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THE TRAPPING OF SOLAR ENERGY

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INTRODUCTION

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There is a conviction among scientists that man can improve upon the efficiency with which nature converts sunlight to chemical energy through photosynthesis. On the occasion of the 75th anniversary of the founding of the American Chemical Society, President Conant of Harvard predicted that in another 50 years, man would be using the sun as a practical source of energy.

When we step outdoors on a sunny summer day we are aware of two sensations, heat and light. Part of the sun's energy reaches us as longer wave-length or "red" waves which supply heat. Part reaches us as shorter wave-length or light waves. Both kinds of waves represent energy and it is with the principles involved in trapping of this energy either directly as heat energy or indirectly by converting it to chemical or electrical energy that the following papers are directed. Conversion to chemical energy also includes photosynthesis in plants, an area of vital interest to agriculture.

The magnitude of solar energy is indicated by two practical statements. The energy striking the roof of an average house in one-half hour on a sunny summer day is enough to supply that house with heat and light and utilities for a whole year. The second statement is that it would take 2 million atomic bombs (fission type) to produce energy equivalent to the solar energy striking the United States in one day.

Energy from solar sources as it reaches the earth is diffuse in contrast to atomic energy. Atomic energy is already trapped and only needs release. Atomic energy may be obtained in a high degree of intensity and therefore have special uses. Solar energy in its diffuse state must first be trapped. Some device which will "filter" it from the atmosphere must be designed. Such a device must also be adaptable to concentration of the energy in order to give it a potential necessary

for its adaptation to modern industry. There is no reason at present why concentration of energy once derived from solar sources, sufficient to supply the demands of modern industry cannot be achieved.

The storage of energy from solar sources presents a special problem. It would be inconvenient if the energy were available only during daylight. This problem is not insurmountable and has been solved in several ways already. Sugar represents stored solar energy perhaps in its most convenient form. Solar energy may also be stored by absorbing it as heat of dehydration of such substances as Glauber's salt. Solar energy has also been stored as water raised during daylight hours by sun-fired steam pumps. The storing of electrical power derived from solar energy has the same limitations as hydroelectric power.

The primary problem therefore is the trapping of solar energy, that is, the conversion of the energy of light waves to other forms of energy, particularly chemical and electrical energy. When we know how this process works, we will have a sound basis for studying the factors that affect its efficiency and thus in time make the use of solar energy practical.

In the following papers, the authors have attempted to state the scientific principles involved in the various ways of trapping solar energy, the factors that affect the efficiency and some of the accomplishments already achieved.