

tient by scoring in categories what the patient says.

SUBSURFACE GEOLOGY IN PETROLEUM EXPLORATION: A Symposium—John D. Haun and L. W. LeRoy, Eds.—*Colo. School of Mines*, 887 p., illus., \$10. Reference work on subsurface exploration.

A TECHNICAL WRITER'S HANDBOOK FOR TECHNICIANS, ENGINEERS, EDUCATORS, BUSINESSMEN AND SCIENTISTS—Margaret Norgaard—*Harper*, 241 p., \$3.75.

UNIVERSITY MATHEMATICS: A Textbook for Students of Science & Engineering—Joseph Blakey—*Philosophical Lib.*, 2nd ed., 581 p., \$10. First-year London University course.

WINDOW IN THE SKY: The Story of Our Upper Atmosphere—Homer E. Newell, Jr.—*McGraw*, 116 p., illus. by Gustav Schrotter, \$2.75. Concise introduction to the phenomena of outer space.

Science News Letter, December 12, 1959

ENGINEERING

Heat and Drag Impact On Spaceships Studied

JUST HOW much heat and drag are exerted on a spaceship, satellite or meteor by the impact of invisible particles in the thin upper atmosphere will be studied during the next three years by Dr. Eldon L. Knuth of the University of California, Los Angeles, under a \$75,800 grant by the National Science Foundation.

The UCLA engineering professor's laboratory investigations into these momentum- and energy-transfer problems may help determine the body construction and flight paths of future spaceships and satellites.

To simulate the conditions of a space vehicle moving at 25,000 feet per second above an altitude of 100 miles, Dr. Knuth will shoot beams of molecules at various metal, glass, and other solid surfaces.

Previous laboratory experiments along this line have been handicapped because of the low speed and intensity of the beams. Dr. Knuth plans to raise their energy range, using an electric arc to heat the molecules above 15,000 degrees Fahrenheit, and a supersonic nozzle to direct the molecules and increase their intensity.

Besides its immediate practical application, Dr. Knuth's study may throw additional light on what happens chemically when molecules collide with other molecules.

Taking part in the project also will be Dr. Andrew Charwat, associate professor of engineering, and several graduate students.

Science News Letter, December 12, 1959

Do You Know

More than 10,000,000 surgical operations are now performed in this country each year.

Great Britain is totally lacking in natural gas resources.

The average American born today will probably live to be 70 years of age.

Cattle bruising during marketing and processing causes losses estimated at \$12,000,000 per year.

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