

lead ores of Mexico by Manuel del Rio in 1801, but investigation of these ores at the French Academy of Science by Collet-Descotils led to the conclusion that no new element was present and that Del Rio's new discovery was nothing else but the known element chromium. About thirty years later vanadium was re-discovered by the Swedish chemist, Sefstrom, in iron produced from the ores of Taberg in Sweden. Immediately afterward several other ores were found to contain this element. However, its occurrence in the various ores was in such small quantities that it still remained a rare and curious element. The great Berzelius interested himself in the discoveries of Sefstrom and practically evolved the entire chemistry of vanadium, producing a host of its compounds. Since then, one after another investigator has recorded its presence in various ores of iron, copper, lead and silver, and in clays, bauxite, and other non-metallic minerals and in almost all of the sedimentary rocks. Up to that time no thought was given to industrial application of vanadium and this period remained that of discovery and chemical study.

Beginning with 1863, Lewis Thompson, and in the following year, Edward Riley more or less suggested that the presence of vanadium in iron might impart to it remarkable ductility and other salutary properties. About 1870 Sir Henry Roscoe attempted to isolate the metal with the idea of studying its properties as such.

These ideas of metallurgical application were not actively pursued, but from that period until about 1890 various chemical applications of vanadium salts were suggested, as in the manufacture of aniline black, in calico printing, in dyeing, and in the ceramic industry. Beginning with the year 1890 serious attention again began to be directed towards the usefulness of vanadium in the metallurgical field and Moissan, in 1893, made very exhaustive attempts to reduce vanadium in the electric furnace. The first important record, however, of application of vanadium to a steel product is a test made on armour plate containing vanadium at the Firminy Steel Works in France. However, it was not until the complete and comprehensive work of Professor Arnold in Sheffield in 1900 was carried out that vanadium was recognized as a useful element for alloying in steel. In 1904 this work was followed up by the further researches of Guillet and considerable interest was aroused in the properties of vanadium steel by the very complete work of Sankey and Smith on chrome vanadium steels published before the British Institution of Mechanical Engineers.

Just at this stage, when the usefulness of vanadium was recognized and established, the best known deposit of vanadium ore in the world was discovered (in 1905) in the Peruvian Andes by engineers employed by the American Vanadium Company. Discovery of this deposit stimulated further research