

The Nitrogen Industry and World War I: Confronting the Nitrate Problem

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At the outbreak of World War I in August 1914 the Allies and the Central Powers were reliant on imported Chile saltpetre (sodium nitrate) for both agriculture and production of nitric acid required to nitrate organic chemicals that employed as explosives. For the Central Powers the availability of the vital nitrate ceased following the Battle of the Falkland Islands in December 1914, when the British Royal Navy sent the Kaiser's Far Eastern Squadron to the bottom of the Atlantic. Germany then turned to two novel industrial processes for capturing atmospheric nitrogen: electrothermal production of calcium cyanamide (Frank-Caro process); and synthesis of ammonia from its elements by the high-pressure process of BASF (Haber-Bosch process). The nitrate shortage in Germany and the long stalemate on the Western Front stimulated technical improvement and massive expansion of synthetic nitrogen processes, and major developments in the production from ammonia of nitric acid by catalytic oxidation. The Haber-Bosch process came to the forefront from mid-1916 mainly as a result of the Hindenburg programme of state-led industrialization. By this time the losses caused by submarine attacks on Allied shipping had stimulated investigations into synthetic nitrogen compounds in Britain and elsewhere. Wartime research in Europe and the United States inaugurated a new era in industrial chemistry, including the growth of a key sector: synthetic nitrogen products as fertilizers.