



INSTITUT DE FRANCE  
Académie des sciences

# *Les traductions des Comptes Rendus*

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## *Chimie*

### **How the element names reveal their history**

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**Abstract:** As soon as Lavoisier had established the very notion of chemical element in 1789, the discoveries of the more than one hundred elements known today, took place up to those of the superheavy elements (SHE) in recent years. This article presents the etymology and history of names which were given to twenty elements or so, among the more recognized. Concurrently, the article evokes the main steps of the building of the Periodic Table: from the initial idea of Chancourtois in 1862, to the fundamental and determining publication of Mendeleev in 1869 and the complement due to William Ramsay at the end of 19th century.

**Keywords:** Etymology, Chemical elements, Periodic Table

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Throughout history, the discoverers of the elements have given them various names, which sometimes inform us about their properties, sometimes about the natural substances from which these elements were extracted, or sometimes about the circumstances of their discovery. Etymology thus brings us into the history of science. We shall mention in this text the names of chemists who have made a particularly significant contribution to the list of known elements to date. Among these chemists, Lavoisier holds a prominent place.

The text will present successively: names related to Lavoisier's fundamental discoveries; names derived from astronomy, then from mythology; names of botanical origin; others linked to geography; and finally, names taken directly from ancient Greek. In addition, this presentation will pay tribute to Mendeleev, the great architect of the periodic table in 1869, whose greatest genius was to predict the existence of elements still unknown and actually discovered later. The epilogue will also pay tribute to the French geologist Chancourtois, who presented his *Vis tellurique* to the Académie des sciences in 1862, the first demonstration of the periodicity of the elements.

## 1. The names accredited to Lavoisier

Lavoisier was a revolutionary theorist, if one dares to say, considering the fate that the French Revolution reserved for him, as well as a brilliant experimenter.

His work, beginning in the 1770s, led to the first evidence of chemical elements as such, well-known today by the names of *carbon*, *oxygen*, *hydrogen*, and *nitrogen*. These names are attested and justified in two founding texts: the *Méthode de nomenclature chimique* (1787) by MM. de Morveau, Lavoisier, Berthollet and Fourcroy, as well as Lavoisier's *Traité élémentaire de chimie* (1789), in which he establishes the very notion of the chemical element, under the term "*simple substance*".

Lavoisier demonstrated the existence of the element **carbon** from his experiments on the combustion of diamond, carried out at a high temperature in the hearth of a solar furnace (equipped with an 80 cm diameter lens built by the German glassmaker Tschirnhaus) [1].

Noting that the gas from this combustion was the same as that obtained by burning coal, he established the existence of a common element, first called "*carbonaceous substance*," then with de Morveau:

— *carbon*, from Latin *carbo*, *carbonis* "charcoal."

**Oxygen** and **hydrogen** were isolated soon afterwards thanks to Lavoisier's experiments on the decomposition and recomposition of water.

Lavoisier gave the two gases produced by the decomposition of water the following names:

— *oxygen* meaning "which generates acid," from the Greek *oxus* "acute, pungent, sour," hence also *oxos*, "vinegar". He assumed that oxygen was present in acetic acid, nitric acid, sulfuric acid, etc.

- *hydrogen* meaning "which generates water," implying "with oxygen".

However, water contains much more oxygen in mass than hydrogen, and it is now known that the acid function is because of hydrogen, not oxygen. The relevance of the names *oxygen* and *hydrogen* has moreover been disputed since 1787, but of course no one dared to change, or even exchange, the names accredited to Lavoisier.

Having finally shown that air was composed of oxygen and of another gas (**nitrogen**), which "*needed a unique name*," Lavoisier opted in 1787 for:

— *azote* (French, in English: nitrogen), from the Greek *azotikos* "no life."

This time, however, Chaptal, as early as 1790, preferred the name *nitrogen*, meaning "which generates nitric acid," a name that the Anglo-Saxon world adopted very quickly, hence the symbol **N** adopted by the international community in the end.

In short, Lavoisier put an end to the reign of the four elements of antiquity by replacing three of these elements (earth, water, and air) with four chemical elements: carbon, oxygen, hydrogen, and nitrogen. These four elements appear in the first table (not yet periodic) of elements which he published in 1789, along with 19 others, including sulphur, phosphorus, arsenic, and 16 metals, of which only 7 were known in antiquity.



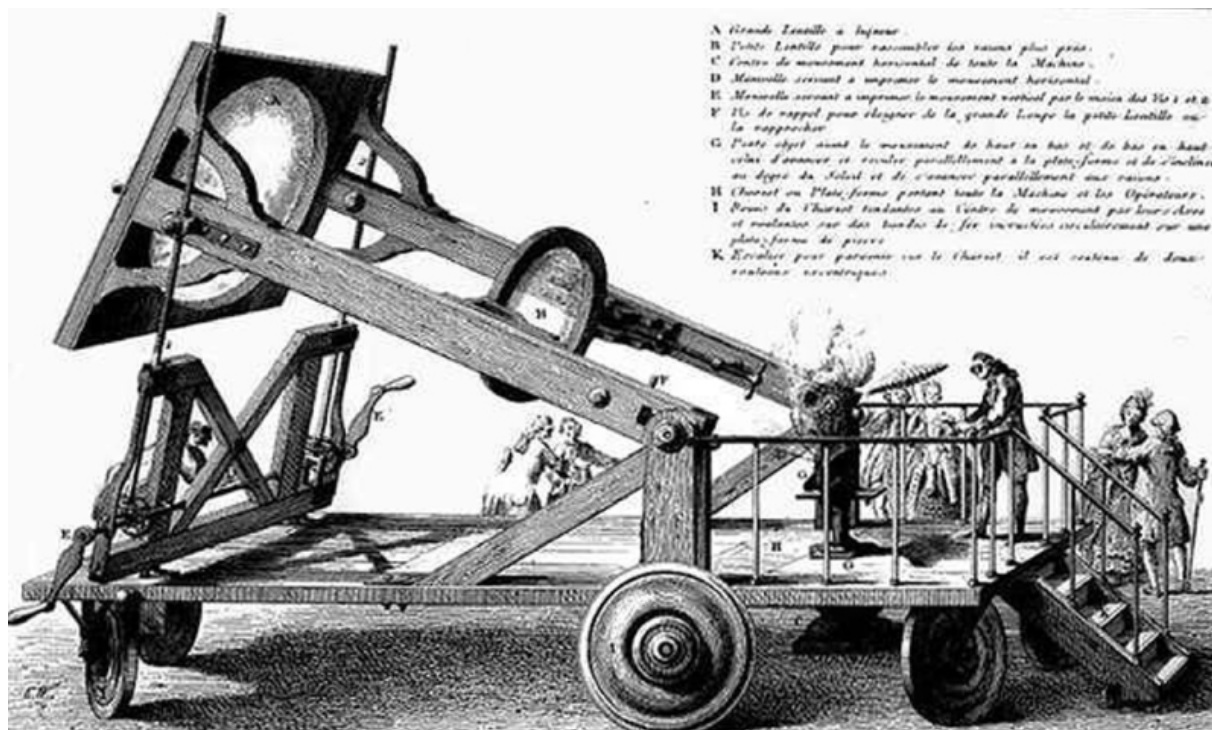
**Figure 1.** Lavoisier (1743–1794).

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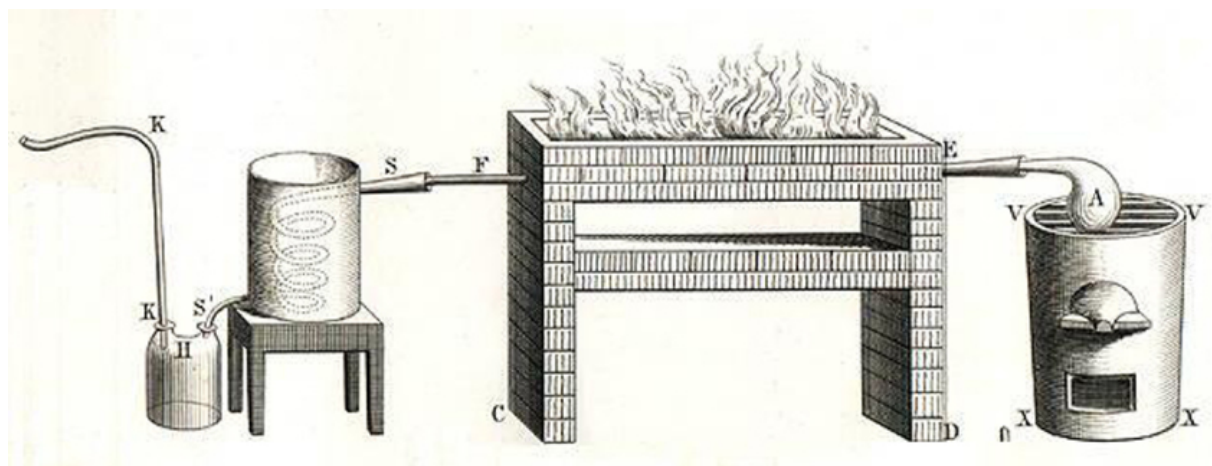
## 2. Astronomically inspired names

### — The magic of the number 7

The Ancients, and later the alchemists, cultivated a sort of numerology based on the number 7 by associating the 7 metals known since time immemorial to the 7 non-fixed celestial bodies they could observe (the Sun, the Moon and the five planets identified at the time, Saturn being the farthest visible to the naked eye), bearing the names of 7 mythological Greco-Latin deities. After some hesitation for certain planets, the subsequent correspondences were imposed [2, p. 154]: The *Sun* and the brilliance of *gold*; the *Moon* and its *silver* light; the red of *Mars* and the *iron* used for war; the yellow of the planet *Venus* and a *copper* mirror (an



**Figure 2.** Solar furnace with Trudaine's lens, used for public experiments on the combustion of diamonds.  
(This file was provided to Wikimedia Commons by the Science History Institute).



**Figure 3.** Lavoisier's device for studying water decomposition (*Traité élémentaire de chimie*, 1789)  
Digital copy of the Dumas & Grimaux edition text, 1862, BNF, author: LaosLos (from a .pdf file).

abundant metal in Cyprus, the island of *Venus*); the white of *Jupiter*, a lightning bolt, and *tin*; the pallor of *Saturn* whose slowness (orbiting the Sun in 30 years) matches with the heaviness of the dull metal that is *lead*; and on the contrary, the velocity of *Mercury* (orbiting the Sun in three months) evokes the fluidity of *quicksilver* (later named *mercury*) and the agility of traders.

☉ Or	– Soleil	♃ Etain	– Jupiter
☾ Argent	– Lune	♂ Fer	– Mars
☿ Mercure	– Mercure	♀ Cuivre	– Vénus
♄ Plomb	– Saturne		

Figure 4. Alchemist table.

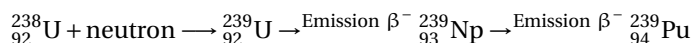
This metal-celestial body-divinity relationship prevailed for a very long time as the first metals identified beyond the 7 of Antiquity appeared only at the end of the Middle Ages, with zinc, antimony, then a few others. As for the first planet beyond Saturn, it was only discovered in 1781 by Herschel. It was named Uranus, the name of Saturn's father in mythology.

— **The planet *Uranus* and *uranium* metal**

In 1792, the German chemist Martin Klaproth identified a new metal in pitchblende [3, pp. 160, 172]. Having pointed out that a dozen or so metals had already been discovered beyond the 7 of antiquity without being able to pair them with new celestial bodies, he hastened to associate the new planet with his new metal, which he named *uranium* (originally *uran*).

— ***Transuranic* planets and *transuranic* metals**

Beyond Uranus, two other planets were subsequently discovered, still named in the mythological tradition: Neptune in 1846 and Pluto in 1930 (which became a dwarf planet in 2006). These planets, called *transuranic* planets, are located beyond the solar system that had been observed since 1781, like an extension into the unknown, which the irregularities of the orbit of Uranus suggested. Similarly, the so-called *transuranic* elements have been discovered. Located beyond uranium, the heaviest of the natural elements, an extension into another unknown. These discoveries were made during nuclear physics research in the 1940s in the United States, mainly under the aegis of Glenn Seaborg (1912–1999) at Berkeley. Thus, after uranium (element 92), neptunium (element 93) and plutonium (element 94) were named after the planets Neptune and Pluto. This research demonstrated successive decay reactions of the following type:



There is a triple filiation:

- mythological, Uranus being the grandfather of Neptune and Pluto,
- astronomical; uranium, neptunium and plutonium appear in the order of the planets,
- radiochemical; from parent nucleus to daughter nucleus.

As we have just seen, the names of astronomical origin also refer to Greco-Latin mythology. However, other names come directly from mythology, Greco-Latin or otherwise.

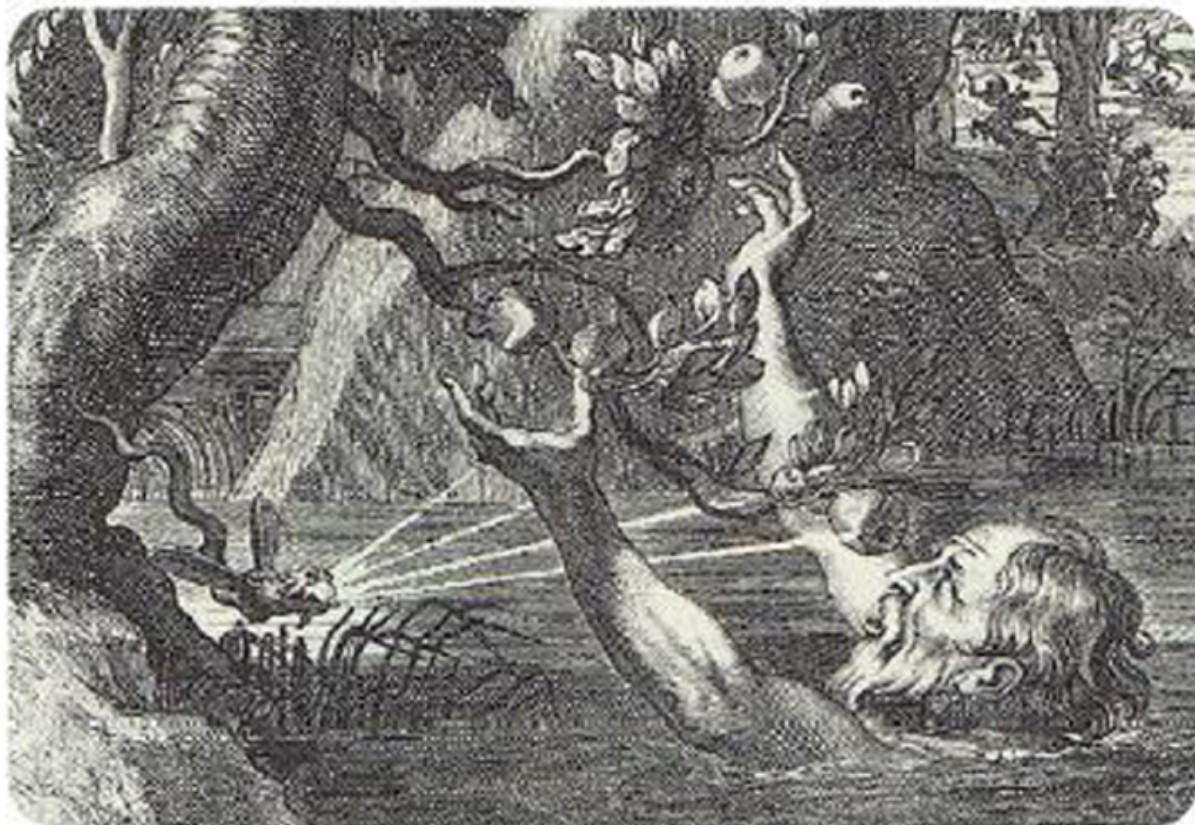
### 3. Names of mythological inspiration

Shortly after dedicating uranium to Uranus, Klaproth discovered another metal and extended its mythological metaphor by naming it *titanium*, in reference to the Titans, sons of Uranus.



**Figure 5.** Martin Klaproth (1743–1817).

Wikimedia Commons; author: Ambroise Tardieu (engraving) after original portrait by Eberhard-Siegfried Henne.



**Figure 6.** The temptation of Tantalus in Tartarus, in the Underworld.  
Bernard Picart engraving, *The Temple of Muses* (1733).

We can also mention *tantalum*, so named by its discoverer, the Swedish chemist Ekeberg, because of the impossibility for this metal to react with the acids in which it is immersed, recalling the impossibility for Tantalus, plunged into Tartarus, to feed and drink: an unexpected consequence of Tantalus' torture.

Greek mythology is not the only mythology to appear in the periodic table. *Thorium* and *vanadium*, named by the great Swedish chemist Berzelius after the Scandinavian deities Thor and Vanadis, can also be mentioned.

We can also find Germanic mythology, which explains the names of **cobalt** and **nickel**. The story takes place in the 18<sup>th</sup> century in the German mines, where the miners led a frighteningly difficult life, for many reasons. First of all, these miners were searching in vain for copper, and could not recognise nor use cobalt or nickel. Secondly, they were seriously intoxicated by roasting ores that were sulphides and arsenides. Lastly, gallery collapses were deadly.

In German legends, those responsible for all these accidents suffered by the miners were the *Kobolds*, small evil goblins who haunted the underground mines. The miners called the ores they found by the German name *Kobold* (in English *kobold*), which inspired the Swedish chemist G. Brandt to name the *cobalt*, which he identified in 1735.

As for nickel?

To appease the wicked kobolds, the miners would give them a nickname, often *Nickel*, a diminutive of *Nicolas*, the name of the most popular saint in the Germanic regions. Thus, German dictionaries define a Nickel



**Figure 7.** Vanadis and Thor, who inspired the names of *vanadium* and *thorium*.  
 Wikimedia Commons: James D. Penrose: *Freyja and the Necklace* (1890); Mårten E. Winge: *Thor's Fight with the Giants* (1872).

as a particular Kobold. The miners even used the term *Kupfernichel*, i.e., "the little Nicolas of copper," who promises you copper and instead poisons you. It is understandable that when the Swedish chemist Cronstedt identified nickel in 1851, he named it after the name given to cobalt some 15 years earlier.

#### 4. Names of botanical origin

Soda is a chemical product that is well known for being *caustic* (coming, through latin, from the Greek *kaustikos*, from the verb *kaiein* "to burn"). But what is the original meaning of the word *soda*?

*Soda* is first of all the ancient name of a plant, today named *saltwort*.

Like *salicornia* (e.g. glasswort), it is a plant described as *halophilic* ("salt-loving"), growing on sea shores where soils are impregnated with salt.





**Figure 8.** Common saltwort (*Salsola soda*).  
GFDL license authorised by L. Rignanese on 2-November-2006.

There are many species of saltwort, characterised by their high concentration of mineral salts, which are now known to be mixtures of carbonates and nitrates, of sodium and potassium. Since ancient times, these plants have been burned to obtain various substances from their ashes, such as those known today as *soda* and *potash*.



**Figure 9.** Humphry Davy (1778–1829).  
Copyright: Wikipedia Commons.

The English chemist Humphry Davy used electrolysis on these substances to obtain metals which he named *sodium* and *potassium* in 1808. He derived *potassium* from the English "*potash*," formed from "*pot*" and "*ash*," from which the word *potasse* in French is also derived.

As for *sodium*, Davy derived it from the Late Latin word *soda*, which simultaneously referred to soda the plant and to the substance obtained from its ashes. This word *soda* is of Arabic origin. It is related to the Late Latin *sodanum*, "migraine remedy," from the Arabic *sudā* meaning "migraine," without doubt in reference to the beneficial effect of the bicarbonate present in these plants. These were also called *qali* in *Arabic*, and with the article, *al-qali*, hence *alkali*, the name given to the basic salts derived from plant ashes, and the adjective *alkaline*. This time, the term is related to the verb meaning "to burn, to grill" in Arabic.

Finally, a student of Berzelius discovered a new metal in 1817 from an ore found in Sweden. The metal was alkaline, like sodium and potassium. Berzelius called it *lithium*, from the Greek *lithos*, "stone," to recall that it had been "*discovered in the mineral kingdom, while the other two (sodium and potassium) were discovered in*



**Figure 10.** Berzelius (1779–1848).  
Copyright: Wikipedia Commons.

*the plant kingdom.*"

We now come to element names inspired by geography. This provides an opportunity to talk about the work of Mendeleev, beginning by describing the current status of the periodic table.

## **5. Names of geographical origin**

### **— The current periodic table**

The periodic table currently contains 118 elements, 90 of which are natural, from hydrogen (element 1) to uranium (element 92), except elements 43 and 61 which are obtained artificially, as are the transuranic elements from 93 to 118. In total, 90 natural elements and 28 artificial, all radioactive.

This table is presented in the form of 18 columns and 7 rows (Figure 11).

Group →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Period ↓	1																	2
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	57 La *	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	89 Ac *	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og
				* 58 Ce	* 59 Pr	* 60 Nd	* 61 Pm	* 62 Sm	* 63 Eu	* 64 Gd	* 65 Tb	* 66 Dy	* 67 Ho	* 68 Er	* 69 Tm	* 70 Yb	* 71 Lu	
				* 90 Th	* 91 Pa	* 92 U	* 93 Np	* 94 Pu	* 95 Am	* 96 Cm	* 97 Bk	* 98 Cf	* 99 Es	* 100 Fm	* 101 Md	* 102 No	* 103 Lr	

Figure 11. The current periodic table.

Let us recall the names of the main families:

column 1: alkali metals

column 2: alkaline earth metals

columns 3 to 12: transition metals, including rare-earth elements (in column 3 and row 6) and actinides, including transuranic elements (in row 7).

columns 12 to 16: post-transition metals, metalloids, and non-metals

column 17: halogens (except astatine, a metalloid)

column 18: noble gases (formerly *rare gases*)

#### — Mendeleev's publication

It is interesting to compare the current periodic table to Mendeleev's publications in 1869 and the following years, particularly his table from 1872 (Figure 12):

The table has 63 elements, 62 of which are valid since didymium (symbol Di) was proved in 1886 to be a mixture of two rare earth elements: praseodymium and neodymium.

This table was a considerable step forward in understanding the periodicity of chemical properties according to the atomic mass of the elements:

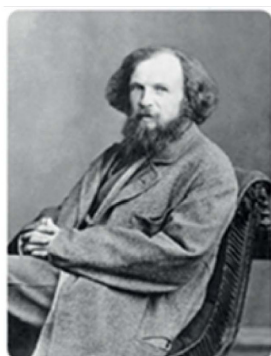
— on the one hand, the 62 elements known at that date were arranged in 17 rows, corresponding to the first 17 columns of the 18 in the current table. This classification is of remarkable relevance, the transition metals in particular being ranked in the right order for the first time.

— on the other hand, Mendeleev's genius was to foresee the existence of still unknown elements, actually discovered later and placed in the locations anticipated in his table. This forecast is shown schematically in the table of Figure 12 by five arrows (one could have placed a dozen). The first case appeared in 1875, with gallium, which took its place in line 13 between aluminium and indium, and which Mendeleev had anticipated under the name of *eka-aluminium* (*eka* = 1 in Sanskrit).

#### — Gallium

It's quite the story that is linked to the name of *gallium*, discovered in 1875 using spectroscopy by François

Dmitri  
Mendeleïev  
(1834-1907)



	K = 39	Rb = 85	Cs = 133	-	-	1
	Ca = 40	Sr = 87	Ba = 137	-	-	2
	-	← ?Pt = 88?	?Di = 138?	Er = 178?	-	3
	Ti = 48?	Zr = 90	Ce = 140?	La = 180?	Th = 231	4
	V = 51	Nb = 94	-	Ta = 182	-	5
	Cr = 52	Mo = 96	-	W = 184	U = 240	6
	Mn = 55	-	-	-	-	7
	Fe = 56	Ru = 104	-	Os = 195?	-	8
	Co = 59	Rh = 104	-	Ir = 197	-	9
	Ni = 59	Pd = 106	-	Pt = 197	-	10
	Cu = 63	Ag = 108	-	Au = 199?	-	11
	Zn = 65	Cd = 112	-	Hg = 200	-	12
	B = 11	In = 113	-	Tl = 204	-	13
	C = 12	Sn = 118	-	Pb = 207	-	14
	N = 14	Sb = 122	-	Bi = 208	-	15
	O = 16	Te = 125?	-	-	-	16
	F = 19	I = 127	-	-	-	17
H = 1	Li = 7	Na = 23				
	Be = 9,4	Mg = 24				
	B = 11	Al = 27,3				
	C = 12	Si = 28				
	N = 14	P = 31				
	O = 16	S = 32				
	F = 19	Cl = 35,5				

gallium (1875)

germanium (1886)

*Annalen der Chemie und Pharmacie*, 1872

**Figure 12.** The table drawn up by Mendeleev in 1872, following his 1869 publication. Mendeleev in 1861. Photo by Sergey Lvovich Levitsky.

Lecoq de Boisbaudran. He proposed the name *gallium* in 1875 without giving the slightest justification, which is highly unusual. The international community has accepted *gallium* anyway, but at the same time, a somewhat controversial interpretation spread: the discoverer put himself forward by taking inspiration from his own name, symbolised proudly by a cock (in Latin, *gallus*) on the family coat of arms. Such an attitude had never been seen; even if elements were later named in honour of great scientists, it was avoided while they were still alive.

After giving free rein to interpretations, Lecoq de Boisbaudran revealed in 1877, in the *Annales de Chimie et de Physique* [4, p. 103], that he had named gallium "in honour of France (*Gallia*)."<sup>1</sup> The problem is that this written explanation came late, and many continued to see *gallium* as a derivative of *gallus* "cock." However, the justification given by Lecoq de Boisbaudran was credible: almost thirty years earlier, the name of *ruthenium* was given based on the Late Latin name *Ruthenia*, of Russia. Moreover, by dedicating gallium to France, he was honouring his country during a period of great tension with Germany. However, in 1886 the German chemist Winkler discovered a new element, which he unequivocally named *germanium*, from *Germania*, the Latin name for Germany. This was seen as a response to Lecoq de Boisbaudran, and *a posteriori*, it strengthened the connection between *gallium* and *Gallia*.

In summary, it can be accepted that *gallium* refers explicitly to France, the nationality of its discoverer, and implicitly to his name. In this regard, the Latin *gallus* "cock" may simply mean "Gallic (bird)," the cock having been considered typically Gallic by the Romans, who joked about the pun *Gallus gallus*, "gallic cock" (which remains the sports emblem of France!). In both cases, *gallium* flatters the national pride of France!

## 6. Names taken directly from Ancient Greek

— An extraordinary event



**Figure 13.** François Lecoq de Boisbaudran (1838–1912) and the cock of his family coat of arms.  
Wikimedia Commons: unknown author.

During the solar eclipse of 1868, astrophysicists detected an intense yellow ray in the spectrum of the solar corona, which was initially thought to be sodium, then was later attributed to a new element, unknown on Earth at the time. Logically, this "extraterrestrial" element was named *helium*, from the Greek *helios*, "Sun." It was not until 1882 that helium was detected in a volcanic rock, then, in 1895, the English chemist William Ramsay successfully isolated it from uranium ore.

— **The discovery of noble gases (formerly *rare* gases)**

In fact, when he discovered helium, Ramsay was seeking in uranium ore the gas he had isolated the previous year (1894). As this gas appeared inert, unable to react with other substances, he named it *argon*, from the Greek *argos*, "inactive," itself formed by the privative prefix *a-* and *ergon*, "action, work" (from which we obtain *energy*...). It appeared that helium and argon were gases of a new nature, paving the way for the discovery of other gases, which Ramsay isolated using an increasingly potent distillation of liquefied air.

Ramsay was also a linguist, and he derived (in English, borrowed from other languages) the names of these gases from the Greek adjectives *neos*, *argos*, *kruptos*, and *xenos*, in the neutral form (suffix *-on*) to reflect the extreme neutrality of these monoatomic gases:



**Figure 14.** Total solar eclipse

*neos* "new" → *neon*

*argos* "inert" → *argon*

*kruptos* "hidden" → *krypton*

*xenos* "strange" → *xenon*

The name of *krypton* is understandable because this gas was found "hidden" in argon (therefore impure). The name *xenon* is the result of a more complicated history.

— **Xenon**

The Greek *xenos* means first of all "foreign", hence also by metaphor, "unknown, stranger." However, Ramsay used the adjective *stranger*, not *foreigner* [5 p. 106]. But then, why *strange*? Because of the unexpected blue colour in the emission spectrum of this new gas. They first looked for a name evoking blue, but while avoiding radicals/etymological roots that had already been used for a long time in organic chemistry. Thus for example \* *cyanon*, from the Greek *kuanous*, "blue" was not suitable because this radical had already been used for a long time in the word *cyanide*. Finally, for lack of an available "blue" radical, the idea was to base the name on the Greek *xenos*, still unused in chemistry, *xenon* in this case meaning "strange (because of an unexpected blue colour)."

— **The 18<sup>th</sup> column**



**Figure 15.** The bluish colour of xenon headlights

All these new elements posed a problem: they did not fit in any free space in the existing periodic table at the time, as it only had 17 columns. The existence of an 18<sup>th</sup> column was not anticipated by Mendeleev, nor by anyone else. It was Ramsay and Rayleigh who proposed it to accommodate helium and argon, then neon, krypton, and xenon shortly thereafter. Initially, Mendeleev even rejected the idea, only to finally acknowledge in a 1902 letter that the 18<sup>th</sup> column was justified, and constituted "*a glorious confirmation of the general character of the application of the periodic law*" [6, p. 144].

### 6.1. *The Vis tellurique of Chancourtois as an epilogue*

Mendeleev was not the first to demonstrate a periodicity in the properties of the elements according to their mass. Based on the dates of publication, this credit goes to the geologist Chancourtois, who proposed in 1862 a classification of elements based on a helix traced on a cylinder, known as "*Vis tellurique*" (i.e. Telluric screw, as a reference to Tellurium, as well as to a theory about elements of the Earth). This first periodic system was not as efficient as the one published by Mendeleev in 1869, but it was nonetheless a major innovation.





**Figure 16.** William Ramsay (1852–1916).  
Wikimedia Commons: Popular Science Monthly Vol. 67, 1905, unknown author.

Chancourtois had the idea of ordering the elements by increasing mass by aligning them along  $45^\circ$  inclined segments to constitute a table that can be described as oblique.

Thus, Chancourtois correctly placed the first two or three elements of columns 1, 2, 13, 14, 15, 16, and 17: sodium was, for example, placed below lithium, calcium below magnesium, silicon below carbon, chlorine below fluorine, etc. He then rolled up the table on a cylinder, so that the  $45^\circ$  segments formed a continuous helix, the chemical families then being on the generatrices of the cylinder.

However, this system lost all relevance from the third turn of the helix onwards, because Chancourtois had not classified transition metals correctly, which Mendeleev would later accomplish by prefiguring columns 3 to 12 of the current table.

Even though there were other contributors, including Lothar Meyer in Germany, we can consider that the three main builders of the periodic table were Chancourtois, for the initial idea; Mendeleev for the understanding of the essentials of the table; and Ramsay for the 18<sup>th</sup> column, which can be qualified as the keystone of the system.

This suggests the following metaphorical diagram:

The table was gradually filled thanks to the discoverers of elements, of which those appearing in this article were among the biggest contributors:

Lavoisier first with the initial 23 elements in 1789, Martin Klaproth, Humphry Davy, Berzelius, Lecoq de Boisbaudran, William Ramsay and his column of noble gases, and Glenn Seaborg and his line of transuranic elements.

We owe the discovery of nearly two thirds of the hundred or so chemical elements that constitute our universe to these great figures in the story of chemistry.

For more information:



**Figure 17.** Alexandre-Émile Béguyer de Chancourtois (1820–1886).  
Wikimedia Commons: date 15 February 2007.

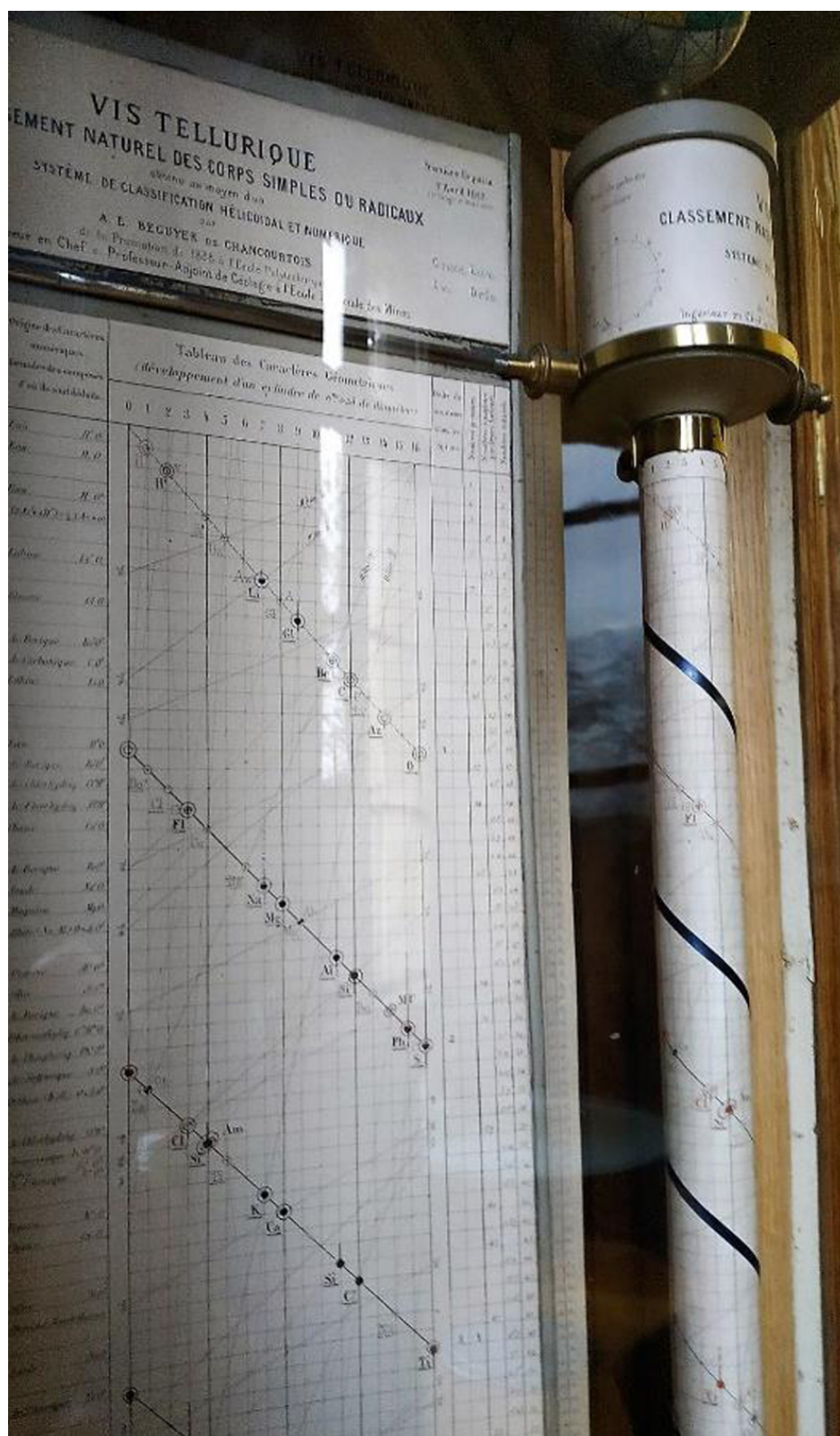
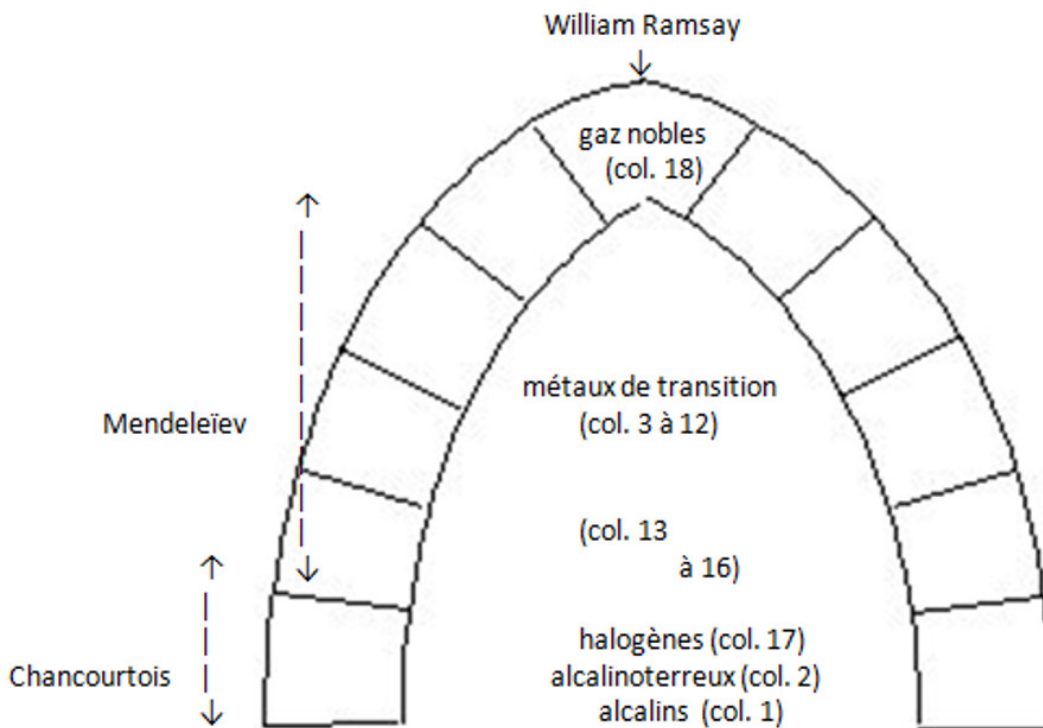


Figure 18. The *Vis tellurique* of Chancourtois, preserved at the *École des Mines de Paris*



**Figure 19.** The periodic table is a construction whose leading architects were Chancourtois (1820–1886), Mendeleev (1834–1907) and Ramsay (1852–1916).

*La Prodigieuse histoire du nom des éléments*, 2018, in English, *The Amazing History of Element Names*, 2020, EDP Sciences/SCE, Paris, by Pierre Avenas, with the collaboration of the scientific journalist Minh-Thu Dinh-Audouin, foreword by Jacques Livage.

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