1982 PROGRAM

A.M.

8:30 **Coffee—Chemistry-Physics Rm. 137**

9:00 **Welcome and Introduction Rm. 139**

9:15 **ARTIFICIAL PHOTOSYNTHESIS: SYNTHETIC CHLOROPLASTS**

Dr. Melvin Calvin

Knowledge of the mechanism of primary energy capture and conversion by green plant chloroplasts is used to guide the design of artificial systems for conversion and storage of solar energy. An essential function to be imitated is the conversion of absorbed light energy by charge separation in an oxidation-reduction reaction, and the prevention of back reaction between the charged oxidized electron donor and reduced electron acceptor. We have achieved this goal in two ways: (1) The phototransfer of an electron across an insulating lipid layer between two separated aqueous phases, one containing the donor and the other the acceptor. (2) The use of small particles, either lipid vesicles or silica particles, with a high negative surface charge density. The sensitizer adheres to the particles, whereas the negatively charged reduced acceptor is repelled into the continuous phase after electron transfer. The separation of products thus achieved has led to a great increase in quantum yield, as high as 30%. Ways are now being sought to use catalytic reactions (such as occur in nature) to bring about the oxidation and reduction of water to hydrogen and oxygen.

10:15 **Discussion and Coffee Break**

10:45 **CHLOROPHYLL FUNCTION IN NATURAL AND ARTIFICIAL PHOTOSYNTHESIS**

Dr. Joseph J. Katz

Chlorophyll is the indispensable agent for light energy conversion in green plant and bacterial photosynthesis, and a detailed understanding of how it functions in natural photosynthesis would do much to facilitate the development of artificial photosynthesis. The chlorophyll molecule, it now becomes evident from various lines of physical investigation, has an unusual combination of coordination properties. These coordination interactions between chlorophyll and other chlorophyll molecules and with various chloroplast components now make it possible to consider specific molecular structures for the different species of chlorophyll present in chloroplasts and bacterial chromatophores. Model systems can now be fashioned in the laboratory that mimic many of the features of natural photoreactive chlorophyll, and rudimentary antenna-reaction centers for the study of energy transfer are also now available. These models, and the ways in which they can contribute to the understanding of natural photosynthesis, will be described.

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ARTIFICIAL PHOTOSYNTHESIS

Speakers

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