

The Periodic Table Past Present and Future
By Geoff Rayner-Canham (Publ by World Scientific 2020)

A review by Phil Ramsden

In his introduction to this fascinating and extraordinary book the author sets out his intention of showing just how much there is to say about the Periodic Table without boring the reader and he certainly achieves this in style. With something as complex as the Periodic Table it would be easy to confuse and frustrate the reader but the author manages to skilfully avoid this through a carefully judged blend of brevity and logical definition illustrated with just enough fascinating facts.

Chemistry is often 'sold' to students as a logical field of study where you don't need to learn reams of facts but just a few patterns and trends from which all details can be worked out, that was certainly true for this reviewer. However pretty soon students begin to notice exceptions to patterns and things which don't fit in and when they ask about this they are sometimes fobbed off with, what the author in his introduction to Ch. 6 calls, the Humpty Dumpty defence, by reference to Lewis Carol's 'Alice Through The Looking Glass' where Humpty tells Alice that "A word means just what I choose it to mean"! Nothing could be further from this author's philosophy and he is meticulous in defining and explaining every term and classification he uses and he is scrupulous in dealing honestly with any facts which don't fit patterns, but still in a way which avoids boredom and pedantry. From the very first chapter he manages to clearly define all terms in a way which anticipates confusions which might lie ahead, no doubt drawing on his extensive teaching/lecturing experience.

This book is not intended as a textbook, although the author has produced several, but it nevertheless seeks to deal with every key idea and theory relating to the elements of the Periodic Table and to do this the author draws on extensive literature research throughout his life and there are over five hundred references to books and articles cited throughout the book.

The author seeks to deal clearly with contentious issues both past and present and does not seek to duck them. In doing this he presents a picture of chemists as human beings with personalities and feelings. This comes out nicely in his discussion of the long running historical debates about where the Lanthanoids (and later the Actinoids) fitted into the Table.

The scope of this book is vast and as well as being of interest to any chemist I would suggest that it is essential reading for those involved in teaching chemistry at any level since it sets all the pieces of information about the Periodic Table in context and it stimulates thinking on so many levels. There are also some salutary warnings for us all, such as when the author asserts that 'chemists can be casual about the use and misuse of terms', an accusation which could never be made against this book which is a paradigm example of logic and clarity.

In his extensive treatment of a myriad of patterns and trends well beyond the ones that everyone is familiar with, such as the 'Knight's Move Relationship' the author is careful always to emphasise the context in which the relationship was suggested and so remind readers that chemistry does not stand still and discoveries made at any time may well cast doubt on previous thinking and that this is all to the good and in no way detracts from that thinking. In his final Commentary of the book the author rightly asserts that 'our perspectives on the patterns and trends of the Periodic Table will never become fixed' and this is a singularly important point for those contemplating research and future study.

In a book which deals with such weighty matters as effectively every element in the Periodic Table i.e. the building blocks of everything, it would be easy to become solemn and even pretentious but the author completely avoids this trap by being open and self effacing in his style and by skilfully using quotes from 'Alice Through the Looking Glass' throughout the book. In Ch.10 when discussing the Knight's Move Relationship the author mentions the fascinating fact that Augustus Vernon Harcourt the famous Oxford Chemist was thought to have been the inspiration for Lewis Carol's White Knight due to his gentle, affable but forgetful nature. A brief but relevant and interesting aside beautifully judged.

Mendeleev's original Periodic Table stimulated and informed the searches for the 'missing' elements which fitted into gaps and gallium and germanium and scandium were subsequently isolated using predictions of their likely properties. There are now no gaps to fill in the modern Table but the author's treatment of the many and various patterns and trends shows an analogous use by identifying 'novel synthetic targets' i.e. novel species i.e. combinations of elements which have not been seen before but could exist by analogy with another related element. Thus

emphasising the continuing usefulness of the Table is stimulating further research.

This is a wonderful and very unique book in that it deals with a very familiar subject in a novel and original way. It is in no way a standard text but more a labour of love building on the author's lifetime of experience teaching and researching chemistry. It is well written and approachable even though some of the content it deals with is complex. It is designed to inform and to stimulate thought and it fully succeeds in this aim. My only regret about the book is that beautifully produced as it is its selling price may prevent it being bought by as wide a readership of chemists than could definitely benefit from it. I am particularly thinking of school teachers when I say this. However I may hope that a lower priced soft back version may be possible in the future.

Phil Ramsden. October 2020.

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Phil Ramsden taught chemistry and science in comprehensive schools in Derbyshire and Leeds before becoming Advisory Teacher and then Adviser for Science in Sheffield. He has been active in the Association for Science Education throughout his career and was its National Chair in 1993/4. He was for 15 years the ASE Field Officer for Yorkshire and Humberside and has also served a term as Honorary Annual Conference Secretary. He has been involved with various Science Education projects such as the Royal Society Partnership Scheme and has served on the Royal Society Education Committee. He has also as been a tutor to Science ITT students for the University of Leeds.

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