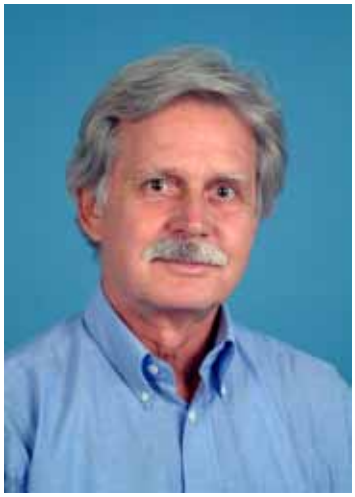
Professor Ernst Anders

A Tribute



Ernst Anders, born January 3, 1942 is well-known for his investigations of stereoelectronically stabilized cations and anions and subsequently for the application of quantum chemistry to biomimetic problems. Professor Anders studied chemistry at the Freie Universität Berlin where he completed his MS thesis under the supervision of Prof. Dr. E. Ruch. In 1968 he spent a research year at the ETH Zürich in the group of Prof. Dr. V. Prelog. Upon his return to Germany, he finished his Ph.D. in 1972 at the Institute of Quantum Chemistry of the Freie Universität Berlin entitled "Prüfung des Stereochemischen Strukturmodells". Thereafter, he moved to the Institute of Organic Chemistry of the University Erlangen-Nürnberg. He submitted his habilitation regarding "Amides with Ylide Character" in 1981. In 1982 he was appointed Assistant Professor (Privat Dozent) and in 1988 acquired tenure track. In this same year he was appointed to a chair at the Institute of Organic Chemistry at the University Göttingen. Up to 1993 he held several guest professorships, one of which was in the chemistry department at the University of Florida, Gainesville, USA. A deep friendship and fruitful cooperation with Prof. A. R. Katritzky, who is one of the leading organic chemists, began at that time and remains in place to this day.

After the reunification of Germany, a major restructuring of the scientific landscape occurred in East Germany. The erection of new buildings was a challenge and an excellent opportunity for the reorganization of a modern and efficient university. Consequently, Ernst Anders applied for a professorship and in 1993 obtained the Chair I for Organic Chemistry at the Institute of Organic and Makromolecular Chemistry of the FSU, Jena. In the years 1995-1997 and 1999-2001 he held the position of Institute Chairman and was Vice-Dean from 1997-1999. In this position he was responsible for many important decisions affecting the faculty's development.

A remarkable event in his career was the nomination in 1966 as chair of the "Sonderforschungsbereichs 436" entitled "Metal mediated reactions modelled after nature". In this group of experts representing not only different scientific areas but different institutes and institutions, the research focuses on metalloenzymes as natural models for selective and effective chemical reactions. Central themes of this scientific community are activation and transformation of small molecules such as carbon dioxide, nitrogen and others in order to produce fine chemicals. Extension of this extremely successful research community will be proposed in 2006. Ernst Anders is responsible for the international reputation of chemistry in Jena due to his enormous efforts and his great engagement as chair of this research cluster. His successful research community managed to attract many Ph.D. students and procured scientific equipment exceeding several million euros in value. In September 2005, outstanding scientists from Europe and overseas presented lectures here in Jena at the Third International Congress and supported the proposal to unite experts in this field of research. Since 1978 his scientific studies have been sponsored by the German Science Foundation (Deutsche Forschungsgemeinschaft) as well as many other institutions such as NATO Scientific Affairs Division, Thuringia´s Ministry for Science, Education and Culture, the Fonds of the Chemical Industry and Hewlett-Packard.

His scientific profile is very versatile and includes themes such as stereoelectronically stabilized cations and anions, organometallic complexes, multi component reactions, synthesis of heterocycles and last but not least, the investigation of catalytic cycles and biomimetic applications.

The chemical reactivity controlled by negative hyperconjugation is not only the title of one of his recent publications, but also one of his illustrious lectures. Quantum chemistry has always served Ernst Anders as a reliable tool in calculating and predicting stabilities and properties of new products. In 2001 he succeeded in solving the mechanism of the carboanhydrase cycle based on *ab initio* calculations. Characteristic of his research is the feedback between theory and experiment which proved to be extremely successful for his synthetic chemistry. The knowledge he gained from mechanistic studies of the carboanhydrase cycle was transferred to artificial chemical products and synthetic procedures. For example, he performed and published experiments with heterocumulenes as artificial substrates based on his theoretical results.

Based on earlier experience with group-transfer reagents, he recently developed a procedure to prepare fascinating ring-fused heterocycles. They not only accept a large variety of substituents but also show remarkable reactivity which allows, for example, cascades of ring transformations.

Ernst Anders succeeded in solving three different mechanisms of ring transformations *via* outstanding ab initio calculations. A preparative application followed immediately by formation of novel heterocycles, semi-cyclic guanidines and their resultant metal complexes.

Due to his experience and knowledge of organic and computational chemistry, he is an esteemed referee of many international and high-ranking Journals such as "Angewandte Chemie", "Journal of Organic Chemistry", "Tetrahedron" and others. He is a member of the Gesellschaft Deutscher Chemiker and is often invited to present lectures at prestigious

international scientific conferences. Ernst Anders is an extremely well-respected guest-speaker at many universities and institutions worldwide.

Selected Papers

1. Chemistry of N-(1-Haloalkyl)Heteroarylium Salts, Review Anders, E.; Wermann, K.; Vanden Eynde, J.-J.; *Adv. Heterocyclic Chem.* **2000**, *77*, 183.
2. New Insights into the Mechanistic Details of the Carbonic Anhydrase Cycle as Derived from the Model System $[(NH_3)_3Zn(OH)^+/CO_2$: How Does the H_2O/HCO_3^- Replacement Occur? Mauksch, M.; Bräuer, M.; Weston, J.; Anders, E.; *ChemBioChem* **2001**, *2 (No.3)*, 190.
3. CS_2 Fixation by Carbonic Anhydrase Model Systems – A New Substrate in the Catalytic Cycle. Sinnecker, S.; Bräuer, M.; Koch, W.; Anders, E.; *Inorg. Chem.* **2001**, *40*, 1006.
4. A Quantitative Reactivity Model for the Hydration of Carbon Dioxide by Biomimetic Zinc Complexes. Bräuer, M.; Pérez-Lustres, J. L.; Weston, J.; Anders, E.; *Inorg. Chem.* **2002**, *41*, *1454*.
5. Bis(1,3,4-thiadiazolo)-1,3,5-triazinium halides, 4: Syntheses of Azole-Substituted Guanidines and Bis(azolyl)alkanes. Wermann, K.; Walther, M.; Anders, E.; *ARKIVOC* **2002**, 24.
6. Bis-(1,3,4-Thiadiazolo)-1,3,5-Triazinium Halides, 5: Formation of Triazinium-Imidothioate Zwitterions and Their Role as Key Intermediates for Novel S_N(ANRORC) Reaction Pathways. Wermann, K.; Walther, M.; Günther, W.; Görls, H.; Anders, E.; *Eur. J. Org. Chem.* **2003**, 1389.
7. Chemical Reactivity Controlled by Negative Hyperconjugation: A Theoretical Study. Nilsson Lill, S. O.; Rauhut, G.; Anders, E.; *Chem. Eur. J.* **2003**, *9*, 3143.
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10. How does the Exchange of One Oxygen Atom by Sulfur Affect the Catalytic Cycle of Carbonic Anhydrase? Schenk, S.; Kesselmeier, J.; Anders, E.; *Chem. Eur. J.* **2004**, *10*, 3091.
11. Preparation of Chiral Thioureas, Ureas and Guanidines from (S)-2-(N,N-dialkylaminomethyl)pyrrolidines Köhn, U.; Günther, W.; Görls, H.; Anders, E.; *Tetrahedron: Asymmetry* **2004**, *15/9*, 1419.
12. Carbon Dioxide Fixation by Lithium Amides: DFT Studies on the Reaction Mechanism of the Formation of Lithium Carbamates. Nilsson Lill, S. O.; Köhn, U.; Anders, E.; *Eur. J. Org. Chem.* **2004**, 2868.
13. Regioselectivity in Iron Catalyzed [2+2+1] Cycloadditions: A DFT Investigation of Substituent Effects in 1,4-Diazabutadienes. Imhof W. and Anders E., *Chem. Eur. J.* **2004**, *10*, 5717.

14. Metal 4-Alkylidene-4H-pyridin-1-ides and 2H-Imidazol-4-ones from Novel Highly Substituted Azomethines. Hampe, D.; Günther, W.; Görls, H.; Anders, E.; *Eur. J. Org. Chem.* **2004**, 4357.
15. Neutral zinc(II) and molybdenum(0) complexes with chiral guanidine ligands: synthesis, chracterization and applications. Köhn, U.; Schulz, M.; Görls, H.; Anders, E.; *Tetrahedron: Asymmetry* **2005**, *16/12*, 2125.
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17. A Density Functional Investigation of the Mitsunobu Reaction. Schenk, S.; Weston, J.; Anders, E.; *J. Am. Chem. Soc*. **2005**, *127*, 12566.

