

because of the Eskimos' excellent clothing and Arctic technology, they do not show any major adaptive changes.

Another long-term project has involved basic studies of cellulose, the most abundant biological substance in green plants and bacteria, and of the ribonuclein particle which is responsible for producing all proteins in living cells. During 1960-61 the precursor of cellulose was isolated for the first time, purified, and its composition determined, while the ribonuclein particle was shown to consist of at least sixteen new proteins. Studies on the hemicelluloses of hardwoods and coniferous woods have provided considerable information of practical use in the pulp and paper and rayon industries. Important information has also been obtained on the structure of the protein hemoglobin and of proteins in general.

**Applied Chemistry.**—The Division of Applied Chemistry is concerned with supplying new scientific information for the development of Canada's natural resources and chemical industries. Although formerly much of the work involved solving immediate, specific problems, a larger part of the Division's effort is now being devoted to more basic studies. This avoids conflict with industrial laboratories and consultants and, in addition to providing fundamental information, often produces practical results.

For instance, a long-term investigation on the contacting of fluids and solids—an operation vital to many chemical engineering procedures—has resulted in a successful commercial operation for drying grain. The same method can easily be extended to chemical reactions and to removing liquids from other materials.

Another long-term project of considerable industrial potential has concerned the factors responsible for the stability, or the destruction, of suspensions of solids in liquids. Recently, a method has been devised for easily separating almost any suspended solid from the liquid surrounding it. When a mixture of solids is involved, it is often possible to separate single elements. Then, too, the study of chemical reactions at very high temperatures—carried on over the past several years—has resulted recently in the successful preparation of a stable polymer that could not be produced by conventional means.

The eleven sections of the Division are: analytical chemistry, applied catalysis, applied physical chemistry, chemical engineering, colloid chemistry, corrosion, high polymer chemistry, metallurgical chemistry, physical organic chemistry, rubber and textiles. Much of the work falls under the general headings of petroleum or corrosion chemistry, in that several sections work on topics related to one of these fields.

**Pure Chemistry.**—The Division of Pure Chemistry is organized around a nucleus of outstanding Canadian chemists who direct about 50 young postdoctorate Fellows from all over the world. The work consists of long-term fundamental investigations in physical and organic chemistry.

The work in organic chemistry includes investigation of the structures of alkaloids, studies of the infrared spectra of steroids, the synthesis of porphyrins and of compounds labelled with isotopes. Other sections deal with chemical kinetics and photochemistry, the study of the ionization potentials of free radicals by mass spectrometry, Raman and infrared vibrational spectroscopy, and the application of high resolution proton magnetic resonance techniques to the study of hydrogen bonding and other molecular interactions. Still others study certain aspects of surface chemistry such as the thermal properties of simple solids and imperfections in the bulk and the surface of alkali halide crystals, the heats of micellization by microcalorimetry, and the thermodynamics and stress-strain relationships associated with the absorption of fluids by active carbons. There is also a small group interested in the chemistry of fats and oils, and one engaged in fibre research.

**Applied Physics.**—The work in Applied Physics is divided between research projects likely to be of practical value and the continual development of the fundamental standards on which measurements generally are based. All the fundamental physical standards for Canada are housed and serviced in this Division, which now has primary standards equal to any in the world in the fields of mass, length, time, electricity, temperature and radiation.