PHYSICS

# Lasers Break Gas Atoms

## Gases react chemically when exposed to the intense light of a laser, experiments have shown

➤ THE INTENSE bursts of light from a laser can produce chemical reactions in gases, a discovery that opens new method for high-temperature studies.

The temperature created by the laser are high enough to break the gas atoms apart into electrically charged particles, or ions, that form a plasma. However, the chemical changes the atoms undergo are typical of high-temperature chemical reactions rather than those resulting from ionizing radiation.

A beam of laser light transforms methane primarily into hydrogen and acetylene, for instance. Acetylene is a gas used as the starting chemical for making artificial rubber and other synthetic materials.

Carbon dioxide is decomposed into carbon monoxide and oxygen in a laser beam, two scientists at Westinghouse Research Laboratories, Pittsburgh, Pa., have found. Results of laser bombardment of typical gases were reported to the American Chemical Society meeting in New York by L. M. Epstein and K. H. Sun.

The laser used in the Westinghouse studies was a so-called "Q-switched" ruby laser, in which the energy output is concentrated into extremely short, high-powered pulses. The average power delivered by the laser was almost 200 million watts in pulses lasting only 30-billionths of a second.

When focused to a point on the target gas, the power density within the gas was at least 650 billion watts per square inch. Temperatures created in the gases are estimated to be about two million degrees F.

The experiments indicate that the giant pulse laser can be conveniently used to study very high-temperature chemical reactions. The technique may also prove useful for measuring the energy levels of laser light beams.

The scientists reported details of their studies to nonchemists in Nature. 211: 1173, 1966.

Lockheed

SPACE WORKER—During high altitude chamber experiments on man's ability to work in a near vacuum, Lockheed's Lou Testaguzza performed simple tasks of threading nuts, torquing bolts and connecting electrical cables on an adjustable panel.

SPACE

# Altitude Test Successful

➤ THE FIRST PHASE of testing a man in an altitude chamber capable of producing the vacuum of space which exists 320,000 feet up was completed by Lockheed Missiles & Space Co., Sunnyvale, Calif. (A man will die in seconds at 50,000 feet without life support equipment.) The series of tests of man's ability in space will run into 1967.

In the tests, a man was placed in a chamber with an atmosphere simulating that of one at an altitude of 50,000 feet to study the ability of man to work in space and on the moon.

The tests marked the first time the Lockheed altitude chamber has been operated with a man as the test subject. The primary purpose was to discover whether there are differences in performing representative lunar tasks in a vacuum as compared to sea level.

According to Dr. Stuart Parsons, test project engineer, preliminary findings indicate that differences may exist. "The results from these first tests," he said, "will help us make final designs on our next set of experiments."

In the one-hour test runs—four at 50,000 feet and four at sea level—Lockheed test subjects Lou Testaguzza and Bob Urling, while wearing space suits performed simple tasks of threading nuts, torquing bolts, and mating connectors on an adjustable panel.

On each test run, these tasks were performed three times with the panel at different heights. Every test concluded with 20 minutes of walking inside the altitude chamber.

During the tests, the subjects' physiological reactions were continuously monitored by a flight surgeon, and the time required to complete each task was clocked from three observation posts.

Dr. Parsons stated that while the first manned chamber operations required only simple tasks of the test subject, later tests would become increasingly difficult. "By next year," said Parsons, "we expect to be able to simulate an entire lunar mission, including the one-sixth gravity of the moon."

Parsons concluded that as soon as the present results could be fully analyzed and incorporated into present planning, the more intricate mission simulations would begin—probably in November.