

Engineering and developmental aspects of individual projects, including several for Canadian industry, have been undertaken. Among these are the oxidation of ethylene to chemical intermediates, the activation of clay used in contact bleaching of oils and the cracking of petroleum oils, sedimentation of suspensions, and potential application of the newly developed spouted solids technique for contacting fluids and solids.

The range of a method for determining the molecular weights of chemical compounds and polymers has been extended to include materials in the molecular weight range 40,000-100,000. The effect of acids and bases on the rates of oxidation of inhibited and non-inhibited liquid hydrocarbon has been examined to gain further information on the mechanism of oxidation of petroleum products.

Preliminary work has been done toward the use of fluorescent and phosphorescent markings on letters for automatic sorting methods. These types of markings avoid many of the difficulties encountered in automatic sorting, and it would appear that a very satisfactory system should result. Work has continued on a thermoplastic rubber adhesive for bonding rubber to metal; this adhesive, derived from natural rubber, is stable and improves with age.

Several interesting new types of textile damage have been studied and synthetic detergents are being examined. The textile laboratory co-operates with the Canadian Research Institute of Launderers and Cleaners to maintain high operating standards in Canadian cleaning establishments. Assistance is given to government departments on problems such as the moth-proofing, rot-proofing and moisture-proofing of textiles. Other work involves problems of applied catalysis, gas phase chemical reactions, effect of high pressures on chemical reactions, heterogeneous catalysis, and physical-organic and analytical chemistry.

Pure Chemistry.—The Division of Pure Chemistry is organized around a nucleus of outstanding Canadian chemists who direct about twice their own number of young postdoctorate Fellows from all over the world. The work consists of long-range, fundamental investigations in the fields of physical and organic chemistry. Although the products of pure curiosity seem far removed from ordinary life the Division's experts are frequently invited to speak to groups of applied chemists and other scientists employed in Canadian industry. They also lecture in universities.

There are thirteen sections in the Division: organic chemistry, mostly on the structure of alkaloids; organic spectrochemistry; organic synthesis; chemical kinetics and photochemistry; mass spectrometry; molecular spectroscopy; surface chemistry and low temperature calorimetry; thermochemistry; activated carbon, inorganic and general chemistry; intermolecular forces and physical properties; fibre research; chemistry of fats and oils; and general physical chemistry.

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, light, electricity, temperature and radiation.

Research on methods of establishing standards in new areas where there is as yet no international agreement has received increased attention. Determination of some of the limits of accuracy of the International Temperature Scale in its present form, and investigation of the possibility of replacing some of its fixed points at a later date, is in progress. Work in the Interferometry Section contributed importantly to an international decision late in 1957 concerning the redefinition of the international metre in terms of a wavelength of light.

The Division is also working to meet a sharply increased demand for research to aid industry. Problems of noise abatement involving the development of a special ear defender, and the silencing of suction rolls in paper mills have received considerable attention, and work is under way concerning centrifugal blowers and nail-making machines.