

# Nitrate

By [Manuel Bastias Saavedra](#)

## Summary

Until 1914 natural nitrates were the most important source for the production of fertilizers and explosives. Beginning in 1883, the main nitrate reservoirs were controlled by Chile, which produced almost 80 percent of world nitrogen. The First World War spurred Germany to develop synthetic nitrogen, which ended Chile's monopoly of world nitrates.

## Table of contents

- [1 Nitrate Production in Latin America](#)
- [2 The First World War and the Nitrate Market](#)

[Notes](#)

[Selected Bibliography](#)

[Citation](#)

## Nitrate Production in Latin America

Since the 19<sup>th</sup> century, nitrates have been used mainly to obtain the nitrogen required for fertilizer production and other chemical uses, particularly for explosives manufacturing. Natural nitrates were found on a scale that made their extraction commercially viable in only two parts of the world: [Latin America](#) and [India](#). However, by 1918 Indian potassium nitrate represented less than 1 percent of total world exports of natural nitrate. Therefore, until the early 20<sup>th</sup> century, industrial processes depended almost exclusively on the natural reservoirs of sodium nitrate found in the coastal regions of what today is northern Chile.

Peru was one of the first producers of natural nitrate in the form of guano, exporting over 10 million tons between 1840 and 1870. Peruvian guano deposits were rapidly depleted due to its intense exploitation, making saltpeter the main source of natural nitrate between 1880 and 1920. The saltpeter deposits were concentrated in the Atacama Desert, then located in Peru's Tarapacá region and the Bolivian coastal region of Antofagasta. The desert's extremely arid climate provided ideal conditions for the formation of natural nitrate deposits. Peru and Bolivia's efforts to control the British and Chilean companies that were mining the desert for nitrates resulted in the War of the Pacific (1879-1883), in which Chile defeated Peru and Bolivia, and annexed both of these nitrate-rich regions. In the 1890s Chile practically monopolized the production of natural nitrate, supplying almost four-fifths of the nitrogen used in the world. But by the turn of the century, Chile's monopoly was eroded by

new processes of synthetic nitrogen production. Still, in the absence of cost-efficient synthetic production methods, Chilean saltpeter still accounted for over 50 percent of the world's production of nitrogen in 1913.

## The First World War and the Nitrate Market

The First World War produced notable transformations on both the supply and demand side of the world nitrate market. On the demand side, perhaps the most obvious shift in nitrogen consumption was from agricultural uses towards large-scale production of powder and explosives. Before 1914, only one-fifth of all Chilean nitrate exports were consumed in the powder and explosives industry; almost four-fifths of all nitrate exports were used for military purposes thereafter. Great Britain, for example, stepped up production of powder and explosives from 50,000 tons in 1914 to over 1,860,000 tons in 1917. After a slump in the first years of the war, Chilean nitrate exports increased in 1916 to meet the war demands for explosives, surpassing pre-war export levels with a peak of almost 3 million tons.

The importance of sodium nitrate for the production of munitions and explosives transformed the transport routes for Chilean nitrate into battlefields. At the outbreak of the war, a German fleet stationed off the coast of Chile under Admiral [Maximilian von Spee \(1861-1914\)](#) interrupted the shipments of sodium nitrate. An English fleet under Admiral [Sir Frederick Charles Doveton Sturdee \(1859-1925\)](#) broke the blockade by sinking the German fleet on 8 December 1914, in the [Battle of the Falkland Islands](#), thus resuming the exports of Chilean saltpeter. With the trade of saltpeter under British control, the markets for natural nitrate were substantially altered. A blockade against Germany closed what was, until 1914, the largest market of Chilean nitrate, and shifted the core of nitrate exports towards other European countries, [Great Britain](#), and the [United States](#). By the end of the war, the United States became the largest market for Chilean nitrate (see Table 1).

|      | Great Britain | Germany | Rest of Europe | United States | Other |
|------|---------------|---------|----------------|---------------|-------|
| 1912 | 5,7           | 37,9    | 31,6           | 23,6          | 1,1   |
| 1913 | 4,9           | 32,9    | 43,6           | 17,4          | 1,2   |
| 1914 | 13,9          | 23,0    | 37,5           | 23,0          | 2,6   |
| 1915 | 15,0          | 0       | 60,4           | 22,4          | 2,2   |
| 1916 | 23,7          | 0       | 34,3           | 40,4          | 1,6   |
| 1917 | 9,3           | 0       | 42,7           | 46,7          | 1,3   |

|      |      |   |      |      |     |
|------|------|---|------|------|-----|
| 1918 | 19,4 | 0 | 23,3 | 57,1 | 0,2 |
|------|------|---|------|------|-----|

Table 1: Chilean nitrate markets, percentage shares 1912-1918<sup>1</sup>

The exclusion of Germany from the natural nitrate market accelerated the industrial production of synthetic nitrate. Germany took advantage of technical processes developed by the country's own scientists in the years leading up to the war. The crucial breakthrough came when [Fritz Haber \(1868-1934\)](#) developed the process of nitrogen fixation through ammonia in 1913, making large-scale production of synthetic nitrogen economically feasible. This process, combined with the method developed by [Wilhelm Ostwald \(1853-1932\)](#) for converting ammonia into nitric acid – the main ingredient for most explosives – freed [Germany's](#) military industry from its dependence on Chilean nitrate. It has been said that, had it not been for the technical capacity to produce synthetic nitrogen, the shortage of munitions would have cost Germany the war by 1915.<sup>2</sup> Ultimately, the developments of the German chemical industry not only prolonged the war, but also transformed the world nitrogen market in the long run. Synthetic nitrates displaced Chilean saltpeter as the main source of nitrogen, thus paving the way for the end of the Latin American nitrate age.

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## Notes

1. Monteón, Michael: Chile in the Nitrate Era. The Evolution of Economic Dependence, 1880-1930, Madison 1982, p. 112. ↑
2. Hardach, Gerd: The First World War, 1914-1918, Berkeley 1981, pp. 59-60. ↑

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## Citation

Manuel Bastias Saavedra: Nitrate, in: 1914-1918-online. International Encyclopedia of the First World War, ed. by Ute Daniel, Peter Gatrell, Oliver Janz, Heather Jones, Jennifer D. Keene, Alan Kramer, and Bill Nasson, issued by Freie Universität Berlin, Berlin 2014-10-08. DOI: [10.15463/ie1418.10228](https://doi.org/10.15463/ie1418.10228)

## External Links

- [Cuevas, Enrique: The Nitrate Industry, 1916 \(Internet Archive\) \(Article\)](#)
- [Penrose, R.A.F.: The Nitrate Deposits of Chile, Journal of Geology, Vol. 18, 1910 \(Internet Archive\) \(Article\)](#)
- [Sass, Erik: World War I Centennial: German Chemists Invent a Lifeline, 2013 \(Mental Floss\) \(Article\)](#)

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### Author Keywords

Chile; Saltpeter; World War I; Nitrogen

### GND Subject Headings

[Chile ; Nitrate](#)

### LC Subject Headings

[Chile saltpeter industry](#)

### Rameau Subject Headings

[Nitrate de sodium ; Industrie et commerce](#)

### Key Person(s)

[Spee, Maximilian Reichsgraf von](#); [Sturdee, Doveton](#); [Ostwald, Wilhelm](#); [Haber, Fritz](#)

### Key Location(s)

### Title

Nitrate

### Author(s)

[Manuel Bastias Saavedra](#)

### Article Type

Encyclopedic Entry

### Classification Group

Objects

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