CELEBRATING LITHIUM

Dear Reader,

The deluge of information which confronts us daily, coming from traditional sources such as the print media, internet, radio and television and, more recently from various enticing social media, causes us often to miss out important developments or happenings. All of us have to devise an individual strategy to prevent this from occurring too frequently and have to be able to retrieve information fast.

The National Institution for Transforming India, better known as NITI Aayog, is currently giving final touches to the medical devices bill, called as the Medical Devices (Safety, Effectiveness and Innovation) Bill, 2019, that will bring a new law to regulate medical devices. Expectedly, consultations with manufacturers, regulators, advocacy groups and associations are contributing significantly to evolving a mature draft Bill.

Health care across the world has progressed in such a manner that without access to in vitro diagnostics, health providers cannot diagnose patients effectively and promptly or provide appropriate treatments. The World Health Organisation has prepared priority lists of medical devices. Several countries, including Argentina, Belize, El Salvador, Estonia, Kyrgyzstan, Latvia, Mexico and Turkey, have already created national lists for procurement of medical devices.

By definition, a 'medical device' means any instrument, apparatus, implement, machine, appliance, implant, reagent for in vitro use, software, material or other similar or related article, intended by the manufacturer to be used, alone or in combination, for human beings, for one specific medical purpose or for multiple medical purposes. It is a health care product which does not achieve its primary intended purpose by chemical action or by being metabolized, a role which is taken care of by medicines. Medical devices can be tiny or huge in size. Many of them are portable or wireless.

Portable medical devices have revolutionized the way in which people monitor and determine their own health and well-being. Lithium-ion batteries have become an integral part, not only of such medical devices, but also of devices we use daily – the mobile phone, the lap top, the smart watch and more. The transport sector is witnessing enormous changes due to such batteries with large energy storage capabilities, while the solar and wind energy sectors are on the threshold of similar transformations.

In recognition of the development of lithium-ion batteries, through which "they created the right conditions for a wireless and fossil fuel-free society, and so brought the greatest benefit to humankind", the 2019 Nobel Prize in Chemistry was awarded to John B. Goodenough (97, "don't retire too early") of Austin, Texas, M. Stanley Whittingham (78) of Binghamton, New York and Akira Yoshino (71) of Meijo, Nagoya. The short Nobel Lecture of Prof. Goodenough, given at Stockholm University in his presence by his long-time co-worker Prof. Arumugam Manthiram, is as inspiring as it is fascinating.

The Goodenough Nobel Lecture highlights the crucial importance of understanding the Periodic Table to combine physics and chemistry in making path-breaking discoveries.

Towards the end of 2019, the International Year of the Periodic Table marking the 150th Anniversary of the Mendeleev Periodic Table, we are tempted to go back to the location of lithium - the first of the alkali metals - near to the top left of the Periodic Table. Coincidentally, Goodenough, a physicist, was born to American parents in Jena, the industrial town in Eastern Germany where Dr. Otto Schott created in 1883 a lithium-based glass which could separate refractive index from dispersion and thus catapult refractometry into an accurate science.

Mendeleev weaved remarkably 63 of the 94 naturally occurring elements in his Periodic Table, which today has 118 elements. Lithium was discovered in Sweden 52 years before Mendeleev's Periodic Table. Today, the wide industrial applications of lithium range from heat-resistant glass and ceramics, grease and lubricants and fluxes to the already mentioned lithium-ion batteries.

Popular in homeopathy for several indications, lithium, especially as lithium carbonate, acts in allopathy as a unique mood-stabilizing psychiatric drug, whose mechanism of action in the treatment of bipolar disorder is still mysteriously unknown, even after 50 years. Several Indian drug manufacturers owe to lithium their birth, growth and strength.

Happy Reading!

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About The Associate Editor

Dr. Nagaraj Narayan Rao obtained Bachelor's degrees in Science (Chemistry) and in the Technology of Pharmaceuticals and Fine Chemicals from the University of Mumbai. After working with Colgate-Palmolive (India) for two years as a laboratory chemist, he obtained his doctorate in science with *magna cum laude* from the University of Tuebingen, Germany, under the guidance of Prof. Dr. H. J. Roth. He carried out post-doctoral research at the Institute of Biotechnology of the Research Center Juelich, Germany. He was a member of the Editorial Board for the first official German-language version of the European Pharmacopoeia. He was a visiting scientist at Juelich and a visiting faculty at the Institute of Chemical Technology Mumbai from 1993 to 2007 in the field of bioprocess technology. He has authored several original research articles, a patent, review articles and book chapters in the fields of pharmaceuticals, biotechnology, brewery and surface coatings. He was Chief Editor of the "Transactions of the MFAI" for a few years. He contributes a monthly 'Report from India' to a leading German technical journal since fourteen years and is a distinguished alumnus of the Research Center Juelich.

Dr. Rao is co-founder of the RRR group of small and medium enterprises, manufacturing organic fine chemicals, formulations for surface coating technologies and fertilizers, process sensors and process units for life sciences, brewery and chemical process industries, as well as representing select overseas companies for cell culture media, bulk drugs and used chemical equipment and plants.

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