Suess speaking at the national meeting of the American Geophysical Union at UCLA (Pressures and temperatures at which organic compounds on the earth were first formed)

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Recent calculations that tell more accurately than ever before the pressures and temperatures at which organic compounds on the earth were first formed were described today by Hans E. Suess, Professor of Geochemistry, University of California, San Diego.

The formation of organic compounds in the hydrogen-rich atmosphere of the early earth was the initial step in the emergence of life on this planet, according to current theories.

Suess and his colleagues used a new solid-state computer on the San Diego campus to work out the complex thermodynamic data on the formation of solid carbon and organic compounds on the earth. Arnold Bainbridge, Junior Research Physicist, programmed the work for the computer.

Speaking before the national meeting of the American Geophysical Union at the University of California, Los Angeles, today, Suess described the results of the calculations and told how they might be applied to the other planets.

"The air that we breathe on this planet is something quite unusual in the universe," Suess said in discussing his paper with newsmen. "Hydrogen is about a thousand times more abundant in the universe than oxygen. Although oxygen combines instantaneously with hydrogen to form water, we find free oxygen in our earth's atmosphere. One reason for this is that in the upper atmosphere water vapor is photochemically split by the light of the sun into hydrogen and oxygen molecules. The hydrogen is so light that it escapes from the earth's gravitational field into outer space. The oxygen is left behind. This has been going on since the formation of the earth some 4.5 billion years ago.

"When the earth was formed, the earth's atmosphere contained much more hydrogen, methane, and ammonia than it does now. Because of photochemical splitting, free oxygen began to accumulate some time in the early history of the earth. But shortly before this-- before the earth's atmosphere became oxidizing-- the first organic compounds were formed from methane and other carbon-containing substances.

"At San Diego we have been calculating the conditions under which this can occur. By using a computer, we have been able to perform these calculations with more accuracy than has previously been known."

Suess said the calculations are applicable to the other planets in the solar system. "They give us a theoretical basis for studying the feasibility of the suggestion that the clouds on Venus consist of petroleum, for example. The calculations do not prove that they are petroleum, but they do prove that they could be.

"If chemical conditions on Venus were the same as those on the earth, then because Venus is closer to the sun and its temperature is higher than ours, the photolysis of water vapor and the escape of hydrogen would be faster and one would expect to find an atmosphere that contains much more free oxygen than that of the earth. But it is well known that Venus does not have such an atmosphere. Instead one finds that large amounts of carbon dioxide are present and no free oxygen. Our thermodynamic calculations make it appear plausible

that large amounts of carbon could have been retained in the terminal phases of the formation of Venus and that would explain the completely different chemical situation."