Ask the Historian

Why Tungsten Instead of Wolfram?

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Question

Why is the name tungsten used for element 74 in the English chemical literature whereas the name wolfram is used in the northern European literature?

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Answer

In 1781 the Swedish chemist, Carl Wilhelm Scheele (figure 1), reported the discovery of a new acidic oxide in a Swedish mineral known locally as "heavy stone" or "tungsten" (from the Swedish *tung* meaning "heavy" and *sten* meaning "stone"), also known as *lapis ponderosus* in Latin, *Schwerstein* in German, and as *tungstène*, *tunstène* or *pierre pesante* in French (1). In honor of this fact, he named the new oxide tungstic acid. Two years later the de Elhuyar brothers isolated the same oxide from the mineral *wolframite* and also reduced it to its component metal (2). They fully recognized that their oxide was the same as that found earlier by Scheele, and it was Scheele who first referred to the new metal as *tungsten regulus* in 1784. Similarly, the traditional French names for the newly discovered metals molybdenum and manganese were *régule de molybdène* and *régule de manganèse* respectively.

However, in their famous proposal of 1787 for the reform of chemical nomenclature, Lavoisier and his collaborators rejected the use of the term regulus to describe metals as it conflicted with their nomenclature proposals for binary compounds (3). As a consequence, they shortened these names to *molybdène*, *manganèse* and *tungstène* respectively, thus making the names for the metals identical with the corresponding irregular names for the minerals from which they were extracted. Robert Kerr, the translator of Lavoisier's famous *Traité* of 1789, rendered these into English as *molybdena*, *manganese* and *tungstein*, respectively (4),

Figure 1. Carl Wilhelm Scheele (1742-1786).

though the first of these was eventually changed to molybdenum and the third to the spelling "tungsten," as found in Scheele's original essay (1). Likewise, the original irregular names of the minerals were eventually displaced by the more systematic names of *molybdenite* instead of molybdena, *pyrolucite* instead of manganese, and *scheelite* instead of tungsten.

Though German chemists also eventually adopted the nomenclature reforms of Lavoisier and his colleagues, they often preferred to use German translations of the Greek names favored by the French reformers (thus *Sauerstoff* instead of oxygen and *Wasserstoff* instead of hydrogen). The German and Scandinavian chemical literature of this period was also much more closely allied to the mineralogical literature than was the case with the British and French literature and this quickly produced additional problems with respect to the term tungsten, as the mineralogists began to favor the alternative name wolfram for the new metal in honor of its original isolation from the mineral wolframite. Yet additional confusion was

produced when it was also proposed that the mineral tungsten be renamed *scheelite* and the corresponding element *scheelium* in honor of Scheele. Thus the 1791 German revision of Macquer's famous dictionary of chemistry listed the metal only under the entry "wolfram" (5), whereas the 1793 German dictionary by Remler listed tungsten, wolfram and scheelium as synonyms (6). In sharp contrast, British and French chemical dictionaries of this period, such as those by Nicholson (1795), Cadet (1803) and Ure (1821), make no mention of these alternatives and simply use the name adopted by Lavoisier and his collaborators or its English equivalent (7-9).

Both the names tungsten and scheelium reflect the fact that the element in question was discovered by a Swede and thus there is some irony in the fact that it was a second famous Swedish chemist, Jöns Jacob Berzelius, who ultimately determined that, in the northern European chemical literature at least, the element would come to be known by the name of wolfram instead. This came about via Berzelius' introduction of our current compositional chemical symbolism around the year 1814 in which each element is represented by a one- or two-letter abbreviation (10). In order to more evenly distribute the resulting symbols throughout the alphabet, Berzelius insisted on some unusual name choices, several of which were suggested by his detailed knowledge of the mineralogical literature and by his preference for Latin, such as beryllium instead of *glucinum, natrium* instead of sodium, *kalium* instead of potassium, tantalum instead of columbium, and, of course, *wolframium* or wolfram instead of tungsten. Commenting on the latter choice in his famous textbook, Berzelius argued that (11):

Though some chemists have suggested that it should be named scheelium in honor of Scheele, not only does this name fit poorly with the Swedish language, the immortality of our fellow countryman requires no such additional support; thus I have given precedent to the name wolfram instead.

Berzelius' symbolism was rapidly adopted by the German and Scandinavian chemical communities, but was much slower in impacting on the British and French. Indeed, Berzelius' symbols were uncommon in British and American textbooks prior to the 1840s and by that time the discrepancy between the name tungsten and the symbol W was dismissed as merely another case of a common name coupled with a symbol based on a Latin alternative (wolframium), not unlike the case of sodium versus Na for natrium. Though also adopting Berzelius' general plan for a chemical symbolism, the French, perhaps in revenge for what the Germans had done earlier with some of Lavoisier's Greek names, altered several of his symbols, thus using G for glucinum, Az for nitrogen or azote, and Tu for tungsten. However, eventually, in the interest of universality, they, like the British and Americans, adopted the symbol W for tungsten, though both communities still retain Lavoisier's original name choice for this element.

Literature Cited

1. C. W. Scheele, "On the Constituent Parts of Lapis Ponderosus or Tungsten," in *The Chemical Essays of Charles-William Scheele*, Murray: London, 1786, pp. 285-293.
2. J. J. Elhuyar, F. Elhuyar, F. "Análisis químico de volfram y examen de un nuevo metal que entra en su composicon," *Extractos Real Soc. Bascongada*, **1783**, 46-88.
3. L. Guyton de Morveau, A. Lavoisier, C. Berthollet, A. Fourcroy, *Méthode de nomenclature chimique*, Cuchet: Paris, 1787, pp. 55, 185, 187, 235 and Table I.
4. A. Lavoisier, *Elements of Chemistry*, Creech: Edinburgh, 1790, p. 175
5. J. Macquer, *Chymisches Wörterbuch*, Vol. 7, Weidmann: Leipzig, 1791, pp. 293-306. This entry was inserted by the dictionary's German editor, Johann Gottfried Leonhardi.
6. J. Remler, *Neues chemisches Wörterbuch oder Handlexicon*, Keyser: Erfurt, 1793, p. 234.
7. W. Nicholson, *A Dictionary of Chemistry*, Vol. 2, Robinson: London, 1795, pp. 955-956.
8. C. L. Cadet, *Dictionnaire de chimie*, Vol. 4, Chaignieau: Paris, 1803, pp. 313-318.
9. A. Ure, *A Dictionary of Chemistry*, Vol. 2, Desilver: Philadelphia, 1821, unpaginated.
10. M. P. Crosland, *Historical Studies in the Language of Chemistry*, Harvard: Cambridge, MA, 1962, pp. 275-276.
11. J. J. Berzelius, *Lehrbuch der Chemie*, Vol. 3, Arnold: Dresden, 1834, p. 120 (footnote).

Do you have a question about the historical origins of a symbol, name, concept or experimental procedure used in your teaching? Address them to Dr. William B. Jensen, Oesper Collections in the History of Chemistry, Department of Chemistry, University of Cincinnati, Cincinnati, OH 45221-0172 or e-mail them to jensenwb@ucmail.uc.edu