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Gosh! I Always Wondered...

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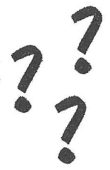
Dr. Juana Noit



Chemistry. When I think of chemistry, I think of all of those great experiments we did in school. The idea of being given a tube of something and then determining the contents by a series of experiments was so intriguing. It was a mystery that could be solved by logic. I always found it to be fun and interesting.

In many ways, chemistry is the librarian's science. Not because we all need to take it (although every member of the Chemistry Division probably thinks we should!) but because it is arranged (cataloged, if I may use that term) in a logical, systematic manner—the same way we tend to organize information for the library. This classification code is the Periodic Table. And that table is arranged and read in a style very analogous to our MARC tagging. So, let's take a look at the arrangement scheme of chemistry.

The Periodic Table is a list of the elements (the basic building blocks of chemistry) in a logical pattern. It was the creation of the Russian chemist Dmitri Mendeleev in 1869. Mendeleev wrote a textbook, *The Principles of Chemistry*, and in the process of his research noted that elements had some commonalities. Arranging by these common traits produced the table. There have been some changes to his table, especially with new discoveries to fill in gaps where elements had not yet been found, but the logic remains to this day and was a great step forward for chemistry and science in general.

The arrangement of the elements moves from left to right and down to the next row. The progression of the horizontal rows is from lower to higher atomic number (the number of electrons in the atom, which also allows you to compute the charge). The rows down indicate similar chemical properties. For example, Group 0 down the far-right column is the noble gases, elements with complete electron shells. They don't react to combine with other elements. These elements don't have the empty space in their shell necessary to share an electron with another element and form a new compound. They're complete as is! Helium, neon, and argon are noble gases. The table also has an acidic side and an alkaline side, metals, metal-like substances, and the nonmetals.

So, the logic is very clear and trained chemists and students can "read" a fair amount of information directly from the table, just as a librarian can "read" a fair amount of information from a call number. One of the interesting things to note is the table isn't neat, but has a number of elements that "funnel" up to one column since they all have similar properties. I liken that to area tables at the back of some of the cataloging schedules!

The chart itself provides a fair amount of information. First, the element itself is noted with its atomic symbol (abbreviation). Since chemical reactions are written in shorthand, a consistent and reliable notation is needed. Generally, the first initial of the substance is used; if already taken, then two letters might be used. The use of letters from the Latin name is common for many elements; for example, iron is Fe and gold is Au. Note the second letter is never capitalized so there is no confusion when reading a chemical formula. CO_2 is one carbon atom and two oxygen atoms, not two cobalts (Co is the cobalt atomic symbol).

In addition to the atomic symbol, the chart lists the atomic number (number of protons in the element, which determines part of the weight and the chemical behavior) and the atomic mass. The atomic mass is the average mass of the element; this is based on the protons and neutrons in the nucleus and the electrons circling the nucleus.

Since the time of Mendeleev, a number of the gaps in his table have been filled as elements are discovered or created. Many of these have been given the names of major scientists, such as Einsteinium, Curium, and appropriately, Mendelevium! New elemental tables have also been devised, including a three-dimensional one.

The logic of chemistry is the arrangement of the elements and their reactions in an informative manner that is an aid to practitioner and student. This is very similar to the logic of cataloging, metadata, and machine-readable files. Now, isn't that enough to make you want to go back and study chemistry again? I wonder, if chemistry had been taught as a logic system, would more people have liked it? Hmm.