

large concentration of technical, scientific, and medical literature, is planning to move to a new building on the Technology Center campus of Illinois Institute of Technology in Chicago. It will be consolidated with the existing Illinois Tech library, which has an estimated total of 125 000 engineering and scientific books and periodicals.

The editors of *Industrial Mathematics*, a publication of the Industrial Mathematics Society, have inaugurated a new policy whereby the journal will be published semiannually and its pages will no longer be restricted to the society's membership. Papers on the industrial applications of mathematics may be sent to the Editors, *Industrial Mathematics*, 100 Farnsworth Avenue, Detroit, Mich.

More on Helium

F. G. Brickwedde's article on "The Helium Situation" in the August issue of *Physics Today* was primarily concerned with reviewing the present status of helium conservation and production in the United States and with spelling out the procedures which must be followed by helium users in obtaining needed supplies. The article also reported briefly on the plan formulated by the US Bureau of Mines for conserving some 60 percent of the four billion cubic feet of precious helium which is wasted annually through the commercial supplying of natural gas to domestic and industrial consumers. That plan, which calls for the construction and operation by private industry of twelve helium recovery plants in addition to the five separation plants now operated by the Bureau itself, would provide for the stockpiling of significant amounts of helium in anticipation of the time when the known reserves of helium-rich natural gas will have been exhausted. Since conventional methods of extracting helium from natural gas involve arrays of compressors and heat exchangers for liquifying the other constituent gases, the separation plants are necessarily large and are expensive to build and to operate. It is therefore of interest that recent experimental studies suggest the possibility that a simpler and less costly extraction process may prove feasible.

A highly selective diffusion technique has been developed by K. B. McAfee of the Bell Telephone Laboratories which makes use of the rapid diffusion rate of helium through glasses of high silica content. The selectivity of the process depends on the inability of atoms of gas with diameters larger than a critical maximum to pass through the interstitial regions of the solid. In the process, a helium-bearing gas is passed over and around a bundle of glass capillaries, which are sealed at one end, and joined in a common header at the other. Under suitable pressure and temperature conditions, the helium passes rapidly through the walls of the capillaries and is taken off at the header, while the depleted gas passes on. Other than helium, the only gases having appreciable diffusion rates are hydrogen,

deuterium, and neon, and for hydrogen, which is the closest competitor, the rate of diffusion is as much as 1000 times slower than that of helium.

Some of the major features claimed for the process are complete separation of helium from most natural gases in a single stage of diffusion, flexibility (the diffusion cells might be installed almost anywhere, even in a pipeline), applicability to gases containing low concentrations of helium, and the relative lack of maintenance that might be expected in actual operation. The process is believed to be economically competitive with existing methods, and it is suggested that the technique might conceivably be used even to extract helium from the atmosphere.

Bell Laboratories described the process to a group of pipeline and consulting engineering firm representatives at a symposium held at Murray Hill in July 1958, and a paper on the subject was presented at the Vancouver meeting of the American Physical Society in August 1958. A number of firms have constructed small pilot units for study, and research at several glass companies has progressed to the point where thin-walled capillaries are now available at relatively low prices in multi-mile quantities. It has been suggested that one big use of laboratory-size diffusion units could lie in the purification and recovery of helium employed as an inert carrier gas in such applications as gas chromatography and in nuclear reactors. At least one commercial manufacturer is reported to be about ready to offer a laboratory unit for such use. With the growth of gas chromatography as an analytical and preparative tool, one estimate indicates that if the inert carrier continues to be wasted this single application could consume the entire present production of helium within the next decade.

A spirited account of Canadian efforts to produce helium gas for use in lighter-than-air craft during the first world war is contained in a recent memoir by John Satterly, for many years professor of physics at the University of Toronto, who narrates from memory and from notes his recollections of the origin and progress of the 1915-20 helium project sponsored in Canada by the British Admiralty. The latter had become painfully aware of the combustibility of the hydrogen-filled observation balloons then used for watching enemy positions and it was decided to investigate the possible use of helium instead of hydrogen. Since the United States was not yet involved in the war, the search for helium was confined to the British Empire and it was finally established that the richest available source of helium was Canadian natural gas from the Bow Island field in Alberta, where the helium abundance was 0.36%. Prof. Satterly's narrative describes the project from its beginning (the initial staff consisted of the three remaining professors in Toronto's wartime Physics Department) and reviews the extraction experiments which culminated in the development of a plant that produced 60 000 cubic feet of helium before being shut down in the spring of 1920. Entitled, *The Story of the Early Days of the Extraction of Helium Gas from Natural*

Gas in Canada, 1915-1920, the document is available from the Department of Mines and Technical Surveys, Ottawa, Canada, as "Mines Branch Information Circular IC 105" (25¢ per copy).

Facilities

Construction has commenced on a building to house the Union Carbide Research Institute, a special research activity of Union Carbide Corporation, which was formed in 1956 in order to complement and extend the scope of the basic research being carried on in the Corporation's research laboratories. A major purpose of the Institute is to conduct fundamental studies of the physical and chemical behavior of matter under ordinary as well as extreme conditions of pressure and temperature. Programs already under way or in the planning stage include such areas of study as solid-state physics, the theory of metal bonds, and the structure of plastics. The new building will be located at Union Carbide's 280-acre site in Eastview, N. Y., and is expected to be ready for occupancy in the latter part of 1960.

The **California Institute of Technology** in Pasadena has received a gift of more than \$1 million from The Firestone Tire & Rubber Company for the construction of a new facility to be known as the Firestone Aeronautical Research Laboratory. The new building will house several kinds of advanced research equipment including plasma jets, shock tubes, electric-arc wind tunnels, and hypersonic tunnels to operate at speeds up to the equivalent of 12 400 mph. Work in the new building will be devoted chiefly to studies of missile and aircraft structures at hypersonic speeds, design criteria for solid propellants for missiles and rockets, flow problems at hypersonic speeds, heat transfer, and theoretical fluid mechanics.

Microwave Associates, Inc., has begun construction of two new buildings in Northwest Industrial Park, Burlington, Mass. One building will be utilized by the firm's semiconductor and tube operations and the second building will house WAVECO Corp., a subsidiary of Microwave Associates which manufactures microwave radar components, and the parent company's Component and Research and Engineering Group. The two buildings are scheduled for completion during the spring of 1960 at a cost of approximately three-quarters of a million dollars.

American Metal Products Company of Detroit began construction in August of a research, engineering, and development center in Ann Arbor, Mich. The location was chosen because of consulting services and facilities that are available to industry at the University of Michigan. The new center, which will open in December and is expected to reach full operation sometime next year, will contain high-temperature enclosures, laboratories for metallurgical and chemical research, and engineering facilities and equipment for

ΦΥΣΙΚΟ —

Physicists

M.I.T. INSTRUMENTATION LABORATORY, directed by Dr. C. Stark Draper, is famous for outstanding contributions and leadership in the development of high performance flight control and inertial guidance systems making use of an ultimate combination of gyroscopic devices, servomechanisms and electronic components.

we are seeking

PHYSICISTS with considerable understanding of Atomic and Solid State Physics, with interests in cryogenics or optics.

the challenging

undertakings of Physicists at Instrumentation Laboratory include instrumentation of star tracking systems, development of telescope stabilization techniques, general optical and servo test and development, rigid dynamic studies, and theoretical evaluation of "blue sky" types of gyros and accelerometers as well as the practical building of such units as may appear promising.

if you are a

Physicist, with the vision to work on theory and the experience to develop in practice, who is interested in performing these composite tasks in a stimulating atmosphere of constant research and discovery . . . write:



DR. C. S. DRAPER
Director
INSTRUMENTATION
LABORATORY,
MASSACHUSETTS INSTITUTE
OF TECHNOLOGY
68 Albany Street
Cambridge 39,
Massachusetts

U. S. Citizenship Required

ΜΑΘΗΜΑΤΙΚΟΣ