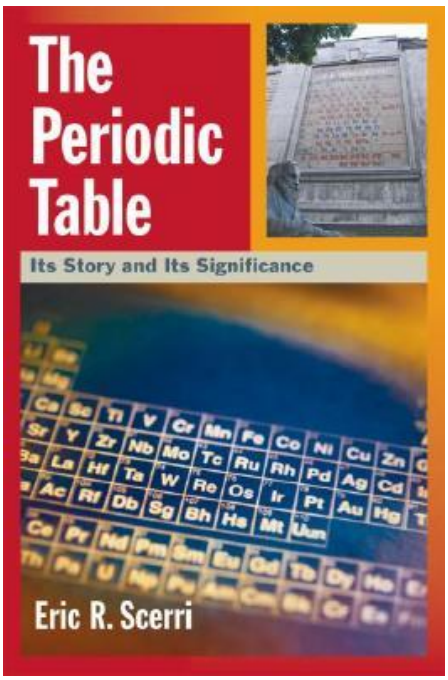

The Periodic Table: Its Story and Its Significance

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The periodic table is one of the most potent icons in science. It lies at the core of chemistry and embodies the most fundamental principles of the field. The one definitive text on the development of the periodic table by van Spronsen (1969), has been out of print for a considerable time. The present book provides a successor to van Spronsen, but goes further in giving an evaluation of the extent to which modern physics has, or has not, explained the periodic system. The book is written in a lively style to appeal to experts and interested lay-persons alike.

The Periodic Table begins with an overview of the importance of the periodic table and of the elements and it examines the manner in which the term 'element' has been interpreted by chemists and philosophers. The book then turns to a systematic account of the early developments that led to the classification of the elements including the work of Lavoisier, Boyle and Dalton and Cannizzaro. The precursors to the periodic system, like Dobereiner and Gmelin, are discussed. In chapter 3 the discovery of the periodic system by six independent scientists is examined in detail.

Two chapters are devoted to the discoveries of Mendeleev, the leading discoverer, including his predictions of new elements and his accommodation of already existing elements. Chapters 6 and 7 consider the impact of physics including the discoveries of radioactivity and isotopy and successive theories of the electron including Bohr's quantum theoretical approach. Chapter 8 discusses the response to the new physical theories by chemists such as Lewis and Bury who were able to draw on detailed chemical knowledge to correct some of the early electronic configurations published by Bohr and others.

Chapter 9 provides a critical analysis of the extent to which modern quantum mechanics is, or is not, able to explain the periodic system from first principles. Finally, chapter 10 considers the way that the elements evolved following the Big Bang and in the interior of stars. The book closes with an examination of further chemical aspects including lesser known trends within the periodic system such as the knight's move relationship and secondary periodicity, as well at attempts to explain such trends.

The Periodic Table: Its Story and Its Significance Details

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From Reader Review The Periodic Table: Its Story and Its Significance for online ebook

AJ says

If you want a history of how all of the elements were discovered, and information about each of them, then this isn't the book for you. Go ahead and check out The Disappearing Spoon instead. The Periodic Table doesn't focus on the individual elements but instead looks at the periodic table as a whole.

I found this book interesting on many levels. First, it was enlightening to read a history of the periodic table and how it evolved from individual scientists noticing patterns in atomic weights. Many of the people involved were working with incorrect information, and obviously they weren't able to read "the end of the book" (so to speak) so they were really paving brand new roads along the way.

Mostly I found the book interesting in its take on the "philosophy" of the science. What does the periodic table really MEAN, and what can it tell us, about elements? How have the advances in quantum physics enhanced this understanding? You can tell that Scerri really has a chip on his shoulder about physics taking the "credit" for so many things in science, which may or may not be a valid argument. I found that his constant physics put-downs took away from the message of the book, which was in fact really eye-opening. A lot of the quantum physics that is used to explain the periodic table is based on empirical data that was based on the periodic table. So it's almost like the snake that eats its own tail: we have quantum physics that explains chemistry by using data derived by chemists to help explain physics.

Really, it's impressive how much we understand, and how little we know about atomic structure. Whether or not it's up to a physicist or a chemist to make these final understandings, I don't care. Honestly, it'll probably be a mixture of both groups to help us learn more about atomic structure in the long run.

Randell says

Loved it. I agree it would be tough going for the non-scientist.

John Anthony Smith says

I liked how the book started with some earlier version of the periodic tables explaining what the scientists were trying to accomplish with the table, and how it over time evolved through atomic weight, to the aufbau principle to the organization structure and explained the relationships of element in the periodic table based on the knight's movement principle a nd the n,n+10 principle. Found it interesting that the Unun-?-iums were included that were just renamed to new elements in Periodic Table. Overall, very interesting read and very informative.

Nigel Stanger says

Interesting, but definitely not a layman's book.

Alan Earhart says

This is the only book in-print and available that gives a comprehensive overview of the history of the organization of elements into a periodic system. There are other books but they are out-of-print and wicked expensive to find.

I recommend this to anyone teaching chemistry, getting a major/minor in chemistry, or anyone really interested in the history of chemistry.

Elizabeth says

Surprisingly good. Recommended for any who has more than a passing interest in chemistry.

Dan D'avella says

This book was intended to satisfy my craving for a good pop-sci book on chemistry. While there are hundreds of books covering a wide variety of topics in physics, it seems like there are relatively few books for the general reader that are about chemistry. Maybe it's because, as the author of this book, Eric Scerri, argues, most people believe that chemistry ultimately reduces to physics, and quantum mechanics in particular, and so they want to go straight to the source. Or maybe it's because chemistry is viewed as less glamorous and more antiquated than things like cutting-edge particle physics and cosmology.

While the periodic table, as the title suggests, is the central object of study in this book, the author covers a wide range of topics in chemistry and physics, while at the same time making fascinating arguments and observations about the history and philosophy of science. Most of the book is focused on the historical development of the concept of periodicity and early versions of the periodic table. Mendeleev takes center stage, but there are a wide variety of other interesting and important players in the development of the periodic table. The remainder of the book discusses the interplay between chemistry and modern atomic theory, including quantum mechanics, along with some fascinating facts about the elements and periodicity.

One of the central arguments is that periodicity and the properties of the elements are not entirely reducible to quantum mechanics, at least not yet. To me this sounds a bit like the grumblings of a chemist with an axe to grind, and I'm not sure I'm entirely convinced (but this can be taken with a grain of salt coming from a largely ignorant layman). However, I did find the arguments and evidence to be completely fascinating, and it is certainly thought-provoking to say the least. The most fascinating discussions to me were those surrounding the questions about the ontological reality of the elements and chemical periodicity. This was accompanied by the discussion of a rather subtle distinction between elements as 'basic substances' and 'simple substances'.

After reading this book, I am left with the impression that chemistry is a rich and fascinating field and that the interaction between the modern fields of chemistry and physics is much more subtle than is commonly believed. Scerri observes that many people, including many chemists and physicists, believe that the

periodicity and electronic structure of the elements was completely explained by Bohr with his first forays into quantum theory. However, he argues, much of modern atomic theory, including the structure of atomic orbitals, was developed as the result of the careful study of chemical properties of the elements, rather than theories based on purely electronic configurations.

This book is a fascinating read, and is extremely well written. My only criticism, which is purely a matter of opinion, is that in some parts the content is too technical to be fully appreciated (or understood at all) by someone outside the field. However, these technical sections were generally very brief and did not detract from the overall narrative. I believe this book would be very difficult for someone who has had no previous exposure to basic concepts in modern atomic theory and quantum mechanics, though.

Chris says

I really liked this book. This one book, more than any other non-textbook, has convinced me that I need to change the content of my college level General Chemistry lectures. There are dozens of things that I realize now that were historically inaccurate in nearly every General Chemistry book I've ever used. I would encourage every physics and chemistry teacher or professor to read this book. A big thanks to Eric Scerri for writing such a well-researched account of the development of the periodic table.
