

Benson S W. Bond energies. *J. Chem. Educ.* 42:502-18, 1965.
[Stanford Research Institute, Menlo Park, CA]

Experimental bond energies are examined for molecules, radicals, and ions. Some very large effects of near and next-nearest neighbors are observed. Applications to kinetics and photochemistry are given. [The SC[®] indicates that this paper has been cited over 320 times since 1965.]

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April 16, 1981

"The paper, 'Bond energies,' was the product of many years of research and thinking on this then little known useful subject. I had wanted for a long time to have some motive to collect and organize these findings and thoughts, some of which ran contrary to some popular thinking. Thus it was, then, that when Peter Yankwich, University of Illinois, an active member of the ACS committee on college chemistry, called me one day to ask me if I would be interested in preparing a 'Resource Paper' for his committee, I was quite pleased to accept. It was particularly pleasing to me to prepare what was primarily a research oriented paper for publication in a journal of chemical education. The subject of thermochemistry and heats of formation in relation to chemical reactivity, particularly to that of free radicals and ions, has been largely ignored in undergraduate teaching and the missionary in me jumped at the chance to try to redress the balance. The *Journal of Chemical Education* provided a wider audience than the usual research journal and that was also attractive.

"The paper has filled a very important niche in that, at the time, there was no single source of quantitative and current information on bond energies. There were many discrepancies in reported energies and for the novice, no easy way to resolve them.

We had in our own research provided a number of new and different data for some species such as the allyl and benzyl radicals which were not widely known. Research papers could be found at the time (some even now) quoting values which had been shown to be grossly incorrect at least 15 years earlier. For me, the paper was also an opportunity to present my then emerging ideas on the stability of radicals and its relation to electronic bonding in a mildly quantitative fashion.

"The outcome of all of this has been quite gratifying to me but certainly quite unanticipated in scope. I had expected that the paper would largely be used, if at all, in advanced physical chemistry courses and special honors courses in colleges. It has instead been largely used by the research community as an easily available data source. This has become on occasion, ironically, a bit embarrassing. In the 16 year interval since its publication the state of the art has advanced appreciably and a large number of values of bond energies are known now with greatly improved accuracy. It is thus somewhat disconcerting to find some of this older data now quoted in apparent rebuttal to me of some of the newer data which we have ourselves measured since then. The differences are not usually more than 1-2 kcal, but this can now loom large in the current state of knowledge of bond energies.

"In these past 15 years the appreciation of the importance of bond energies has expanded considerably and research in the area has grown. We have continued our own work and much of the content and ideas presented in this paper have been expanded and incorporated in my book, *Thermochemical Kinetics*,¹ now in its second edition. This is very definitely a research oriented book, although I look forward to the day when it will become incorporated into the freshman chemistry curriculum."

1. Benson S W. *Thermochemical kinetics*. New York: Wiley, 1976. 320 p.