Silver in Organic Chemistry

Coinage metals have emerged in the last decade as efficient catalysts for many reactions …

Reader: *Here, in the first sentence, we have the usual sort of statement aimed at selling your product! I think I will skip this article and move on …*

Writer: *No, truly, it is like that! Let me show you, give me one more minute!*

A search in the Science Citation Index (SCI) database for the topic "catalysis" combined with "copper", "silver", or "gold" over the period 1899–2010 yielded the following (rounded) figures: 4300, 1300, and 2900 citations for Cu, Ag, and Au, respectively. When the period was limited to the past decade (2000–2010), the corresponding numbers of citations found were 3200, 1050, and 2700. Therefore, the numbers of publications devoted to the use of coinage metals in catalysis in the last decade as percentages of those over the entire timespan are 75 % for copper, 80 % for silver, and an impressive 93 % for gold.

R: *Well, it seems that most of the work on catalysis using Group 11 metals has been done in the last decade, but probably it is the same for other elements.*

W: *Smart, as expected of course from a reader of Angewandte … One more minute?*

A similar study for rhodium, palladium, platinum, and ruthenium yielded the following percentages of citations in the last decade compared with the whole period: 70 % (Rh), 77 % (Pd), 70 % (Pt), and 77 % (Ru). Therefore, we could say that silver and gold have developed at a faster rate during that time, whereas copper has increased at a rate similar to that for these four metals (in all cases specifically for the field of catalysis). But a closer look at the available data can provide more information. Just searching within *Angewandte Chemie* in the period 2000–2010, the numbers of publications as percentages of the totals cited in SCI over the whole period (100 × articles in *Angewandte Chemie* 2000–2010/total number of SCI citations) are: Cu, 6.2 %; Ag, 3.1 %; Au, 6.7 %; Rh, 7.0 %; Pd, 5.7 %; Pt, 4.0 %; Ru, 3.7 %. Copper and gold surpass palladium and platinum, and approach rhodium, whereas silver is within the same range as ruthenium. This analysis supports the assessment that coinage metals have emerged in the last decade, being now comparable, both quantitatively and qualitatively, to other transition metals commonly used for catalysis.

R: *Indeed, I believe the data demonstrate that coinage metals, silver included, are currently a focus of interest for research in catalysis. Probably there is a lot of literature reviewing this subject.*

W: *Actually, this is not the case for silver. The renaissance of gold chemistry, as well as the extensive use of copper, which is relatively cheap, has probably made silver the Ugly Duckling of Group 11. But the above figures demonstrate that it is filling the gap along with other metals. Although there are reviews on specific aspects, there has not previously been a collection of articles on the current state of the art in the use of argentum from a catalytic point of view. Silver in Organic Chemistry is the first book entirely devoted to the use of this metal in organic synthesis.*

R: *Is this a book only for those already working with silver in organic chemistry?*

W: *Not at all. Michael Harmata, the editor of this volume, has compiled a series of 12 chapters that contain information relevant to the catalytic uses of silver. In most of them, clear introductions for non-specialist readers are provided. On the other hand, for those involved in any of the areas covered, the book provides a very fresh look at the different topics, with references to the relevant recent literature (up to 2009). Each chapter ends with a "Conclusion" section, usually highlighting some yet-to-be-done topics, as an indication of directions for future research, for both specialists and beginners.*

The topics of the chapters are as follows, all with the focus on silver-based processes: silver alkyls, alkenyls and related compounds in organic synthesis (R. H. Pouwer, C. M. Williams), cycloaddition reactions (A. M. Szpilman, E. M. Carreira), sigmatropic rearrangements (J.-M. Weibel, A. Blanc, P. Pale), electrocyclic processes (T. N. Grant, F. G. West), cycloisomerization reactions (P. Belmont), nitrene transfer reactions (Z. Li, D. A. Capretto, C. He), silylene transfer (T. G. Driver), silver carbenoids (C. J. Lovely), aldol and related processes (M. Kawasaki, H. Yamamoto), coupling reactions (J.-M. Weibel, A. Blanc, P. Pale), supramolecular chemistry (W.-Y. Sun, Z.-S. Bai, J.-Q. Yu), and lastly a comparison of the three coinage metals in various processes (A. S. K. Hashmi).

Altogether, this is an impressive work for both libraries and laboratories. It should serve as a valuable reference source for all those who are already working in the field of silver-catalyzed organic synthesis. Also, readers searching for an emerging area of research will find that the book identifies gaps to be covered by future work, or provides inspiration for new processes to be developed.

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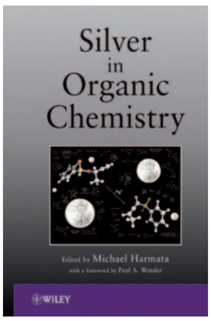

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