2022/04/27

Chemistry topics 02

This periodic table is quite good! 👍 (04/26/2022)

Thanks to "うぉむ太郎"'s retweet, I was able to know Massimo's tweet.Thank you very much.😊His tweet introduces an unusual periodic table. It shows each element has its own spectral fingerprint. 😀

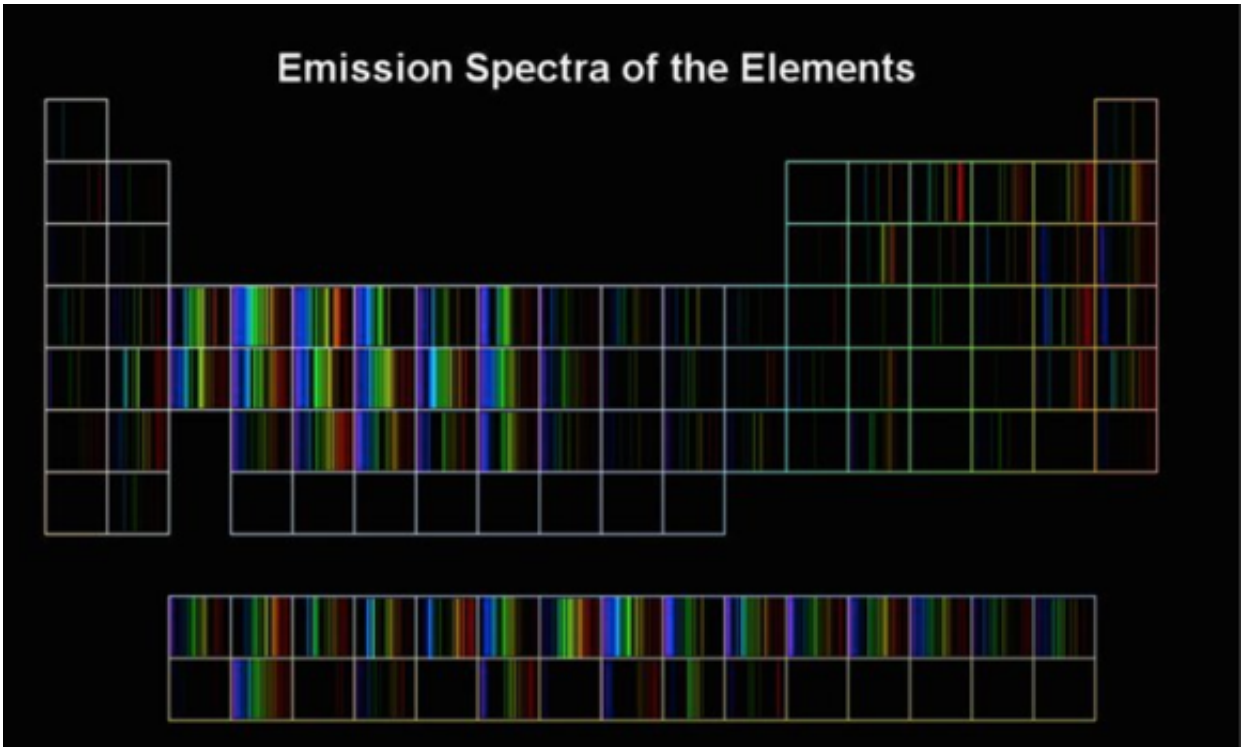

Image 1: element emission spectrum periodic table from Massimo's tweet

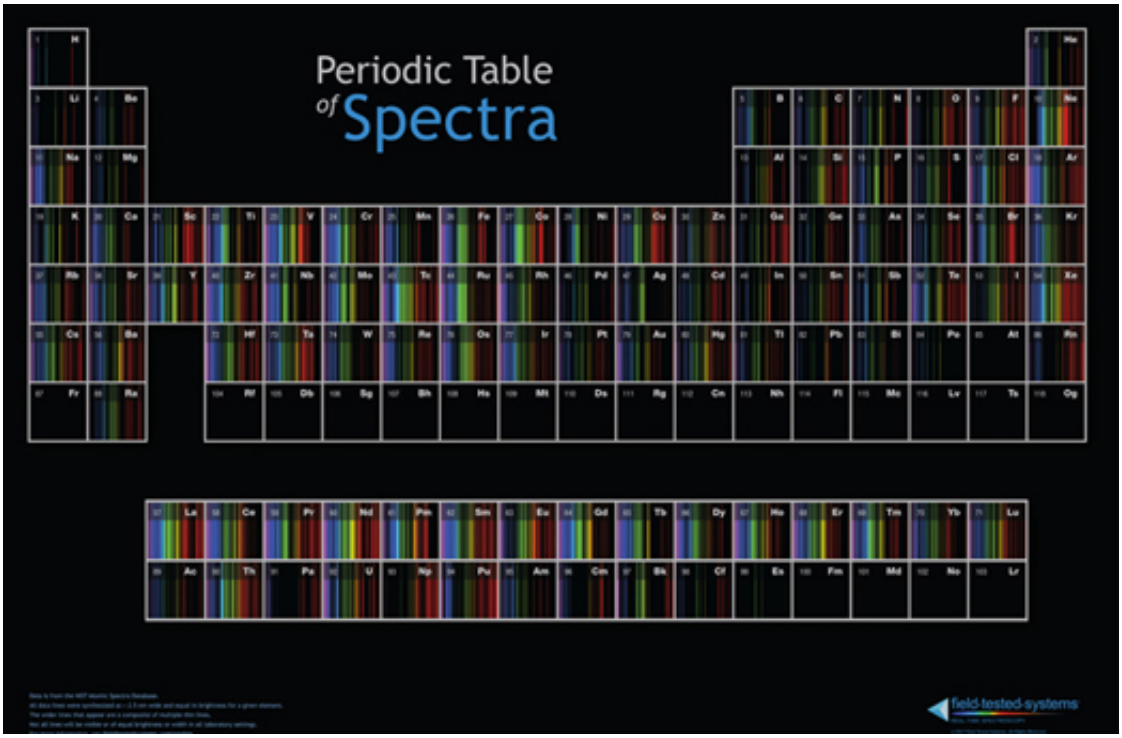

Image 2: element emission spectrum periodic table from Field Tested Systems website

There is a link to Field Tested Systems website in his tweet. I'ld like to quote a description of the "Periodic Table of Spectra" on this website:

> **What is a spectrum?**
> When a chemical element is heated sufficiently, the electrons that surround the nucleus may jump from level to level. When these electrons jump levels, they can release energy, which in some cases can be seen as one or more colors of light mixed together. This light from a “glowing” element can be spread out using a prism, revealing the individual colors that make up the element’s colorful spectrum.

> The exciting thing is that each element has its own unique spectrum. In other words, a spectrum is like the fingerprint of an element. For example, the spectrum of copper is different the spectrum of oxygen.
> (See https://en.wikipedia.org/wiki/Emission_spectrum)

Previously, after writing about flame test in the topic called "Where have calcium hypochlorite gone finally?😳 (01/07/2022)", when I saw John Carlos Baez's tweets about the periodic table, I wanted to know a flame test of each element, so I was making the note below.😅 The emission spectrum periodic table of the element is very good.😊

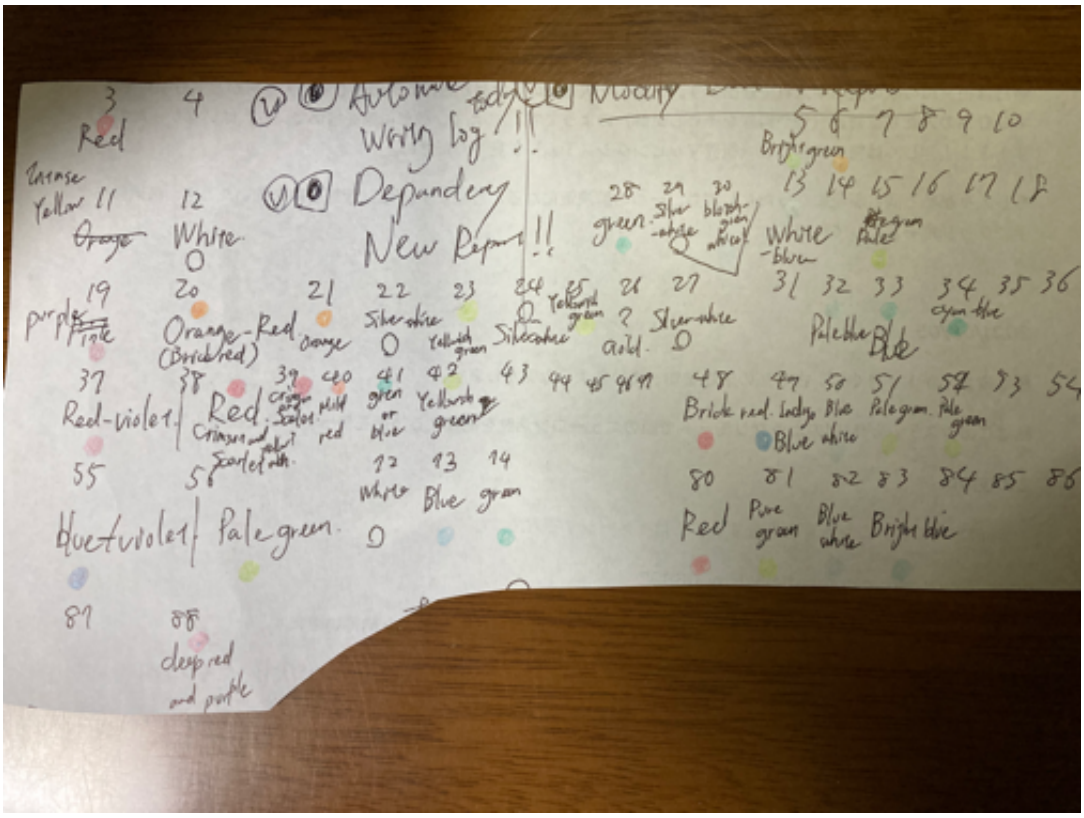

Image 3: the part of my messy note

As I wrote above, when a chemical element is heated sufficiently, it may release energy(or visible rays).

In addition, in the previous topic of "Tritium is used to generate neutrinos🧐 (02/17/2022)", it was also written about the characteristics that radioactive isotopes change due to radioactive decay. In this case, I wrote that it emits energy (as an electron and a neutrino).

Both give energy to an element (or a nucleus), and as a result, the state of it changes and an energy is released. I think this shows that the energy is the same as a component of the element. I thought it was good for an explanation of Einstein's equation of special relativity "E = mc2".😃 Britannica's explanation of "E = mc2" was easy to understand. Thank you very much.😊 The following are quotes from [the article]():

> E = mc2, equation in German-born physicist Albert Einstein’s theory of special relativity that expresses **the fact that mass and energy are the same physical entity and can be changed into each other**. In the equation, the increased relativistic mass (m) of a body times the speed of light squared (c2) is equal to the kinetic energy (E) of that body.

> In physical theories prior to that of special relativity, mass and energy were viewed as distinct entities. Furthermore, the energy of a body at rest could be assigned an arbitrary value. **In special relativity, however, the energy of a body at rest is determined to be mc2. Thus, each body of rest mass m possesses mc2 of “rest energy,” which potentially is available for conversion to other forms of energy. The mass-energy relation, moreover, implies that, if energy is released from the body as a result of such a conversion, then the rest mass of the body will decrease. Such a conversion of rest energy to other forms of energy occurs in ordinary chemical reactions, but much larger conversions occur in nuclear reactions. This is particularly true in the case of nuclear fusion reactions that transform hydrogen to helium, in which 0.7 percent of the original rest energy of the hydrogen is converted to other forms of energy. Stars like the Sun shine from the energy released from the rest energy of hydrogen atoms**

> **that are fused to form helium.**

I've still been learning about "Mass–energy equivalence".😅

Keywords: Periodic Table, Spectrum, Energy, Element, Flame Test, Visible Ray, Radioactive Isotope, Electron, Neutrino, Einstein, Special Relativity, E = mc2

You may partly understand a process of creating a crater! 😳😃(04/17/2022)

I was reading an article called "Scientists Confirm Discovery of 'Hottest Rock on Earth'" on Sci-News. Thank you very much.😊This article introduced a result of a study that a glass rock which contained small zircon grains in the Mistastin Lake crater in Canada was formed at 2,370°C. The following are quotes from this article:

> **“The biggest implication is that we are getting a much better idea of how hot these impact melt rocks are, which initially formed when the meteorite struck the surface, and it gives us a much better idea of the history of the melt and how it cooled in this particular crater,” said University of Western Ontario postdoctoral student Gavin Tolometti.**

> **“It can also give us insight to study the temperature and melts in other impact craters.”**

> “Most of the preserved evidence, such as glass samples and impact melt samples, were found close to the crater floor,” he added.

> **According to the team, this is the first time reidites — a mineral formed when zircon undergoes high pressure and temperatures — have been discovered at the Mistastin site.**

> The researchers found three reidites that were still preserved in the zircon grains, and evidence that another two were once present but had crystallized when temperatures had exceeded 1,200 degrees Celsius, at which point the reidite was no longer stable.

> This mineral allows the scientists to better constrain the pressure conditions indicating that there may have been a peak pressure condition around 30 to potentially above 40 GPa (gigapascals).

It's very interesting to be able to know partly how a process of a meteorite colliding with the surface have done by examining reidites.👏

Keywords: Crater, Mistastin Lake, Meteorite, Zircon, Reidite

The antimicrobial properties of silver are amazing! 💪(04/08/2022)

A story of chemistry was also featured in the latest episode of Wired UK podcast. Thank you very much.😊 Silver is used to develop of photos and antimicrobial, but using that silver, it's a shocking story that Paul Karason used self-described medications to cure problems with his sinuses, dermatitis, acid reflux and other issues and his face looked like a Smurf. 😳

But actually I don't have no knowledge of silver as the antimicrobial properties.😅I did a little search on the chemical information of silver.😃 A website called "Silver as an Antimicrobial Agent" was helpful. Thank you very much.😊 The following are quotes from it:

> The antimicrobial properties of silver have been known to cultures all around the world for many centuries. **The Phoenicians stored water and other liquids in silver coated bottles to discourage contamination by microbes (Wikipedia: Silver). Silver dollars used to be put into milk bottles to keep milk fresh, and water tanks of ships and airplanes that are "silvered" are able to render water potable for months (Saltlakemetals.com)**. In 1884 it became a common practice to administer drops of aqueous silver nitrate to newborn's eyes to prevent the transmission of Neisseria gonorrhoeae from infected mothers to children during childbirth (Silvestry-Rodriguez et al., 2007).

> In 1893, the antibacterial effectiveness of various metals were noted and this property was named the oligodynamic effect. **It was later found that out of all the metals with antimicrobial properties, silver has the most effective antibacterial action and the least toxicity to animal cells (Guggenbichler et al., 1999)**. Silver became commonly used in medical treatments, such as those of wounded soldiers in World War I, to deter microbial growth (Saltlakemetals.com).

> Once antibiotics were discovered, the use of silver as a bactericidal agent decreased. However, with the discovery of antibiotics came the emergence of antibiotic-resistant strains such as CA-MRSA and HA-MRSA, the flesh-eating bacteria. Due to increasing antibiotic resistance, there has recently been a renewed interest in using silver as an antibacterial agent. The availability of new laboratory technologies such as radioactive isotopes and electron microscopy has greatly enabled us to investigate the antibacterial mechanism of silver in recent years (Fox and Modak, 1974; Feng et al., 2000).

Does silver pastas mean that you can sterilize bottled water in case of emergency? 😳

It's been a while since I read The Smurfs in popular comics series among us in our school library when I was in elementary school.😃

Keywords: Silver, Antimicrobial Agent, Photo, Paul Karason, The Smurfs, Phoenicians