Jöns Jacob Berzelius. One of the Founders of Modern Chemistry
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This story is written on the occasion of the issuing of two stamps with a mineral connection. These stamps show electron micrographs of crystals of silicon and of selenium, isolated and/or discovered by Berzelius. My interest is that while in university, I had, as a project, to produce some amount of the silicon element. Silicon is one of the most common elements in the earth crust. It is present everywhere as sand. All beaches in the world are made up of millions of grains of sand, and the compound is known by chemists as quartz, a compound of formula SiO$_2$. My challenge was to “extract” the oxygen atoms from quartz to obtain pure silicon, Si.

The process I used is called the aluminothermic reduction of silica. It is an exothermic chemical reaction using aluminum as a reducing agent at high temperature. It consists of mixing sand and aluminum powder in a crucible and igniting it with a strip of very flammable magnesium.

$$3 \text{SiO}_2 + 4 \text{Al} \rightarrow 3 \text{Si} + 2 \text{Al}_2\text{O}_3$$

It is a very spectacular reaction. Flames and sparks develop as the aluminum starts to burn producing the very high heat required. Small grains of silicon and some aluminum oxide are found at the bottom of the crucible once it has cooled down. I still have the elemental silicon I produced some sixty years ago.

**Announcement from the Karolinska Institutet.**

"This year (2010) we are celebrating the Karolinska Institutet Bicentennial. The stamps depict crystals of silicon and selenium, two elements discovered by Jöns Jacob Berzelius who laid the foundation for Karolinska Institutet's focus on the natural sciences. When the suggestion was made to issue a stamp to commemorate Karolinska Institutet's bicentennial, the Swedish Post unanimously agreed that this was a world-class anniversary that easily qualified to be reproduced on a stamp," says Britt-Inger Hahne, Head of Sweden Post Stamps.

The blue stamp is of silicon crystals while the purple one shows selenium crystals.

On 13 May, the Swedish post office unveiled the two stamps. They come in a coil with two motifs. The denomination is Second Class Domestic, 5.50 kronor. They were issued on March 24, 2010. In collaboration with representatives from Karolinska Institutet, one of the highest ranked medical universities in the world, the decision was made to tie in one of the great researchers, Jöns Jacob Berzelius.
Jöns Jakob Berzelius was born into a well-educated Swedish family, but he experienced a difficult childhood because first his father and then his mother died. As a boy Berzelius developed an interest in chemistry. While in medical school at the University of Uppsala, he read about Volta’s “pile” and immediately constructed one for himself. Except for his fine performance in physics, however, he nearly failed in his medical studies at Uppsala, but he did receive an M.D. degree (1802) and became assistant professor of medicine, botany, and pharmacy at Stockholm.
His interest in all sorts of compounds led to his discovery of a number of new elements. Using his experimental results, he determined the atomic weights of nearly all the elements then known. He created a simple and logical system of symbols – H, O, C, Ca, Cl, etc. Berzelius also applied his organizing abilities to mineralogy, where he classified minerals by their chemical composition rather than by their crystalline type, as had previously been done.

The major intellectual synthesis of Berzelius’s career was “dualism” – a line of thinking that could be traced back to the original electrochemical investigations both he and Davy had made. Because compounds were decomposed by an electrical current and released elements were obtained at the poles in an electrolytic cell, he assumed that atoms were charged and chemical combination resulted from the mutual neutralization of opposite charges. Berzelius discovered the elements cerium (1803), selenium (1817), and thorium (1828). He isolated silicon (1823), zirconium (1824), and titanium (1825); classified minerals on a chemical basis; and made detailed studies of the compounds of tellurium, vanadium, molybdenum, tungsten, uranium, and other elements. Sometimes called the father of gravimetric analysis, he introduced the use of the water bath, desiccator, wash bottle, filter paper, and improved blowpipe technique.