The Periodic Table of USITC Investigations

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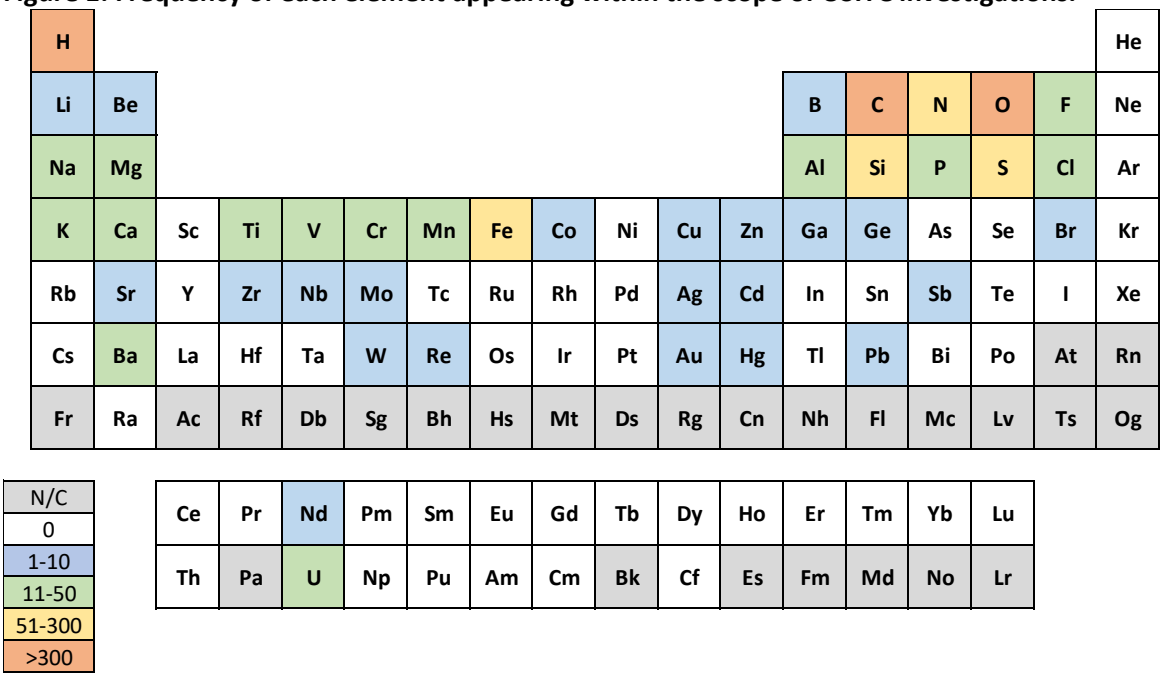
Chemicals are one of the more common categories of products investigated by the USITC in its statutory work. The number of possible chemicals an analyst could work on is basically infinite as far as chemistry is concerned, but only a small subset are both commercially relevant and likely to be subjects of statutory Commission investigations. The goal of this EBOT is to highlight the most commonly encountered classes of chemicals that an analyst might encounter at the USITC.

The periodic table of elements summarizes the properties of all 118 elements discovered thus far. The majority of them (78 percent) find some current commercial use.[1] Slightly less than half of those elements have been part of a chemical subject to a Commission investigation, although with greatly varying frequency (figure 1).

Figure 1: Frequency of each element appearing within the scope of USITC investigations.



Note: N/C – no commercial use. Numbers in legend are based on the procedure described in "Methods".
Source: U.S. International Trade Commission, "Commission Publications Library," retrieved October 17, 2019.

Methods

In developing this survey of chemical investigations by the USITC, data was pulled from available USITC publications dating from 1961 to the present.[2] A chemical was included in the data set if it (1) was a defined chemical species or narrow group of chemicals, including isolated elements and ores; (2) was not

[1] Commercial use here means that an element is used outside of research. English, "Here's the Real Life Use of Every Element on the Periodic Table," April 5, 2017 (accessed February 5, 2020).
[2] Starting with the investigation on Nepheline Synanite from Canada (Inv. AA1921-15).

a finished or intermediate good;[3] (3) was not food;[4] and (4) was specifically requested for investigation.[5] Each element was only counted once per chemical per publication, regardless of stoichiometry.[6] All preliminary, final, and sunset reports were counted separately to reflect continued interest in those chemicals. MTB petitions were not included.

Findings

The elements most commonly appearing in investigations—carbon (C), oxygen (O), and hydrogen (H)—reflect the number of organic chemicals as targets of study.[7] Of the 222 unique chemical products investigated by the Commission since 1961, 114 (51 percent) have involved organic chemicals. The most commonly investigated organic chemicals are glycine (a food additive) and sulfanilic acid (input for dyes and drugs), each accounting for 2 percent of all chemicals investigations. Nitrogen (N) and sulfur (S) are in the next most common group of elements due to their presence in a substantial fraction of organic chemicals, while silicon (Si) and iron (Fe) are more often investigated in the forms of alloys, metals, and ores.[8] Many of the elements in the next most frequent category can be split into either functional groups within organic chemicals or as counter ions in salts.[9] The lowest frequency chemicals are either not often used by industry or lack a domestic production base, which is often true for the elements lacking a single investigation as well. [10]

Outlook

Subject chemicals are not consistently represented over time. Some experience significant activity in a relatively short timespan, such as titanium dioxide in the 1960s, while others have been reviewed regularly throughout the decades, like uranium (nuclear fuel) and sorbitol (food and cosmetics). Recent years have shown a significant rise in cases involving mass-produced polymers, especially polyethylene terephthalate (PET) and polytetrafluoroethylene (PTFE).[11] Another emerging group is lithium (Li) chemicals, whose increased demand by battery manufacturers correlates with the recent appearance of subject investigations. However, one should not take for granted that past publications will equate to future petitions, as the majority of chemicals (68 percent) are the subject of only one or two investigations. Anything can come through the door at any time, and the USITC chemists are prepared to handle it.

Source: U.S. International Trade Commission, "Commission Publications Library," retrieved October 17, 2019.

[3] For example, polymer resins would be included, but a sheet of plastic would not.
[4] For example, sugar (sucrose) was not included despite being a defined chemical.
[5] That is, independent research was excluded, as were annual reports like Trade Shifts.
[6] For example, lead chromate ($PbCrO_4$) added one count each to lead (Pb), chromium (Cr), and oxygen (O), despite the ratio being 1:1:4 in the compound.
[7] The term "organic" in chemistry refers to chemicals that contain carbon, not a method of agriculture.
[8] Ferrosilicon, ferrovanadium, and silicomanganese are all frequently investigated forms of these elements, collectively accounting for 6 percent of chemicals investigations. All are used in the processing of alloys.
[9] For example, fluorine (F) and chlorine (Cl) are commonly used in pesticides like sulfentrazone and chloropicrin, and sodium (Na) and potassium (K) are parts of salts like the fertilizer sodium nitrate or the widely used oxidizing agent potassium permanganate.
[10] For example, antimony (Sb) has relatively few applications and gallium (Ga) is not produced in the United States.
[11] There has also been a shift in subject countries, away from Europe and Japan in the 1970s and 1980s to China, Latin America, former Eastern Bloc countries, and Soviet successor states after 1990. Some, like Russia, are focused on minerals and fertilizers, while Chinese products run the gamut of chemical classes.