

and Cheminformatics Data Standards (CPCDS), co-chair of the CPCDS Subcommittee on Cheminformatics Data Standards, and secretary of the InChI Subcommittee. ORCID.org/0000-0003-2968-1674

<https://iupac.org/body/802>

Metrics for Green Syntheses

Green metrics are a relatively new concept in Green Chemistry and a necessary tool. They serve to quantify, in an unbiased way, the efficiency or environmental performance of chemical processes. They also allow practical and effective changes in chemical manufacture to be measured, moving from rough and casual estimation to precision and accuracy. A verifiable and credible claim of the “greenness” of any procedure is, therefore, not absolute, but rather a claim that is comparable by metrics analysis to all prior procedures.

There is a general desire and fashion for chemists to be green, given modern global concerns of climate change and resource scarcity, but there is a confusing multitude of meanings and approaches to issues of green metrics in the scientific literature, both in organic and inorganic chemistry.

The Interdivisional Committee on Green Chemistry for Sustainable Development (ICGCSD) has recently initiated a project on Metrics for Green Syntheses that will be implemented in two phases over time:

The first phase will focus on the production of a survey that will collect the existing procedures and information published in numerous dedicated journals, books, and specialized book series. At a later stage, the second phase will produce guidelines for dealing with metrics limitations and for publishing results.

Many experimental procedures reported in scientific journals claim to be “green.” However, when a careful metrics analysis is applied, many of these “green” procedures are, in fact, not. The fact that these reports are nevertheless published shows the high levels of interest in the topic of “green” chemistry, as well as its current and future importance. However, the current state of casual reporting of greenness based on one or two criteria presents a bewildering and unscientific scenario, particularly for chemists who are genuinely interested in learning about, practicing, and implementing green chemistry principles in their research work. Additionally, there are a multitude of metrics available, often with different names given by different authors, despite having the same meaning.

For these reasons, IUPAC will provide its crucial

support to regulating this pivotal field for chemistry, in order to avoid the creation of misconceptions, fallacies, and abusive advertisements of “greenness” that threaten to discredit this important field of chemistry. IUPAC is the only scientific body that can harmonize the correct application of green metrics analysis in syntheses, because of its worldwide reputation and influence, and its role and responsibility in standardizing nomenclature and terminology in chemistry.

Once guidelines and protocols are sanctioned by a well-known and respectable body of scientists working under the IUPAC umbrella, chemists will be encouraged to submit procedures and experimental protocols following these well-defined guidelines and goals. One of the fields which deserves attention and is not satisfactorily covered by current publications is organic synthesis in connection with environmental protection and sustainability. New reaction pathways and organic and inorganic catalysts involving and including fundamental chemistry are needed, on which future developments in green chemistry can be built and sustained. This represents a very real and modern scientific challenge, and it is necessary to give precise guidelines on synthetic green metrics to avoid misunderstandings and pretentious claims made according to subjective, rather than objective, evaluations.

For more information about this project, please contact the Task Group Chair Pietro Tundo <tundo@unive.it>

www.iupac.org/project/2017-030-2-041

An International Exercise-Based Syllabus in Polymer Chemistry

Textbooks in polymer science are numerous, but they are expensive, err on the side of incorporating surplus content, usually have insufficient problems and worked examples, and fail to follow IUPAC recommendations. This project is intended to augment traditional textbooks and guide educators and learners in their use in the following ways:

(1) By clearly specifying a core syllabus of polymer chemistry topics which we (the IUPAC Subcommittee of Polymer Education) consider to be essential in any undergraduate course in polymer science. This core syllabus will be linked throughout to existing IUPAC documents in polymer science.

(2) By illustrating each of the individual points in this core syllabus with at least one worked example,

and providing a set of problems for each individual point modelled on these worked examples.

(3) By exhibiting best practice in the use of IUPAC recommendations throughout the syllabus and accompanying exercises, providing links to the documents where these recommendations are detailed.

This is an undertaking that is intended to reflect global needs while adhering to IUPAC best practice. The breadth of expertise and awareness of IUPAC recommendations within Division IV's Subcommittee on Polymer Education makes it the ideal body to carry out this work. It is intended that this syllabus will act as a scaffold on which educators can attach topics of particular interest to their audience, and that it will be expanded over time and in subsequent projects, so that it will be a viable replacement for current textbooks.

For more information about this project, please contact the Task Group Chair Christopher Fellows <cfellows@une.edu.au>.

www.iupac.org/project/2017-019-2-400

Essential Tools for Chemistry: A Celebration of IUPAC's Contributions over the Past 100 Years

IUPAC will celebrate its Centenary in 2019. This global community of chemists, who reside within IUPAC's National Adhering Organizations, has a rich history of accomplishments centered on providing a "Common Language for Chemistry." But what does this really mean? How has IUPAC contributed to the enormous advances in the chemical enterprise over the last 100 years? What is the relevance and future role of IUPAC, not only in advancing chemistry and the related sciences, but also in solving the critical challenges facing our planet?

In preparation for the upcoming celebration, IUPAC will step back and take a moment to consider its accomplishments as a global community of chemists working towards a common goal, document those accomplishments for posterity, and envision IUPAC's goals and objectives for the next one hundred years.



One initiative already in progress under the leadership of Laura McConnell will highlight some of the Essential Tools that have been developed by the IUPAC community and examine their relevance, not only to today's scientists, but also to the future of chemistry and to the benefit of society in general.

Each month from January 2018 to December 2019, a story will be posted on IUPAC.org. For this initiative, "Essential Tools" are defined broadly to include the many and diverse initiatives undertaken by the Union. For, while IUPAC was initially established to create a common language for chemistry, the Union's work encompasses the unification of experimental methods and the establishment of standards (including file formats for spectra) and reference materials, recommendations on procedure, safety training, and various educational needs.

Among the "Essential Tools" to be celebrated are:

1) Awards that range from the IUPAC-Solvay International Award for Young Chemists, which supports and encourages young researchers at the start of the scientific career, to the IUPAC Distinguished Women in Chemistry or Chemical Engineering Awards, established to recognize and support the work of outstanding women scientists.

2) International Conferences that not only provide a forum for the free exchange of scientific information, but also contribute to the worldwide understanding and application of the chemical sciences. An example is the International Conference on Green Chemistry, established to advance research for the sustainability of our planet.

3) Chemical Safety and Responsible Care programs for the training of researchers from developing countries so that they can deliver improved environmental, health, and safety programs to their institutions.

4) The Periodic Table, for which IUPAC oversees the confirmation and naming of new elements

5) The nomenclature, terminology, symbols, and standards that serve as the foundation for the common language of chemistry shared worldwide and that are freely accessible to researchers around the globe via the IUPAC Color Books.

As scientists, we know that precision and accuracy are critical for success. In chemistry, unambiguous communication regarding the precise identity and structure of chemicals used in research is a requirement for advancement in the field. So it is fitting that the first Essential Tool to be highlighted is an example of how IUPAC has fulfilled its charter and ensured the unambiguous communication of chemicals among