



A Great Development of the Past Decade. Immense works of the Aluminium Co. of Canada Limited at Arvida, Que., construction of which has been an important factor in Canada's industrial progress.

Canada's Progress in the Chemical Field

Important Advances Made in Many Lines of Industry as a Result of the Research Work of Chemists

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Some of the remarkable achievements of the past decade in Canada, resulting from the research activities of chemists and the application of chemical engineering, are outlined in this informative article by Dr. Whitby. When brought together, they reveal in their entirety a truly wonderful expansion, with many new products taking the place of commodities previously imported. Possibly in no other field has such progress taken place as in that in which chemistry has played a part.

IN REVIEWING some of the outstanding technological advances which industry has made in Canada during the last decade, it is perhaps not inappropriate, on account of the great current interest in mining, to start with that branch of chemical industry which is concerned with the production and refining of metals. Here are some of the landmarks which have marked the last decade:

In 1926 the fine plant at Arvida, Quebec, started to produce aluminium, making use of a large amount of electricity produced from the rushing waters of the Saguenay River; and

exports of aluminium from Canada rose from 11,327 tons in 1924 to a peak of 36,485 tons in 1929. In 1927 a plant was installed at Arvida for refining the aluminium ore, bauxite, by a novel electric furnace process which eliminates the iron as merchantable ferrosilicon. As a result, from 1928 onward bauxite ore, from British Guiana, has been the raw material of aluminium manufacture in Canada, in place of refined alumina formerly used.

In passing, it may be noted that Japan, which has been an important market for Canadian aluminium (9,500 tons was exported to Japan in 1931) is strenuously endeavouring to establish the manufacture of aluminium at home, using as raw material either alunite (an aluminium silicate) from Korea or clay from Manchukuo.

In 1927 smelting was started by Noranda. In 1928 cadmium was produced for the first time in Canada; in 1930, bismuth; in 1931, selenium, and in 1933 radium and uranium compounds. Canada is potentially a large producer of selenium, a by-product of copper refining. The known uses of

selenium are limited, however, and if a large increase in production is not to break the price, research on new uses for the element is much to be desired.

An important advance based on research carried out in Canada was signaled by the construction at Trail in 1930 of a plant, with a daily capacity of 100 tons, for recovering zinc by fuming from slag piles. A marked change has come over copper production in Canada. Largely owing to the imposition of a 4 cents duty on blister copper by the United States, the refining of copper in Canada has undergone a great development. In 1924 only 1,768 tons of refined copper was produced in Canada; by 1931 the amount had risen to 92,183 tons. The total production of copper rose from 52,228 tons in 1924 to 151,739 tons in 1930 and a still higher figure in 1934. Canadian production of refined lead rose from 65,235 tons in 1924 to 152,225 tons in 1930 and still more in 1934. A significant advance in gold recovery is the recent application to gold ores of the flotation method of concentration prior to dissolving the gold out by cyanide solution. The

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Gold Medal of the Canadian Institute of Mining and Metallurgy was awarded to R. J. Denny in 1932 for this advance.

The production of stainless steels at Shawinigan Falls is another recent development of note. Mention should also be made of the fact that a much wider range of alloys of the ferro-silicon type, products of the electric furnace used by the steel industry, is now being made in Canada than was the case in 1924. The production of rare metals of the platinum group increased as follows: Platinum from 9,186 ozs. worth \$1,091,427 in 1924 to 98,860 ozs. worth \$3,746,794 (estimated from first six months' production) in 1934; palladium, rhodium, etc. from 9,516 oz. worth \$862,513 in 1924 to 79,248 oz. worth \$1,512,516 (estimated from first six months' production) in 1934. Canada is now second only to Russia as a platinum producer.

The development of better refractories, capable of withstanding higher temperatures and having greater resistance to attack by the furnace contents, has necessarily been a condition of metallurgical progress. The



Refinery for Coal Tar Chemicals Erected in Toronto in 1931. New plant of Dominion Tar & Chemical Company Limited, in which pure phenol is manufactured for the Canadian market. This is a product which was formerly imported. In addition, creosols and other tar acids are produced.

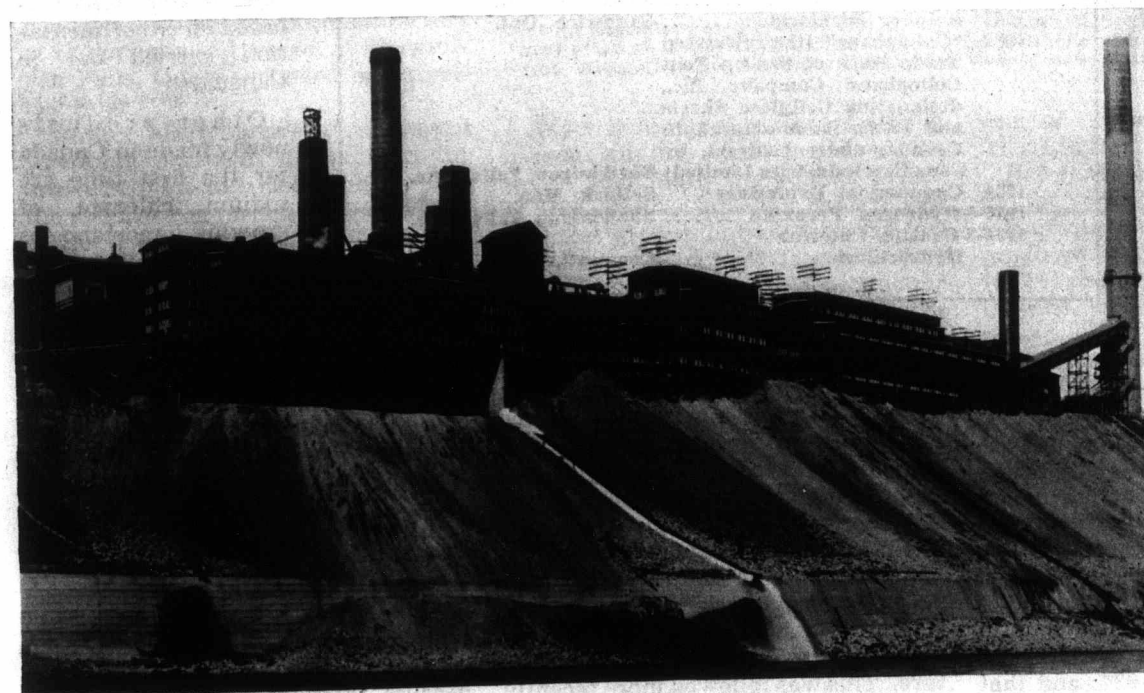
fact therefore is deserving of note that during the last decade there has been a notable advance in the production of basic refractories in Canada from the magnesian rock of Quebec. A considerable tonnage of refractory material was produced from this rock during the war, but when the pure, Austrian magnesite again became available, the business dwindled, away. Thanks, however, to intensive research carried out by the National Research Council in co-operation with Canadian Refractories Limited, the industry has been re-established; the technical difficulties presented by the Quebec rock have been overcome, and there has been developed a product which has such advantages over

the Austrian product for lining open-hearth steel furnaces that it is actually receiving a premium over the latter in the export market.

"Heavy" Chemicals

While those branches of chemical industry which deal with organic substances have in general been subject to rapid change, owing to the frequency with which new and improved products have been developed, the inorganic chemical industry—the so-called "heavy" chemical industry, which embraces what may be called the staples of chemical manufacture, such as inorganic acids, alkalies and salts—has been relatively stable. Yet even here there have been very notable developments during the last decade.

In 1931 plants were put into operation by the Consolidated Mining and Smelting Company, Trail, B.C., and Canadian Industries Limited at Sandwich, Ontario, for making synthetic ammonia—snatching inert nitrogen from the very air and turning it into a chemical compound, used at Trail for the manufacture of nitrogenous fertilizers and in the case of Sandwich for the production of nitric acid employed in



Slag Fuming Plant of the Consolidated Mining & Smelting Co. of Canada Limited at Trail, B.C.