# The Periodic Table of the Elements, 21-Scandium and the Symmetry in Numbers

Charles William Johnson

The first twenty elements of the periodic table of the elements are generally referred to as the regular elements. As of element 21-Scandium that supposed regularity breaks down.

In my studies of the periodicity of the elements regarding the protonic, electronic and neutronic counts it would appear that the elements reflect a regularity that can be predicted on many different levels. And, as I have shown regarding the neutron count of the elements, even that count reflects a periodicity with a similar degree of predictability as the protonic and electronic counts.

Nonetheless, it would appear that element 21-Scandium represents a definite breaking point in the structure of the elements regarding their different counts. Element 21-Scandium has 21 protons, 21 electrons and 24 neutrons.

24 / 21 = **1.142857143**

For those who believe that much of nature enshrouds definite patterns of communication, this could be one such example. A circle contains 360 degrees as historically defined.

360 divided by pi (3.141592654) yields **114.591559** (the **diametian**). The diameter of a 360-degree circle contains the relational length of 114.591559 degrees.

Were pi to be represented as 3.15 as in ancient times, then:

360 / 3.15 = **1.142857143**

There are three options to consider in the reasoning about this relationship. Firstly, one may wonder whether it is simply a random coincidence and nothing more. Or, secondly, whether it is by design, with some purpose of choice and communication. Or, thirdly, one may simply consider the 1.142857 ratio to represent relations of spacetime/movement; in that this is the way matter-energy behaves. One might further consider along these lines, the relationship within organic chemistry defined by the relation of 7-Nitrogen and 8-Oxygen: **8 / 7 = 1.142857.** The element 21-Scandium is but a projection or multiple of

the same/similar relationship between Nitrogen and Oxygen. In a like manner that the relation of Nitrogen | Oxygen defines organic chemistry, so the 1.142857 relationship of Scandium determines much of inorganic chemistry.

From this perspective, given the significant relationship of the diameter of a circle to the circumference of a circle (pi), the relationship between the protonic/electronic count of an element to the neutronic count may harbor a similar significance of spacetime. The 24n:21p relationship appears to be reflecting an extremely significant ratio found throughout matter-energy, and that this relationship appears at the level of 21-Scandium on the progression of elements may be of significance for identifying relationships of symmetry within the progression of elements.

***The First Twenty Representative Elements***

Examine the relationships of the protons (p), electrons (e) and neutrons (n) for the first twenty elements. This will offer a basis for the following analysis and the idea that the periodic table of the elements begins in a limited and conditional sense at element 21-Scandium.

**The Neutron Count of the First Twenty Elements Divided by the Neutron Count**

| Element Atomic Number | Neutrons | Protons | Ratio |
|---|---|---|---|
| 1-Hydrogen | 0 | 1 | 0 |
| **2-Helium** | **2** | **2** | **1** |
| 3-Lithium | 4 | 3 | 1.3333 |
| 4-Boron | 5 | 4 | 1.25 |
| 5-Beryllium | 6 | 5 | 1.2 |
| **6-Carbon** | **6** | **6** | **1.0** |
| **7-Nitrogen** | **7** | **7** | **1.0** |
| **8-Oxygen** | **8** | **8** | **1.0** |
| 9-Fluorine | 10 | 9 | 1.1111 |
| **10-Neon** | **10** | **10** | **1.0** |
| 11-Sodium | 12 | 11 | 1.0909 |
| **12-Magnesium** | **12** | **12** | **1.0** |
| 13-Aluminum | 14 | 13 | 1.0769 |
| **14-Silicon** | **14** | **14** | **1.0** |
| 15-Phosphorus | 16 | 15 | 1.0666 |
| **16-Sulfur** | **16** | **16** | **1.0** |
| 17-Chlorine | 18 | 17 | 1.0588 |
| 18-Argon | 22 | 18 | 1.2222 |
| 19-Potassium | 20 | 19 | 1.0526 |
| **20-Calcium** | **20** | **20** | **1.0** |

Throughout the series of books, essays and extracts (www.theschemata.com), I have been emphasizing the significance of the neutron count for the elements. This is especially so with regard to this baseline relationship within the first twenty elements as shown above. The nucleonic equilibrium attained reflected in elements 2, 6, 7, 8, 10, 12, 14, 16, and 20 form a baseline pattern that established different kinds of symmetry discussed in my work, ***The Schemata of the Elements***.

## ***A Starting Point for the Progression of Elements: 21-Scandium***

This apparent struggle for regularity within the first twenty representational elements breaks at element 21-Scandium, when the ratio of the atomic number and the neutron count produces a number that is found in nature, as in the ratio of the diameter of a circle to its circumference:

**21-Scandium** **24n** **21p** **1.142857**

The total proton-electron-neutron count for the element 21-Scandium is **66**.

**20-Calcium** **20n** **20p** **1.0**

The element 20-Calcium has 60 sub-particles ( 20p + 20e + 20n ).

66pen / 60pen = **1.1** 24n / 20n = **1.2**

66 x 1 = 66pen ( 21- Scandium has 66pen)

66 x 2 = 132 ( 40-Zirconium has 131pen )

66 x 3 = 198 ( 58-Cerium has 198pen )

66 x 4 = 264 ( 76-Osmium has 266pen )

66 x 5 = 330 ( 92-Uranium has 330pen )

These numbers begin to reveal a certain kind of symmetry. Consider that element 57-Lanthanum represents a **protonic midpoint** to the limiting elements of 21-Scandium and 92-Uranium.

**21 | 57 | 92**

[ 92 – 21 = 71 / 2 = 35.5 + 21 = **56.5** or, 92 – 35.5 = **56.5** ]

The **combined pen midpoint** is similar:

21-Scandium has **66pen**

57-Lanthanum has **196pen**

92-Uranium has **330pen**

**21 | 57 | 92**

[ 66 + 330 = 396 / 2 = **198** ]

The **neutronic midpoint** varies:

21-Scandium has **24n**
57-Lanthanum has **139n**
92-Uranium has **238n**

[ 24 + 238 = 262 / 2 = **131** ] Regarding the symmetry of the neutronic count, the element 40-Zirconium represents a midpoint for the limiting elements of 21-Scandium and 92-Uranium.

Therefore, the element 57-Lanthanum represents a math-based midpoint for the limiting elements 21-Scandium and 92-Uranium, the beginning and end of certain "irregular" natural elements within the periodic table.

The periodic table and the schemata of the elements have been extended to 216 elements, or to 218 elements, depending upon the criteria for the periods. Each of these triplicities of elements represent a specific midpoint.

Elements 21-Scandium and 216-Buh have as their midpoint element **118**-Uuo

Elements 21-Scandium and 218-Buo have as their midpoint element **120**-Ubo

Element **118-Uuo** is generally shown as representing the limiting element of the conventional periodic table in use today. The significance then for element 21-Scandium becomes evident in determining relationships of symmetry with other limiting aspects of the periodic table of the elements. Symmetries and midpoints are defined as of the element 21-Scandium and other end elements of the *aufbau* progression.

If one attempts to conceive the internal symmetry of the progression of elements as of the limiting elements 1 through 92 or 1 through 118, very distinct symmetries are produced. These symmetries are equally significant, but by conceptualizing the initiation of the schemata of the elements as of element 21-Scandium distinct symmetries appear that are generally no considered in the literature.

Consider then the symmetry and midpoints of limiting elements within the schemata of the elements:

| Begin Element | Midpoint Element | End Element |
|---|---|---|
| 21 | - | - |
| 21 | 57 | 92 |
| 21 | 71 | 120 |
| 21 | 118 | 216 |
| 21 | 120 | 218 |

The observation should not escape us, that elements 21-Scandium and 39-Yttrium, both initiating irregular groups of elements, when summed by their atomic number produce the number 60. Sixty being half, obviously, of the limiting table of 120 elements; again, a distinct protonic midpoint.

Elements 21 and 57 have as their protonic midpoint element 39.

[ 21 + 57 = 78 / 2 = 39 ]

Elements 21 and 71 have as their midpoint element 46, the midpoint to the 92-element natural schema.

[ 21 + 71 = 92 / 2 = 46 ]

Elements 21 and 89 have as their midpoint element 55.

[ 21 + 89 = 110 / 2 = 55 ]

Elements 21 and 92 have as their midpoint element 57.

[ 21 + 92 = 113 / 2 = 56.5 (57) ]

Element 21 and 120 have as their protonic midpoint element 71.

[ 21 + 120 = 141 / 2 = 70.5 (71) ]

From these computational relationships it becomes obvious that the placement of the elements by groups and families is not a random act of choice. It also becomes evident that element 21-Scandium, whose baseline ratio is 1.142857 represents itself a starting point to the progression of elements, as of the end progression of the regularity found in the neutron count that ceases with element 20-Calcium

If one inverts the reasoning, then, element 39 implies the boundary elements of 21 and 57. Element 55 implies the boundary elements of 21 and 89. Element 57 implies the boundary elements of 21 and 92. Element 71 implies the boundary elements of 21 and 120. Element 118 implies the boundary elements of 21 and 216. Element 120 implies the boundary elements 21 and 218. And so on.

In this manner the significance of the placement of element **71-Lutetium** on the Schemata of the elements is confirmed by the relationship of elements 39 and 103.

[ 39 + 103 = 142 / 2 = **71** ]

In this manner, as of the protonic count, there exists a mathematical confirmation of the placement of the elements on the schemata; not so on the conventional periodic table of the elements.

Also, in this same manner, the significance of element **55-Cesium,** cited above of elements 21 and 89, finds itself as the midpoint for elements 39 and 71.

[ 39 + 71 = 110 / 2 = **55** ]

On the electronic schemata of the elements, 55-Cesium lies within the family of elements: 3-Lithium, 11-Sodium, 19-Potassium, 37-Rubidium, **55-Cesium**, 87-Francium, and 119-Uuc.

In my recent book, ***Elemental Triplicity,*** numerous examples are presented to distinguish between the symmetries of the **protonic midpoints** and symmetries of the **neutronic midpoints** of the elements.

For example, there are 50 neutrons in element 39-Yttrium and 82 neutrons in element 57-Lanthanum. The neutronic midpoint for these two elements is element 49-Indium, which is relationally centrosymmetrical on the schemata of the elements to the other two elements.

[ 50n + 82n = 132 / 2 = 66n ] (49-Indium has 66 neutrons.)

The **protonic midpoint** for elements 39 and 57 is element 48-Cadmium, end element of the third transition group.

The **neutronic midpoint** for elements 39 and 57 is element 49-Indium, secondary begin element of the representational group for its period.

Within the progression of elements, then, various patterns of symmetry coexist that help explain the relationships of the elements to one another. Even though the elements reveal an *aufbau* progression of one proton and one electron, along with numerous aggregate neutrons, the elements as of the symmetries identified appear to exist as a whole, as an integral process. When one element is affected all elements are affected.

The element 21-Scandium appears to initiate different kinds of centrosymmetry relationships with other elements. It also begins internal relationships of symmetry and progression. Element 21-Scandium establishes a distinct regularity, unlike the irregularities supposedly identified in the literature of today.

Organic chemistry is identified as of a significance of the elements **7-Nitrogen** and **8-Oxygen.** This relationship is also reflected in the ratio of element 21-Scandium.

8p / 7p = **1.142857**

The *aufbau* progression of the elements is apparent for the protonic and electronic counts. For the neutronic count the relationships among the elements are more subtle and require further analysis in terms of possible relationships of centrosymmetry and translation symmetry.

Distinct relationships of centrosymmetry may lie in the boundary elements chosen for the analysis:

3-Lithium | 57-Lanthanum | 118-Uuo

21-Scandium | 57-Lanthanum | 92-Uranium

And so on.

In my mind, there is no random coincidence in the fact that the first twenty elements establish a pattern of nucleonic equilibrium (1.0) for certain elements (elements 2, 6, 7, 8, 10, 12, 14, 16 and 20). Nor is there any elemental happenstance to the fact that most of the elements reflect ratios that are exclusive of all others. Nor is there random coincidence in the fact that some of the elements pair off with the same ratio (elemental pairs **24 | 30; 35 | 42; 36 | 48; 55 | 60**; and, **76 | 78**). Nor do I perceive any random coincidence in the fact that the unique ratio for the element 21-Scandium happens to reflect the ratio of the diameter of a circle to its circumference, as of the ancient value for pi (**360 / 3.15 = 114.2857**).

In order to better illustrate the symmetry in the pairs of elements that share the same ratio of neutron:proton counts, I have transferred the data onto a neutronic schema of the elements. The color coding of each element allows us to visualize the pairs in relation to the twenty-element baseline of the neutronic schema of the elements. Instead of presenting the neutronic schema on the customary view of twenty elements per row, I have presented the schema based on ten elements per row in order to visualize the symmetry in the pattern better. The pattern of symmetry and the progression of seven elements in relation to the paired elements is explained below.

In order to better understand the nature of the neutronic schema presented here, one may also view the values for each element regarding its ratio of neutrons:protons on a list annexed to this brief essay. Keep in mind that elements **4-Boron** and **18-Argon**, together with **7-Nitrogen**, represent anomalies to the symmetry of the baseline pattern for the first twenty elements. These elements are colored in orange on the neutronic schema.

**Neutronic Schema with Ratios of Neutrons:Protons for Selected Elements:**

*See list above for corresponding values.*

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 H | 2 He | 3 Li | 4 Be | 5 B | 6 C | 7 N | 8 O | 9 F | 10 Ne |
| 11 Na | 12 Mg | 13 Al | 14 Si | 15 P | 16 S | 17 Cl | 18 Ar | 19 K | 20 Ca |
| 21 Sc | 22 Ti | 23 V | 24 Cr | 25 Ma | 26 Fe | 27 Co | 28 Ni | 29 Cu | 30 Zn |
| 31 Ga | 32 Ge | 33 As | 34 Se | 35 Br | 36 Kr | 37 Rb | 38 Sr | 39 Y | 40 Zr |
| 41 Nb | 42 Mo | 43 Tc | 44 Ru | 45 Rh | 46 Pd | 47 Ag | 48 Cd | 49 In | 50 Sn |
| 51 Sb | 52 Te | 53 I | 54 Xe | 55 Cs | 56 Ba | 57 La | 58 Ce | 59 Pr | 60 Nd |
| 61 Pm | 62 Sm | 63 Eu | 64 Gd | 65 Tb | 66 Dv | 67 Ho | 68 Er | 69 Tm | 70 Yb |
| 71 Lu | 72 Hf | 73 Ta | 74 W | 75 Re | 76 Os | 77 Ir | 78 Pt | 79 Au | 80 Hg |
| 81 Tl | 82 Pb | 83 Bi | 84 Po | 85 At | 86 Rn | 87 Fr | 88 Ra | 89 Ac | 90 Th |



**21-Scandium** has the ratio of 1.142857

**35-Bromine** is **14p** more than 21-Scandium. And, its ratio of 1.285714 contains a mantissa that is double the mantissa of element 21: for .142857 x 2 = .285714.

**42-Molybdenum** is **21p** more than 21-Scandium. And, its ratio of 1.285714 contains a mantissa that is double the mantissa of element 21: for .142857 x 2 = .285714.

Consider subsequent progression and relations of pairs to 21-Scandium:

48 – 21 = **27 [28]**

55 –21 = 34 [**35**]

60 – 21 = **39**

76 – 21 = **55 [56]**

78 – 21 = **57**

Progression of difference in multiples of seven: 14, 21, 28, 35, [**39**] 42, 49, 56, [**57**]. The theoretical progression based on multiples of seven would be:

21, **28**, 35, 42, 49, 56, 63, 70, 77.

The progression of paired elements is as of 21:

**21**, **35**, **42**, [48], [55], 60, [76, 78].

The variation between the theoretical progression and the existing progression of paired elements lies with regard to theoretical element **63** and existing element **60**. All other comparisons are either exact or similar removed by on one proton.

Did the ancients know of these relationships, one may rightfully ask. There is a Maya count of 819, which we have analyzed in previous essays.

21 x 39 = 819
21 x 57 = 1197
21 x 71 = 1491

The difference between **1197** and **819** is **378**, which is half the baseline of the Great Pyramid of Giza (baseline **756** feet). Also, 21 x 360 degrees equals 7560. Remember, the ancient Egyptians had 36 *dekans* in their calendar. The Maya also had a 360 day-count calendar. The Maya chose **1872000** for their long count period. Half of 1872 is 936. **936 / 819 – 1.142857**. However, this set of considerations would take us into another realm altogether, one that must be explored eventually.

## ***Addendum***

### The Neutron Count of the First Twenty Elements Divided by the Neutron Count

| Element Atomic Number | Neutrons | Protons | Ratio |
|---|---|---|---|
| 1-Hydrogen | 0 | 1 | 0 |
| **2-Helium** | **2** | **2** | **1.0** |
| 3-Lithium | 4 | 3 | 1.3333 |
| 4-Boron | 5 | 4 | 1.25 *Anomaly* |
| 5-Beryllium | 6 | 5 | 1.2 |
| **6-Carbon** | **6** | **6** | **1.0** |
| **7-Nitrogen** | **7** | **7** | **1.0** *Anomaly* |
| **8-Oxygen** | **8** | **8** | **1.0** |
| 9-Fluorine | 10 | 9 | 1.1111 |
| **10-Neon** | **10** | **10** | **1.0** |
| 11-Sodium | 12 | 11 | 1.0909 |
| **12-Magnesium** | **12** | **12** | **1.0** |
| 13-Aluminum | 14 | 13 | 1.0769 |
| **14-Silicon** | **14** | **14** | **1.0** |
| 15-Phosphorus | 16 | 15 | 1.0666 |
| **16-Sulfur** | **16** | **16** | **1.0** |
| 17-Chlorine | 18 | 17 | 1.0588 |
| 18-Argon | 22 | 18 | 1.2222 *Anomaly* |
| 19-Potassium | 20 | 19 | 1.0526 |
| **20-Calcium** | **20** | **20** | **1.0** |

| | | | |
|---|---|---|---|
| **21-Scandium** | **24n** | **21p** | **1.142857** |
| 22-Titanium | 26 | 22 | 1.1818 |
| 23-Vanadium | 28 | 23 | 1.2173 |
| **24.-Chromiun** | **28** | **24** | **1.1666** |
| 25-Manganese | 30 | 25 | 1.2 |
| 26-Iron | 30 | 26 | 1.1538 |
| 27-Cobalt | 32 | 27 | 1.1851 |
| 28-Nickel | 31 | 28 | 1.1071 |
| 29-Copper | 35 | 29 | 1.2068 |
| **30-Zinc** | **35** | **30** | **1.1666** |
| 31-Gallium | 39 | 31 | 1.2580 |
| 32-Germanium | 41 | 32 | 1.2812 |
| 33-Arsenic | 42 | 33 | 1.2727 |
| 34-Selenium | 45 | 34 | 1.3235 |
| **35-Bromine** | **45** | **35** | **1.2857** |
| **36-Krypton** | **48** | **36** | **1.3333** |
| 37-Rubidium | 48 | 37 | 1.2972 |
| 38-Strontium | 50 | 38 | 1.3157 |
| 39-Yttrium | 50 | 39 | 1.2820 |
| 40-Zirconium | 51 | 40 | 1.275 |
| 41-Niobium | 52 | 41 | 1.2682 |
| **42-Molybdenum** | **54** | **42** | **1.2857** |
| 43-Technetium | 55 | 43 | 1.2790 |
| 44-Ruthenium | 57 | 44 | 1.2954 |
| 45-Rhodium | 58 | 45 | 1.2888 |
| 46-Palladium | 60 | 46 | 1.3043 |
| 47-Silver | 61 | 47 | 1.2978 |
| **48-Cadmium** | **64** | **48** | **1.3333** |
| 49-Indium | 66 | 49 | 1.3469 |
| 50-Tin | 69 | 50 | 1.38 |
| 51-Antimony | 71 | 51 | 1.3921 |
| 52-Tellurium | 76 | 52 | 1.4615 |
| 53-Iodine | 74 | 53 | 1.3962 |
| 54-Xenon | 77 | 54 | 1.4259 |
| **55-Cesium** | **77** | **55** | **1.4** |
| 56-Barium | 81 | 56 | 1.4464 |
| 57-Lanthanum | 82 | 57 | 1.4385 |
| 58-Cerium | 82 | 58 | 1.4137 |
| 59-Praseodymium | 82 | 59 | 1.3898 |
| **60-Neodymium** | **84** | **60** | **1.4** |
| 61-Promethium | 84 | 61 | 1.3770 |
| 62-Samarium | 88 | 62 | 1.4193 |
| 63-Europium | 89 | 63 | 1.4126 |
| 64-Gadolinium | 93 | 64 | 1.4531 |
| 65-Terbium | 94 | 65 | 1.4461 |
| 66-Dysprosium | 97 | 66 | 1.4696 |

| | | | |
|---|---|---|---|
| 67-Holmium | 98 | 67 | 1.4626 |
| 68-Erbium | 99 | 68 | 1.4558 |
| 69-Thulium | 100 | 69 | 1.4492 |
| 70-Ytterbium | 103 | 70 | 1.4714 |
| 71-Lutetium | 104 | 71 | 1.4647 |
| 72-Hafnium | 106 | 72 | 1.4722 |
| 73-Tantalum | 108 | 73 | 1.4794 |
| 74-Tungsten | 110 | 74 | 1.4864 |
| 75-Rhenium | 111 | 75 | 1.48 |
| **76-Osmium** | **114** | **76** | **1.5** |
| 77-Iridium | 115 | 77 | 1.4935 |
| **78-Platinum** | **117** | **78** | **1.5** |
| 79-Gold | 118 | 79 | 1.4936 |
| 80-Mercury | 121 | 80 | 1.5125 |
| 81-Thallium | 123 | 81 | 1.5185 |
| 82-Lead | 126 | 82 | 1.5365 |
| 83-Bismuth | 126 | 83 | 1.5180 |
| 84-Polonium | 125 | 84 | 1.4880 |
| 85-Astatine | 125 | 85 | 1.4705 |
| 86-Radon | 136 | 86 | 1.5813 |
| 87-Francium | 136 | 87 | 1.5632 |
| 88-Radium | 138 | 88 | 1.5681 |
| 89-Actinium | 138 | 89 | 1.5505 |
| 90-Thorium | 142 | 90 | 1.5777 |
| 91-Protactinium | 140 | 91 | 1.5384 |
| 92-Uranium | 146 | 92 | 1.5869 |


**Earth/matriX Science Today** www.theschemata.com
Mailing address: P.O. Box 231126, New Orleans, Louisiana 70183-1126