



T. Kauffmann

Thomas Kauffmann (1924–2012)

On February 23, 2012, Thomas Kauffmann, Emeritus Professor at the Institute of Organic Chemistry at the University of Münster, passed away at the age of 87 years. He grew up in Ebersbach an der Fils, and after finishing high school, he was moved into the military service and there he spent two hard years in the war. Thereafter he began to study chemistry in Würzburg and then moved to the Technical University Darmstadt, where from 1952–1956 he studied for his diploma and PhD with Clemens Schöpf working on the isolation and characterization of Lobelia alkaloids. In his habilitation, he conducted research on diazoanhydrides, on the yellow pigment of the fire salamander, and the preparation of new radical anions. Furthermore, he was able to add sodium hydrazide to pyridines to form hydrazines **1**, and with this reagent he was able to achieve a double-bond cleavage combined with a hydrogenation, for example the conversion of stilbene into toluene and benzalhydrazine. In 1960 he completed his habilitation with 17 independent publications from the period after his graduation. Thereafter his interest moved to the preparation and reactivity of hetarines. He generated these by elimination of mono- and dihalopyridines or thermolysis of pyridine diazonium carboxylates. The trapping reaction with furan to **2** together with kinetic investigations and competition experiments proved convincingly that free hetarines were intermediates. From this work many results originated that belong today to our basic knowledge on the preparation and reactivity of hetarines.

In 1965 he accepted a chair as professor at the University of Münster and there he started a new research field: dimerizations via copper compounds (Kauffmann dimerization). For that purpose, organic groups were transferred to copper halides by transmetalation and then were dimerized by thermolysis or oxidation to acyclic and cyclic structures, for example, the heterocyclopolyarenes such as **3**. In continuation of this work, he could develop selective cross-coupling reactions by C–C bond formation between nucleophilic and electrophilic heterocycles. This reaction produced a large diversity of compounds, for example **4**, which became accessible in a few steps with high yield and selectivity. Compounds of this structure are used today in materials science.

Further experiments with lithium 2-azaallyl compounds resulted in two discoveries. The reaction with styrene led to a cycloadduct and not to the expected acyclic product. His formation could be well explained as anionic $[4\pi + 2\pi]$ cycloaddition and was extended to further compounds with multiple bonds. With ketones the second reaction

was found: the nucleophilic aminomethylation. To develop robust reagents for synthesis he used the main-group elements: As, Se, Sn, Sb, Pb, and Bi as substitutes for labile functional groups. These reagents were applied in eliminations, for the preparation of halo compounds, and the synthesis of ligands for transition-metal catalysts. Very elegant in this respect was the reaction of lithium element organic compounds as nucleophiles with spiro[2.4]hepta-4,6-diene as electrophile.

Further fields of research were reactions with alkyl chromium compounds. Their alkyl groups could be added specifically to aldehydes in the presence of ketones and acid chlorides. Additionally they were not very sensitive to water, which made them very useful reagents for synthesis. This successful research was then extended to the 4d and 5d metals: molybdenum and tungsten. With alkyl molybdenum and alkyl tungsten complexes, ketones could be converted into vinyl groups (Kauffmann olefination) or could be dimerized in an alkylating reduction to pinacols, such as **5**. Stimulated by known conversions with organo-(cyano)cuprates, he prepared methyl-(cyano)ferrates, -cobaltates, and -nickelates and applied them for selective cross-coupling reactions. As the citations of his publications indicate, the latter investigations and those on heterocyclopolyarenes and hetarines are still being used and further developed.

Thomas Kauffmann led his co-workers in lively seminars and thorough discussion of their results to independent and successful research. He was an excellent and inspiring teacher for beginners as well as for advanced students, and served in the administration and reorganization of the large institute, as Dean in the faculty, and as a member in scientific boards and advisor of research foundations. In his limited free time he liked activities such as jogging, bicycling, sailing, and skiing or enjoyed drawing and painting.

After having published 265 scientific papers in technical prose, as emeritus he wrote two books: “In another time – Memories 1944 to 1950” and “Farewell lecture – A German research group in Chemistry 1956 to 1993”. All who knew him will keep his charming and lively nature and his enthusiasm for chemistry in good memory.

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