



# On two new metals, pelopium and niobium, discovered in the bavarian tantalites

Prof. H. Rose

**To cite this article:** Prof. H. Rose (1845) On two new metals, pelopium and niobium, discovered in the bavarian tantalites, Philosophical Magazine Series 3, 26:171, 179-181, DOI: [10.1080/14786444508562692](https://doi.org/10.1080/14786444508562692)

**To link to this article:** <http://dx.doi.org/10.1080/14786444508562692>



Published online: 30 Apr 2009.



Submit your article to this journal [↗](#)



Article views: 4



View related articles [↗](#)

body with absolute success; and though but a very trifling application of natural philosophy to the practice of surgery, I have no doubt that, had it been adopted before, many joints would have been saved; and I confidently anticipate that it will be the means, in future, of frequently saving these parts from destruction."—*Lecture on the Detection of Needles and other Steel Instruments.*

ON TWO NEW METALS, PELOPIUM AND NIOBIUM, DISCOVERED  
IN THE BAVARIAN TANTALITES. BY PROF. H. ROSE.

I have discovered in the tantalite of Bavaria two new metals, in the present memoir however I shall only treat of one: the oxide of the second metal, to which I have for the present assigned the name of *oxide of pelopium*, greatly resembles tantalic acid, although I am fully persuaded that it is distinct. I shall however institute a series of experiments to determine their precise difference.

For more than four years I have been engaged in investigating the tantalites from various localities, and the tantalic acids derived from them. An observation of my brother engaged me to undertake these researches. He found that the tantalites of Bodenmais in Bavaria, and those of North America, have the same crystalline form as Wolfram. I had also noticed that the tantalites from the same or from different localities, having the same form of crystal and the same chemical composition, differed from each other by their specific gravity.

The analysis of these different tantalites was executed according to Berzelius's method, by fusing the mineral reduced to a very fine powder with bisulphate of potash in a platinum crucible.

To obtain an accurate idea of the composition of the tantalites of Bavaria and of North America, it was requisite to submit the tantalic acid obtained from them to a very strict examination. On comparing the amount of oxygen of the tantalic acid, derived from these localities, with the amount of oxygen of the bases, protoxide of iron and protoxide of manganese, the relation existing between them is found to be not simple. This relation is, on the other hand, perfectly simple in the tantalites from Finland, viz. as 3 : 1. The tantalic acid derived from the tantalites of Finland only is pure. Its characters have been described by Berzelius, and it alone will retain the name of tantalic acid. The acid obtained from the tantalites of Bavaria is composed of two acids, one of which greatly resembles the tantalic acid procured from the Finland tantalites, and will form the subject of a future communication. The other likewise resembles tantalic acid, but differs from it in many essential points: it is the oxide of a metal which differs from all known metals. I have called it *Niobium*, and its acid *niobic acid*, from Niobe, daughter of Tantalus, a name which calls to mind the resemblance between the two metals and their oxides.

Tantalic and niobic acids bear most resemblance in their properties to titanic acid and the binoxide of tin: all four have probably the same composition. Both of them, when calcined in the hydrated state, present the same luminous phenomenon. Both are white be-

fore and after calcination. When tantalic acid is heated, it acquires a faint yellow colour; niobic acid, on the contrary, a deep yellow; both became colourless on cooling. Tantalic acid forms on cooling a white dull powder; niobic acid, fragments possessed of great lustre, similar to that presented by titanitic acid precipitated by ammonia and calcined; with this difference,—that the titanitic acid exhibits a brownish tint, while the niobic acid remains colourless.

Tantalic and niobic acids readily combine with the alkalies. When fused with carbonated alkalies, they expel the carbonic acid. These combinations are soluble in water, and also in an excess of a solution of caustic or carbonated potash, but with difficulty in an excess of caustic or carbonate of soda. The niobate of soda indeed is almost insoluble in an excess of a solution of soda. Acids precipitate the tantalic and niobic acids from these solutions. Sulphuric acid precipitates both completely on the application of heat; but in the cold the tantalic acid is only partially thrown down by it, while the niobic acid is entirely precipitated. Hydrochloric acid in the cold only produces a turbidness in a solution of tantalate of soda; an excess of acid even causes this to disappear; with the assistance of heat it precipitates the tantalic acid, but not completely. In a solution of niobate of soda it produces a considerable turbidness in the cold, without precipitating the whole of the niobic acid, which it effects however with the assistance of heat. Oxalic acid has no effect on either of the alkaline solutions, while acetic acid produces precipitates. Hydrochlorate of ammonia forms precipitates.

When an infusion of galls is added to a solution of tantalate of soda, rendered slightly acid with hydrochloric or sulphuric acid, it produces a bright yellow precipitate. In a solution of niobate of soda it gives rise to a deep orange-yellow precipitate, which has some resemblance to the precipitate formed under similar circumstances in a solution of titanitic acid. Both the precipitates dissolve in caustic alkalies.

The tincture of galls is the best test for small quantities of tantalic or niobic acids in acid solutions; but it should be observed, that the presence of oxalic acid, or of any other non-volatile organic acid, prevents the formation of the precipitate.

The yellow ferrocyanide of potassium produces in a solution of tantalate of soda, rendered acid with a few drops of sulphuric acid, a yellow flocculent precipitate, which is slightly soluble in a large excess of hydrochloric acid. It gives rise to a decided red precipitate in a solution of niobate of soda, resembling that produced in the same solution by tincture of galls. The red ferrocyanide of potassium forms a white flocculent precipitate in a solution of tantalate of soda, a deep yellow one in a solution of niobate of soda.

If a blade of zinc be immersed in a solution of tantalate of soda rendered slightly acid, it produces no effect at first; but after some time a white deposit is formed consisting of tantalic acid, which is thrown down when the excess of acid begins to dissolve the oxide of zinc formed. In a similar solution of niobate of soda the zinc produces a blue precipitate, which in the course of time becomes brown.

Perchloride of tantalum, prepared from tantalic acid by means of

charcoal and chlorine, is yellow, very fusible and volatile. Perchloride of niobium prepared in the same manner is colourless, non-fusible, and but very slightly volatile.

When dry ammonia is passed over perchloride of tantalum, the gas is absorbed, but very slowly, and the perchloride becomes less heated than is the case with the other liquid and volatile metallic chlorides placed under the same circumstances. This is not owing to the perchloride not possessing great affinity for the ammonia; but the new combination formed envelopes the perchloride of tantalum, and prevents the reaction from extending further. If this new compound be heated, metallic tantalum is obtained, and hydrochlorate of ammonia disengaged. The whole of the hydrochlorate of ammonia is removed by washing with water. On heating the metal with access of air, it is converted into tantalic acid with evolution of light. The reduction of tantalum requires a much higher temperature than that of titanium under similar circumstances. Metallic tantalum presents the appearance of black crusts. Water has no action on it.

Perchloride of niobium submitted to the action of dry ammonia becomes yellow, with considerable evolution of heat, because from its being infusible it offers a greater surface to the action of the ammonia. On applying heat to the new compound it immediately becomes black, with disengagement of hydrochlorate of ammonia. The reduction is effected at a much lower temperature than that of the tantalum. On washing it with water to free it from hydrochlorate of ammonia, the water passes clear as long as it contains any of that salt; but when the metal is nearly pure the water becomes turbid. This inconvenience is avoided by adding a few drops of alcohol to the water. When heated in the air the metal burns with evolution of light into white niobic acid. Nitric acid and *aqua regia* are without action on it even on boiling; but it is attacked, with disengagement of red vapours, by a mixture of nitric and hydrofluoric acids. Tantalum behaves in the same manner towards these acids.

If the same atomic composition be admitted for tantalic and niobic acids, the weight of niobium will be higher than that of the tantalum\*.—From the *Chemical Gazette* for Jan. 15th, 1845.

#### ON THE CALCINATION OF HYDROUS OXIDE OF CHROMIUM.

BY M. KRÜGER.

It is well known that when hydrated oxide of chromium ( $\text{Cr}^{\text{r}}$ ) is heated to low redness in a platina crucible, it loses its water, becomes strongly incandescent, and loses its solubility in dilute acids. Several interesting circumstances have however remained entirely unnoticed in this experiment.

If hydrated oxide of chromium be heated only to a little above  $392^{\circ}$  F. in contact with the air, it loses all its water and becomes almost black, it is however brown, when reduced to fine powder; if

\* We are also informed by Mr. W. Francis that another new metal called *Ruthenium* has recently been discovered in the platinum residues, by Prof. Claus of Kasan.—R. T.