

The Underlying Foundation of Science Used in the Regulation of Industrial Chemicals

by Joseph Plamondon

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reviewed by Bernard West and
Michael Booth

A new book by Joseph Plamondon presents a survey of the different approaches to regulating chemicals in the United States and Europe, with the occasional comment about the Canadian system. *The Underlying Foundation of Science Used in the Regulation of Industrial Chemicals* compares the U.S. federal government's Toxic Substances Control Act (TSCA) and the European Commission's (EC) Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) legislation.

Plamondon presents the rationale for developing these regulations clearly as a balance of risk versus benefit. The survey of the risk factors and the way in which each jurisdiction handles the risks is explained and is a valuable insight into the different approaches. While he comments on the underlying theory of risk analysis, he does not comment on the bigger political problem of the outrage factor described in Sandman's work.¹ Sandman describes Risk as the Hazard multiplied by Outrage. An equation, which drives the formulation of regulation and the basis for banning products, overwhelming the more logical scientific approach.

The chapter on substance naming conventions is also very thorough and underlines the difference between the U.S. and E.U. approaches, namely that the E.U. relies upon the IUPAC naming conventions and the USA relies upon the Chemical Abstract Services naming. The problems of multiple naming, even within the IUPAC convention, clearly shows that there is a need for a common convention. No doubt this is wishful thinking, as this would reduce the opportunity for playing non-tariff item games in the future.

One common approach that is being pursued is the Simplified Molecular Input Line Entry Specification (SMILES), which is effectively a computer code for a given structure of substance. IUPAC is developing something similar called The International Chemical Identifier (InChI). Again, we need to develop a truly international standard, not a two solitudes approach.

However, an interesting thought about these approaches is that they might be more amenable to dealing with characterizing the sizes and shapes of substances, which will likely be needed for regulation of nanomaterials in the future.

Chapters 4 and 5 of the book describe, with examples, some of the difficulties arising from naming issues under TSCA and the challenges arising under REACH. Chapter 6 takes a look at the thorny problem of polymers and the contrasting approaches of the different jurisdictions. Very large molecular weight polymers are treated as benign by systems, but the shorter chain polymers can be reactive and the systems vary in how they handle them.

Chapter 7 discusses the problems that nanotechnology presents to both systems of regulation and outlines some of the recent examples of how each system is handling the issues. It will be some time before any broad approaches are developed, but meanwhile individual issues are being regulated. At some point, there will need to be standardized ways of characterizing "new" substances that are on a nanoscale and shape. Perhaps an extended application of SMILE or InChI would be helpful.

The final chapter provides a summary and an indication of where substantial work to improve the weaknesses of both systems should occur.

We would like to see an attempt to develop a common worldwide system for characterizing substances. IUPAC would be a good vehicle for this. The interpretation of the information and translation into regulations could remain a national prerogative, but it would certainly help to have a common approach there, too. Such a system would help with the risks of chemicals down the value chain and into places where there is no production and no regulation.

TSCA is a mature system that is being improved incrementally. REACH is new, having replaced the former, much weaker E.U. system, and is therefore a step change. It is clear that both systems have their challenges and this book provides a broad understanding of the challenges and an idea about some of the needs for the future.



Bookworm

The number of new and existing acronyms are a challenge for anyone who has an aversion to AFA (Another Flipping Acronym); however, there is a fulsome list of abbreviations in the appendix. IUPAC also comments on the use of abbreviations.²

In summary, we recommend this book to anyone who faces the need to get a new substance registered in North America or Europe. It is not only useful to regulatory affairs practitioners, but also useful background for researchers and marketers, as it indicates the enormity of the task of bringing a product to market.

References

1. *Outrage and Technical Detail: The Impact of Agency Behaviour on Community Risk Perception*, Branden

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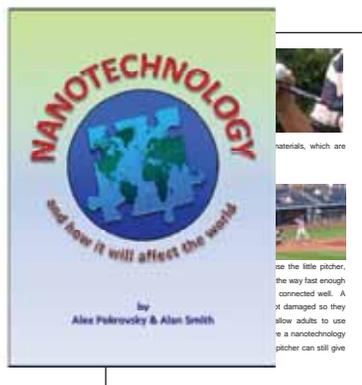
2. "Use of Abbreviations in the Chemical Literature (IUPAC Recommendations 1979)," David R. Lide, Jr. *Pure and Applied Chemistry*, 1980, Vol. 52, No. 9, pp. 2229-2232; doi:10.1351/pac198052092229

Bernard West <bernard.west@sympatico.ca> has a extensive experience in the chemical industry, most recently as CEO of Cansolv Technologies of Montreal, Canada. He is chair of several boards involved in new chemistry developments and is a member of the IUPAC Committee on Chemistry and Industry.

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Nanotechnology for Schools and the General Public

Chemistry International has published five articles on the exciting topic of nanotechnology, including ones on healthcare, sports and leisure, water, biomimetics, and new chemistry. Now, the author of these articles has produced a small 32-page booklet on the applications of nanotechnology. Topics covered are a general



description of what nanotechnology is, along with sections on transport, sports and leisure, home, healthcare, energy, environment, risks and benefits, and future directions. The booklet is well illustrated, and should appeal to a wide age range from schoolchildren to the general public.

Nanotechnology for Schools and the General Public is available for free following request to <info@iupac.org>.

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A Tribute to Máximo Barón

From 1993 to 1999, he was a member of the editorial board of *Speculations in Science and Technology* (Chapman & Hall). Since 1992, he has been a member of the editorial board of *Ciencia e Investigación*, the *Argentine Journal for the Advancement of Science*, and, since 1996, he has been a member of the editorial board of the *Journal for Materials Education*, University of North Texas, USA.

In addition to scholarships from the Canadian National Research Council of Canada and the University of Toronto, Máximo Barón received the History Science Award (History of Physics in Argentina) in 1980 and the Awards for Scientific and Technological Productions for the years 1992-1994. In 2000, he was invited to the

Weiss Graduate Scholars program of the Pennsylvania State University.

Eighty years of a fruitful life, much of it spent in science. We are fortunate that Máximo Barón dedicated a significant share of his time to IUPAC and Division IV. He has provided us with a perfect example of how to work effectively in a multinational scientific organization: scientific competence, patience, and mutual respect. Máximo has helped to create the high spirit and family-like atmosphere of the Committee of Macromolecular Nomenclature's Subcommittee on Polymer Terminology that we all have enjoyed. This has made the "dry" discussions about terminology and nomenclature much more palatable. We all thank Máximo Barón for his contributions and friendship and send him our best wishes. 