The names of the chemical elements have received a certain amount of attention in Word Ways over the years. Borgmann (1968) presented a quiz on 20 transposed element names in the first issue of Word Ways. Other articles have documented more extensive transpositions of element names (Borgmann, 1974, 1978; Francis, 1977) and where an element did not have a transposition, Francis (1977) offered the shortest possible transadditions of the element names.

Others papers have offered more transadditions (Francis, 2006a), old names for some of the elements, elements in US placenames, and words composed exclusively of the element symbols, such as CoAgULaTe.

All the symbols of chemical elements as an ordered collection of letters have been examined too (Francis 2002, 2006b). Viewing the symbols as a sequence of more of two hundred letters, Francis presented words that occurred "naturally" in that sequence (CLARK and CONIC were five-letter examples), words that could be made by transposition of the letters in adjacent symbols (e.g. SPORTIER can be formed from the symbols Re Os Ir Pt with atomic numbers 75-78), and words that can be made by transposition of symbols and partsymbols.

An analysis of the chemical symbols that compose the names of the elements with atomic numbers 1 to 111 is presented in this paper in puzzle format as a new contribution to this word play about chemical elements. We have detected that solely 15 names of the 111 chemical elements are composed by the chemical symbols of others elements of the periodic table. Chemical symbols of the isotopes of hydrogen (deuterium (D) and tritium (T)) have been included in this analysis too. The shady and empty squares in Figure 1 correspond with the position of those 15 elements at the periodic table. If you are chemist, you will know easily these elements with transposition.
In order to know those 15 special elements, names of elements that compose them are showed as clues. To solve the puzzle, you must find the symbols that correspond to the elemental names and rearrange them into the chemical elements' names. For example, if the clues at [1] are nitrogen, carbon, argon, oxygen and boron, symbols are N, C, Ar, O and B. If you rearrange these symbols, it will appear CARBON, correct? Find the rest of elements.

[2] neon, nitrogen, oxygen
[3] cobalt, nitrogen, lithium, silicon
[4] ruthenium, sulfur, oxygen, hydrogen, phosphorus
[5] oxygen, nitrogen, iridium
[6] cobalt, aluminium, tritium, boron
[7] erbium, phosphorus, carbon, oxygen
[8] carbon, nickel, arsenic, selenium
[9] yttrium, tritium, oxygen, nitrogen, phosphorus, krypton
[10] iodine, tritium, nitrogen
[12] nitrogen, oxygen, xenon
[13] samarium, uranium, bismuth, thorium
[14] tantalum, arsenic, titanium, neon
[15] deuterium, oxygen, radon, nitrogen

In addition to that, names of elements formed for a collection of chemical symbols with a shortest transaddition have been detected in other 61 chemical elements. Those elements include an additional letter that it does not correspond with chemical symbols.

M consonant as additional letter is contained in the 84% of these elements approximately. It is odd that this letter has a chemical meaning too. On the one hand, M is the initial of the scientific surname that made the periodic table of chemical elements, Dmitri Mendelelev, and on the other, M is the symbol for molar, that describe the concentration of chemical solutions.

We should add M to 51 elements. The shady and empty squares in Figure 2 correspond with the position of these 51 elements at the periodic table. Other 10 elements that can be formed by chemical symbols and other different additional letter to M are included in Figure 2 too at white squares with a letter from A to J. All chemical clues to solve this puzzle are showed after Figure 2.

**Figure 2:** Chemical elements inside of other elements with an additional letter

![Periodic Table](image)

1. lithium, uranium, helium
2. lithium, iodine, uranium, thorium
3. oxygen, sulfur, deuterium, iodine, uranium
4. silver, uranium, silicon, neon
5. iodine, uranium, aluminium, nickel
6. phosphorus, arsenic, uranium, silicon, oxygen, tritium
7. aluminium, carbon, uranium, iodine
8. calcium, nitrogen, uranium, sulfur, deuterium, iodine
9. titanium, tantalum, iodine, nitrogen, uranium
10. oxygen, bromine, neon, iodine
11. bismuth, ruthenium, deuterium, uranium, iodine

Next clues and different additional letters to M that you need to form the others 10 elements are:

| A | germanium, nitrogen, deuterium, yttrium, oxygen, hydrogen |
| B | oxygen, boron, nitrogen |
| C | nickel, germanium, nitrogen, oxygen, tritium |
| D | yttrium, oxygen, germanium, nitrogen |
| E | iodine, neon, oxygen, fluorine, lutetium |
| F | argon, nitrogen, oxygen |
| G | iodine, carbon, nitrogen |
| H | erbium, vanadium, silicon |
| I | nitrogen, yttrium, molybdenum, titanium |
| J | neutron, uranium, tellurium, sulfur, tritium |


Finally, if we want form the names of the rest of chemical elements as a series of chemical symbols we need from two to six additional letters.

REFERENCES