Computational Studies

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Attractive and Convincing

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Hoffmann, Schleyer, and Schaefer[1] address a very important issue in computational chemistry that often (if not usually) does not receive sufficient attention: the significance of computed values, not only in the technical and methodological sense (precision, accuracy) but also in the sense of their physical and chemical implications (stability, realistic target, etc.).

Many computational chemists are aware of the issue but, in the majority of cases, not in a sufficiently explicit form. I like the authors' proposition[1] to introduce a protocol for computational studies that claim new targets for synthesis. This protocol comprises, for example, the requirement to explore if molecules are really sufficiently stable with respect to various conceivable modes of dissociation and, in particular, if they are sufficiently inert in the presence of a number of other compounds. On the other hand, it will not always be easy to satisfy all these conditions and I don't think that they should be too strictly imposed. Even the authors of the Essay themselves[1] do not always obey the proposed protocol and this has, to my knowledge, never been a problem. Also the classification of potential molecular targets as viable versus fleeting is very useful. A protocol may go hand in hand with a classification scheme from which the reader can easily deduce which aspects of viability have been verified for the predicted molecules.

The authors[1] point out corresponding weaknesses in experimental chemistry, for instance, the accuracy in X-ray structures. This point might even be emphasized somewhat more. There are many severe (and in practice often overlooked) problems with experimental "facts" that stem from an imprecision inherent to the techniques, from theoretical input, and/or from assumptions that go into the interpretation of the primary data.

Also the fact that computational work can gain significance from addressing important bonding concepts may be somewhat elaborated upon. In my experience, many chemists do not know why computational work gains significance from bonding analysis and the development of models.

In conclusion, I think it is important that the appealing and convincing essay of Hoffmann, Schleyer, and Schaefer[1] receives the attention of the readership of *Angewandte Chemie*.

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[1] R. Hoffmann, P. von R. Schleyer, H. F. Schaefer III, *Angew. Chem.* **2008**, DOI: 10.1002/ange.200801206; *Angew. Chem. Int. Ed.* **2008**, DOI: 10.1002/anie.200801206.

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