

have reduced the amount of waste. One of the new products of the pulp and paper industry is 'vanillin' made from waste sulphite liquor.

The manufacture of phosphoric acid by oxidation was started in Canada in 1924. Phosphorus had been produced by the electrothermic smelting of phosphate rock since 1897. A plant was built in 1932 to use this pure phosphoric acid for making phosphate of lime which is used as one of the primary ingredients in many baking powders. The production of trisodium and disodium phosphate followed in 1934.

In recent years a number of additional products derived from acetylene have been prepared in Canada. Among these are acetylene black used in dry batteries and for thermal insulation, a variety of synthetic resins produced by polymerization of vinyl acetate alone and in conjunction with acetaldehyde and formaldehyde, ethyl acetate produced by the catalytic condensation of acetaldehyde, and vinyl acetate from acetylene and acetic acid.

A sulphuric acid plant erected in 1925 near Sudbury is believed to be the first contact plant to employ smelter gases. Much preliminary investigation was necessary, since these gases have characteristics different from those of ordinary burner gases.

The mining industry in Canada has been helped in many ways by the application of science. New mines have been discovered by the application of geology and geophysics. The determination of mineral deposits has been effected by these sciences. The limits of the Precambrian area, which is known to contain great mineral wealth, have been outlined by geological methods. The calibre of the Canadian work in geology is indicated by the fact that in a recently prepared list of Canadians who have distinguished themselves in the field of science about half the names are those of geologists.

Prior to 1920, nickel was used chiefly in armament manufacture. With the policy of reduction in armaments that followed, the nickel industry faced serious conditions. However, the research staffs in the United States and Great Britain developed new alloys and uses for nickel. Nickel has made possible the production of alloys having a wide variety of properties, sometimes opposite in character, such as low magnetic permeability (no-mag), extremely high magnetic permeability (permalloy), zero coefficient of thermal expansion (invar), the same coefficient of thermal expansion as glass (platinite) zero coefficient of electrical conductivity (constantan), resistance to tarnish (monel), resistance to tarnish at high temperatures (nichrome), resistance to alkalis, resistance to all common acids, hot or cold, dilute or concentrated.

In the metallurgical field Canada has contributed her share to progress. The late D. H. Browne conceived the idea of firing reverberatory furnaces with pulverized coal. This method made possible the burning of a greatly increased quantity of coal per unit of time. The higher temperature and higher rate of smelting resulted in a lower cost for fuel, refractories, and overhead, and reduced slag losses.

Selenium is being recovered as a by-product in refining the copper from certain mines. Recovery was started in 1931, and the output has grown so rapidly that Canada is now an important producer of the element.

An electrolytic process using as anodes the lead concentrate to be refined and as a bath a solution of lead fluosilicate containing an excess of fluosilicic acid was developed at Trail, B.C. The production of zinc at lowered cost was made possible