CLOSED-SHELL INTERACTIONS BETWEEN METALS: EXCITEMENTS AND DISAPPOINTMENTS IN THE LABORATORY OF A GOLD CHEMIST

Hubert Schmidbaur

Anorganisch-chemisches Institut, Technische Universität München, Lichtenbergstrasse 4, D 85747 Garching, Germany; H. Schmidbaur@lrz.tum.de

Aurophilic interactions (1) are now known to contribute very significantly to the structure and stability of isolated molecules and of matter in the condensed phase. The energies associated with close Au--Au contacts are large enough to compete with or even overrule other weak forces as e.g. hydrogen bonding or conventional coordinative bonding. The problem in using aurophilic bonding in the design of a molecular or multidimensional structure is the unreliability. Owing to the delicate balance between various contributions in a given molecule or lattice, it is often very difficult to predict if closed-shell interactions will be found fully operative as expected.

The rapidly growing collection of examples has shown that even simple steric hindrance which seems to be rather predictable using the dimensions of suitable models may be grossly over- or underestimated. Coulomb forces between molecular ions and their counterions or the dipoles of solvent molecules, and even general packing forces can help to induce or to hinder close contacts between the metal centers. The interplay of steric and electronic/electrical effects can be studied in a set of new cases reported from several laboratories. Fortunately the predictable results are growing in number giving support to the general rules set up during the last decade (2, 3). It is equally fortunate, however, that from time to time the results are completely unexpected and lead to new or refined insights.

(1) H. Schmidbaur, Gold Bull. **23**, 11 (1990)
(2) H. Schmidbaur, Gold Bull. **33**, 3 (2000)
(3) P. Pyykkö, Chem. Rev. **97**, 597 (1997)