

Spain Celebrates Its Year of Science Honoring Mendeleev



Large version of the Periodic Table shown in the stamp *Tabla Periódica de Elementos de Mendeléiev* on the wall of the Experimental Science Department (*Facultad de Ciencias Experimentales*) at the University of Jaén, Spain, on the day of its unveiling: 22 November 2007. Each element is made of an individual ceramic tile (20 x 30 cm).

by Javier García-Martínez and Pascual Román Polo

The winter of 1907 was particularly cold in St. Petersburg, Russia. Mendeleev had suffered a bad flu since December. Despite this, he had to go to the Office of Weights and Measures, as the Minister of Trade and Industry had a visit scheduled for that day. That was a bad decision, since the effort further deteriorated his precarious health. Shortly thereafter, on 2 February, Mendeleev died at his home while his wife, Ana Popova, was reading to him a passage from one of his favorite books, *A Journey to the North Pole* by Jules Verne. A few days later, he was buried at the Volkovo cemetery, next to the tomb of his mother, Maria Dmitrievna. Those days, the cold was so intense that the workers could only write his name on the tombstone. There, even today, is only his name. Someone commented: “on a tomb as it could not be put otherwise.” His former students of the University of St. Petersburg carried a large banner at his funeral with the Periodic Table in which Dmitri Ivanovich Mendeleev lives forever.¹

Chemistry weeks are wonderful opportunities to promote and raise public awareness about, and appreciation for, chemistry. In some countries, they are quite popular, some even have been institutionalized and are on our calendar every fall. In general, they prove to be quite successful. Sometimes, the events provide children with their first exposure to science and for many they are a good occasion for remembering a science studied a long time ago. Based on such experience, and following the International and World Years of Mathematics (2000), Physics (2005), and Astronomy (2009), IUPAC endorsed, at its last Council (11–12 August 2007, Torino, Italy), a plan to obtain United Nations approval of 2011 as an International Year of Chemistry. In 2007, Spain celebrated its National Year of Science with many activities to celebrate and promote chemistry on the occasion of the centenary of Dimitri Ivanovich Mendeleev’s death (1834–1907). Herein, we share our experience in the hope we can all celebrate again in 2011.

A hundred years later, Spain celebrated a Year of Science with a large number of activities. This was an excellent opportunity to raise public awareness and promote chemistry on the occasion of the centenary of Mendeleev’s death.

The Periodic Table as a Tool to Promote Chemistry

The Periodic Table is perhaps one of the most popular icons of science. It is hung in our chemistry classrooms, found in many science books, in most laboratories throughout the world, and even in advertisements, logos, and T-shirts. It summarizes, not in an equation, but in a powerful image, the order and periodicity in which all matter is organized. Its construction, still going on, is a team effort and one of the best examples of international collaboration since at least 13 countries have contributed with the discovery of elements. The Periodic Table is also one of the best known activities of IUPAC, which standardizes and organizes it as new elements are discovered. We had very little doubt when we decided that the Periodic Table, the great legacy of Mendeleev to future genera-

tions, should be the official image of activities organized to promote chemistry in 2007 in Spain.

A Stamp to Celebrate Mendeleev's Great Legacy

Mendeleev's Year began formally on 2 February 2007 with the launch of a very special stamp entitled *Tabla Periódica de Elementos de Mendeléiev* (Mendeleev's Periodic Table of Elements)—see box below. Surprisingly, this is the only stamp that has been dedicated to the Periodic Table to date and the second ever devoted to Mendeleev by a non-Soviet country.² Djibouti issued a Mendeleev stamp in 2006.

Although the Periodic Table (or some portions of it) is shown in some stamps, including stamps related to

Mendeleev,² the stamp described here is probably the only one ever dedicated solely to the Periodic Table. Although there have been many stamps featuring famous chemists issued by countries like Germany, UK, France, Sweden, and the USA, only the USSR (1934, 1951, 1957 and 1969), Poland (1959), Bulgaria (1984), and the Democratic People's Republic of Korea (1984) issued stamps on Mendeleev until recently. Although Mendeleev died well before the October Revolution (October 25, 1917), politics excluded him from Western philately until 100 years after his death.

The General Post Office of Spain issued the first copies of *Tabla Periódica de Elementos de Mendeléiev*

Designing the Periodic Table Stamp

When the Spanish General Post Office (Correos) proposed, through my friend Roman Polo, that I (Javier García-Martínez) design this stamp, I was writing a review article about philately dedicated to Mendeleev, recently published in *Anales de Química*—the official journal of the Spanish Royal Society of Chemistry.¹ Spain has relatively few stamps on science and technology. In fact, until the creation of the stamp dedicated to Mendeleev's Periodic Table, there was only one Spanish stamp clearly related to chemistry, although at least 15 stamps are devoted to related subjects. This is the 1983 stamp *Bicentenario del Descubrimiento del Wolframio* that celebrates the 200th anniversary of the discovery of the element wolfram by Juan José Delhuyar (1754–1796) and his brother Fausto (1755–1833).²

From the beginning, it was clear to me that this would be a great opportunity to present a modern and positive image of chemistry. I wanted my design to be radically different from the more traditional stamps previously issued. Piet Mondrian's (1872–1944) *Neo-Plasticism* served as my inspiration. The colorful box-like designs of his paintings are very suitable to a

new version of the Periodic Table, with bright plain colors, thick black borders, and simplified forms. I chose the colors of each block from the ones used on the *webelements* webpage³ as a tribute to a modern, online periodic table that receives thousands of hits per day. This new version of the Periodic Table features four void spaces corresponding to the elements predicted by Mendeleev: ekaboron (scandium), ekaaluminum (gallium), ekasilicon (germanium), and ekamanganese (technetium). These have been included to celebrate Mendeleev's genius; he not only ordered the known elements, but predicted the existence of new elements, and even their properties with amazing accuracy; something that allowed for an early confirmation of his Periodic Law. A recent issue of *Philatelia Chimica et Physica*, which has on its cover this new stamp, includes an article in which I describe in detail some relevant aspects of this stamp. For those interested, this is a good source of additional information.⁴

References

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3. a) *Webelements* webpage <www.webelements.com>. b) A note on this stamp in the news site of the *webelements* webpage <www.webelements.com/nexus/node/1169>.
4. J. García-Martínez, "Remembering Mendeleev's Centenary: Spain Issues the First Stamp Dedicated to the Periodic Table," *Philatelia Chimica et Physica* 29(3), 132–139, 2007.

Spain Celebrates Its Year of Science Honoring Mendeleev

exactly a century after Mendeleev's death, at the price of 0.30 euros (first class) in a limitless edition. On the eve of its release, 1 February 2007, the stamp was officially presented at the Residencia de Estudiantes (Madrid, Spain). The minister of Home Affairs (Ministro del Interior), Dr. Alfredo Pérez Rubalcaba; the president of the General Post Office, Dr. José Damián Santiago Martín; and the president of the Spanish Royal Society of Chemistry, Prof. Nazario Martín León, attended the crowded presentation of the Mendeleev stamp. For this occasion, the Spanish General Post Office issued a special postmark that was used during the ceremony to cancel 3 000 first-day envelopes. On 2 February, over 45 million Periodic Tables—in the form of 40.9 x 28.8 mm stamps—were issued. This was probably the largest dissemination ever of the Periodic Table and it was an efficient and smart way to promote chemistry.

Recently, Daniel Rabinovich wrote an excellent column about this stamp in *Stamps International*, which appears in this magazine.³ The stamp also contains hidden codes to be discovered, teaching lessons, and, above all, a profound tribute to Mendeleev. The use of this stamp as a didactic tool to introduce students to the Periodic Table, Mendeleev's life, and the history of chemistry has been nicely highlighted by Gabriel Pinto in *Education in Chemistry* and the *Journal of Chemical Education*.^{4,5} He uses this stamp in the activities described in those articles in his classes at the Polytechnic University of Madrid. Many other news outlets, more or less related to chemistry and/or philosophy, have covered the issuance of this new stamp.

A few months ago, the University of Jaén decided

to decorate the wall of its Experimental Science Department with a large version of the Periodic Table of this stamp. The photo on page 4 shows this beautiful Periodic Table, which is made of ceramic tiles, on its inauguration day of 22 November 2007. We were impressed to see such a large version of the periodic table (3.80 x 2.70 m) compared to the usual stamp size.

A Design Competition to Spark the Imagination

The Periodic Table is not only the fixed organization of elements hanging on the chemistry classroom, but a living creature that grows and changes over time. There are literally hundreds of versions of the Periodic Table, each one emphasizing a different aspect of the Periodic Law. So, why not give everyone the opportunity to have his or her own version? With this objective, the First Periodic Table Design Competition was launched in June 2007 to promote science and art, especially among the young. Once again, young people showed they are full of creativity and excitement about chemistry when given the opportunity.

All the Periodic Tables received were put on display at the University of La Rioja, where students, faculty, and the public were amazed by their beauty and creativity. The entries were organized according to their various properties, electronic configuration, dates of discovery, or even their names. The awards were presented on 13 July at the closing ceremony of the History of Chemistry Summer School in Logroño, Spain (see photo below). The first prize went to Luis Otaño. He designed a beautiful and very original Periodic

Table in which each element was represented by a portrait of its discoverer. Some elements shared the same person, elements 94–98 have Seaborg as their discoverer; others did not have any portrait since they have been known since antiquity, such as copper, silver, and gold. Jorge García received second prize for a Periodic Table organized by the electronic configuration of each element, and the third prize went to Alberto Soldevilla.



Participants of the First Summer School on the History of Chemistry held at the University of La Rioja, Logroño (July 11–13, 2007).

Spain Celebrates Its Year of Science Honoring Mendeleev

RSEQ Prize for the Best Comic on Mendeleev

On October 2007, the Spanish Royal Society of Chemistry (RSEQ, Real Sociedad Española de Química) launched a competition for high school and college students for the best comic about Mendeleev's life. Twenty-four comics were received from Spain, Mexico, and Argentina from students with ages ranging from 14 to 25 years old. The comics show some of the best known moments of Mendeleev's life. We were amazed by the beauty and detail of the comics received, as can be observed in the samples shown on the cover of this issue. So, we decided to make them available, as well as selected periodic tables from the First Periodic Table Design Competition, at the official RSEQ website <www.rseq.org/comics>. It is hoped that this site can be used by teachers and students to learn more about Mendeleev and the Periodic Table.

At the RSEQ Council meeting in Madrid on 23 November 2007, the president of the RSEQ presented prizes to the following students: María de la Cueva León Merino for her comic *Mendeléiev* (1834-1907), Aysha Zreika for *Vida y Obra de Dimitri Mendeleev*, and to Sergi Segura Font who presented a very original black and white comic entitled *Dimitri Mendeleev*.

First Summer School on the History of Chemistry Dedicated to Mendeleev

On many occasions, chemistry students get the impression from their well-organized text books and planned lessons that chemistry has been developed in the same way, from its solid principles to the complexity of the modern branches of chemistry. The history of chemistry helps them (and us) discover the creativity, intuition, and effort that great chemists relied upon to unfold a relatively new science hidden between layers of magic and secrecy. On 11 July 2007, students of the First Summer School on the History of Chemistry gathered at the University of La Rioja to begin what were most likely their first lessons on the principles and techniques of medieval alchemy. Over the following days they discovered how chemistry grew as an independent science, how some theories were discarded whereas others, thanks to careful observation, measurement, and the scientific method, were confirmed.

The students learned that in the middle of the 19th century there was not a clear understanding of how chemical elements were organized, although some similarities among them had been known for a long time. Prof. Fernández Garbayo described how



Mendeleev (an actual-size-cardboard model) with some participants in the Science Week at Murcia, Spain, during the presentation of the stamp "Tabla Periódica de elementos de Mendeléiev" on November 2007. Javier García-Martínez is standing to the left and Pascual Román Polo is next to him.

the chemical elements were discovered, emphasizing those isolated by Spaniards (platinum: Antonio de Ulloa, 1735; wolfram: Juan José and Fausto Delhuyar, 1783; vanadium: Andrés Manuel del Río, 1801). One of us (PRP) presented the contributions of Mendeleev in organizing the chemical elements, his Periodic Law, and some relevant moments of his fascinating life. The students were amazed to learn the details of Mendeleev's great love, and second wife, Ana Popova, or his solo ascent using a balloon—with no previous experience—to measure a solar eclipse. The summer school showed once again how useful the history of chemistry is for engaging students, and raising public awareness and appreciation about a subject usually considered difficult.

Mendeleev: Main Character at Science Week

Every fall, around the first week of November, towns in Spain, as in many other countries, become full of activities promoting science, especially among the young. At that time of year, it is common to see science fairs in parks, hands-on exhibitions in museums, and lectures by famous scientists to children. During recent years, many people who usually are not exposed to science have had the opportunity to



Spain Celebrates Its Year of Science Honoring Mendeleev

actively participate in literally hundreds of activities. Science Week is one of the most successful initiatives for raising public awareness and appreciation about science and technology.

Since 2007 was the National Year of Science in Spain, last year's Science Week (actually extended over several weeks in November) was especially extensive and ambitious. Almost all the major scientific institutions took part in an attractive and diverse program. Many of the activities, especially those organized to promote chemistry, had Mendeleev as their main character. He made an attractive and easy-to-recognize symbol, with his long disorganized hair and beard. The photo on page 7 shows an actual-size cardboard model of him holding his Periodic Table surrounded by students and the activity organizers.

At least 20 lectures about Mendeleev, his life, and the Periodic Table were organized last year at high schools, universities, parks, and museums. Local and national newspapers echoed these activities. For example, *El País*, with a circulation of half a million, included an extensive article on 27 June 2007 about Mendeleev.⁶

One of us (JGM) had the opportunity to attend the XVIII Mendeleev's Congress on General and Applied Chemistry held in Moscow (23–28 September 2007) to celebrate the 100th anniversary of these conferences and share with some of our Russian colleagues the activities that we have been carrying out in Spain. Some of them were surprised about the number of activities that Spain organized to celebrate Mendeleev and to learn that he actually spent time in Spain. He visited Toledo, Madrid, and Seville during his (second) honeymoon after (finally) getting married to Ana Popova. Probably, one of the happiest times of his life.

Looking back at 2007, we have to admit that it was a lot of hard work that took much of our time, but it was also an enjoyable year. Not only because of the personal fulfillment from organizing so many activities to promote an admired chemist, but mainly because of the impact of those activities on other peoples' lives. Now, we receive letters from all around the world from people who want to share stamps with us from their respective countries. Chemistry is usually defined as the study of matter, its properties, and transformations. Last year, we learned that it is much more. It is also history—as there are stories behind every discovery and the men and women that make them, art—as we use graphical schemes to represent

molecules, chemical reactions, and even the periodic law in a table, and even a great way to make new lasting friends with similar interests. We hope our experience, as well as previous events (Germany, 2003; South Korea, 2006) will be useful to others organizing similar initiatives, such as the 2009 National Year of Chemistry in Russia and the 2011 IUPAC International Year of Chemistry. 

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For More Information

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