and strategic vision, facilitating collaboration among the Divisions and Standing Committees, and reviewing their work regarding projects, conferences, and publications.

Another important restructuring element is the establishment of new Forums for communication and interaction with IUPAC's stakeholders. The NAOs Forum is a yearly virtual meeting with NAO representatives to provide an opportunity to discuss matters of interest with IUPAC leadership. The Presidents Forum, an annual

meeting with the leaders of global chemical societies, provides a strategic opportunity for IUPAC to lead and coordinate international initiatives.

Other significant components of the restructuring act are establishing a new Standing Committee on Ethics, Diversity, Equity, and Inclusion (CEDEI) and the Centenary Endowment Board. Altogether, these changes award IUPAC with robust organizational tools that render it more efficient, agile, and fast in responding to challenges and opportunities.

Expanding International Basis

Most global challenges are chemical problems by nature, including climate changes, food for everybody, the race for sustainable energy, water quality, dwindling raw materials, and health problems. Consequently, humankind can meet these challenges through the chemical sciences and global cooperation. Chemists are good at solving complex problems, working together across borders and disciplines despite different political systems and cultural diversity. And IUPAC should take a global leadership position to help meet the global challenges. This is only one of the reasons for why IUPAC should invest much effort in adding less represented countries, mainly in Latin America, Africa, and Asia. Over the past several decades, IUPAC has included primarily the economically and scientifically developed nations. Although the 54 national members represent most of the world's chemical sciences and industry, they constitute only one-quarter of its countries. IUPAC should not stay a club of the wealthy but become more inclusive and take proactive measures to expand its membership worldwide.

The Chemist's Oath

The Hippocratic Oath, taken by new physicians for more than two millennia in a traditional White-Coat ceremony, has become a document of professional ethics that describes a medical doctor's obligations and professional behavior to their patients and society. In its original form, the oath requires a new physician to swear to uphold specific principles of medical ethics, including medical confidentiality and non-maleficence. It is enshrined in the legal statutes of various jurisdictions, such that violations of the oath may carry criminal or other liability beyond the oath's symbolic nature.

As the archaic language of the Hippocratic Oath from circa AD 275 is too long, several new versions have recently become popular in American schools of Medicine. Although the various versions reflect nearly two dozen different values, they all include a commitment to social responsibility, social justice, and essential ethical values. Thus, Hippocrates' legacy endures in most new versions through four fundamental values from the ancient oath: respecting patient confidentiality, avoiding harm, respecting teachers, and upholding the profession's integrity.

I propose considering a Chemist's Oath to be taken by all chemistry graduates worldwide. I wish that all new chemists would pledge to pursue truth and the principles of science and use their power to sustain life rather than end life, *e.g.,* refrain from developing chemical weapons and lethal injections. This pledge stands in line with an Italian Chemical Society initiative of 2007 (https://www.soc.chim.it/sites/default/files/chimind/pdf/2007_5_154_ca.pdf), the Hague Ethical Guidelines of 2016 (https://www.opcw.org/hague-ethical-guidelines), and a set of policy guidelines currently being finalized at IUPAC by the newly established CEDEI.

As is the case for the Hippocratic Oath, the Chemist's Oath would have a moral value rather than a legally binding commitment. It would enhance the newly graduated chemist's ethical behavior and professional pride. The following text of 61 words is my proposed draft of the Chemist's Oath. Believing in collective wisdom, I invite you to offer modifications to the text while keeping it clear and concise.

> *By what I hold most sacred, I solemnly swear that I will pursue scientific truth and expand knowledge ethically and responsibly. I will endeavor to promote diversity, equity, inclusivity, and mutual respect for all. As a member of society at large, obligated to all my fellow human beings, I will use my chemical expertise to sustain life and protect the environment.*

With your help, I wish to crystallize the final version and offer it as an experimental pilot among the 2023 chemistry graduates in one or two countries before proposing it through IUPAC to the global community.

I look forward to serving the global chemistry community at exciting times for IUPAC. I'll appreciate any comments, fresh ideas, and proposals on how to strengthen IUPAC. Please send your messages directly to me at <ekeinan@iupac.org>.

Ehud Keinan has been IUPAC Vice President and President-elect since January 2022. He is a Professor of Chemistry and previous Dean of Chemistry at the Technion – Israel Institute of Technology. Since 2009 he has served as President of the Israel Chemical Society, Editor-in-Chief of the *Israel Journal of Chemistry*, and Head of Israel's delegation to IUPAC. He is a former member of the EuChemS Executive Board, a current member of the FACS Executive Committee, and Editor-in-Chief of the FACS magazine, *AsiaChem*. Since 2008 Keinan has been leading the Chemistry Education in Israel as Chair of the Chemistry Advisory Council at the Ministry of Education.