Acids and Bases

This excellent, much-needed book by Brian Cox (no relation), an acknowledged expert in the field, carefully and clearly explains the meaning of acidity and basicity in non-aqueous solvents, which at least in some cases is by no means obvious, as well as the factors which affect them. The changes from the familiar acid and base strengths in water often involve many orders of magnitude and profoundly affect the rates and equilibria of reactions in non-aqueous solvents, many of which are important in synthetic chemistry, as well as in analysis and in pharmaceutical and industrial manufacturing. Many of the physical attributes of non-aqueous media are very important to the reactions that can take place in them. For instance, dimethyl sulfoxide really cannot solvate hydroxide ions, and they are thus many orders of magnitude more basic and far more reactive in it.

The definitions of acidity constants, activity coefficients and other thermodynamic quantities are carefully provided. The book can be read on many levels; undergraduates will appreciate the careful definitions, and experts will find the tables of data and the critical analyses as to which measurements are the most reliable very useful too. Many up-to-date acidity constants and other data are provided, and it is good to have all of this information in one place rather than having to hunt it down in the literature.

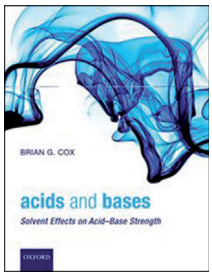
In a way it is a pity that our concept of acidity and basicity is based on aqueous solution, because water is very different from any other liquid—a point that the author could have made more of, I thought. For instance, there is a mechanism of proton transfer available in water, the Grotthuss mechanism, that is essentially unavailable even in the closely related alcoholic media. (Even liquid ammonia does not appear to have this; the science-fiction writers that speculate about life on colder planets based on liquid ammonia as a solvent may have a problem here.) The recent and continuing work by Page and Atherton on reactions and equilibria in liquid ammonia, too recent to be included in this book, will shed more light. The value of this book is that it is not water-centered.

I would have liked to have seen a chapter on molten salts and ionic liquids as reaction media in the book, since the concepts of acidity and basicity in them are very interesting and quite different, but I realize that much of the work in this fast-moving field is too recent to have been included.

The only real problem I had with the book is not the fault of the author at all. The book is written in English (analyse, behaviour) rather than American (analyze, behavior), but many readers would not even notice this. The problem comes from the copy editing, which is quite bad, and stems, I am sure, from the publisher outsourcing this production step. For instance (and there are dozens if not hundreds of examples in the book), in science atomic symbols are given in regular type, but the symbols for physical quantities are italicized. Thus pH is correct, H simply meaning hydrogen, but pK is not, since K is the symbol for an equilibrium constant; it should be pK. The book even extends this to K as well, writing it as K. The opposite also occurs; base 10 logarithms are written correctly as log, but base e ones incorrectly as *ln*. Subscript zeros should be 0, not *0*. Mistakes like these do not affect the sense of the text, but they are annoying, an emotion which I am sure the publisher did not wish to provoke.

By far the worst case of this is that "sulfur" (and derivative words, sulfoxide, sulfuric, etc.) are all written with a "ph", not an "f". This is wrong because, unlike phosphorus, which is a Greek word with the "phi" correctly transliterated as "ph", sulfur is a Latin word, and Latin has no "phi" but has an "f" instead. Amusingly, in the Index of the book, obviously done by a different person, "sulfur" is correctly spelt. It is to be hoped that in a second printing all of these mistakes will be corrected.

However, all of this is trivial; I found the book to be exceedingly useful and easy to read, and I strongly recommend it to everyone who works or is interested in this area of chemistry.



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