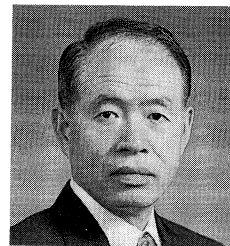


Advancing Organic Synthesis

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Organic Synthesis is crucial for the future of mankind. This significant realm provides a logical and technical basis of natural sciences and technologies based on molecular substances. We have an immense responsibility to solving a range of current, or even unforeseen, social and global issues associated with health, materials, food, energy, environment, etc.

Organic Synthesis, in principle, can create an infinite variety of compounds in any quantities based on our scientific knowledge. In reality, however, its practicability is still to be developed. Although a range of "efficient" synthetic methods has been discovered over the decades, the practical multi-step chemical synthesis is now limited only to production of substances in small volume and of a very high-added value. Chemists are then encouraged to pursue the absolute synthetic efficiency, instead of the relative efficiency that is evaluated largely by economical and biological factors. The current level of Organic Synthesis remains unsatisfactory to be generally practiced. Many reactions are performed in hazardous organic solvents. Furthermore, synthesis of a target compound is accompanied with inevitable formation of various organic and inorganic side products. Since the structures of biologically active compounds are often complex, the necessity of using protective groups makes the overall synthetic scheme lengthy and impractical. Chemical reaction should be much more selective, rapid, and productive, although the efficiency of certain molecular catalysts already rivals or even exceeds that of natural enzymes. The advanced chemical process is required to be economical, safe, environmentally conscious, energy- and resource-saving. We need new catalysts, either homogeneous or heterogeneous, effecting "perfect chemical reactions" that lead to only the desired products with 100% selectivity without unwanted wastes under energy-saving conditions. Organic Synthesis is an integrated technology, in which all ingredients should be compatible to the practical requirements. I would propose, as an urgent goal, an increase in efficiency by two orders of magnitude in many respects. We desire a 100-fold increase in rate (turnover frequency) and productivity (turnover number) of many catalytic reactions. The quantities of precious catalysts, amounts of toxic reagents and substrates, and energy consumption are to be reduced to 1%. These improvements must be possible. As a consequence, Organic Synthesis would not only facilitate industrial production of useful compounds but also spark an explosion of research, particularly in molecular life science, opening a new era of chemical science.

Organic Synthesis is exciting and also powerful, and the potential is limitless. Organizing the intellectual and technological cooperation among the academia, industry, and government, The Society of Synthetic Organic Chemistry, Japan, must assume forward-looking leadership in creating "Advanced Organic Synthesis" that will further contribute to the quality of human life than it does now.

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