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## Period 6

# Why Isn't Hafnium a Noble Gas?

*also more on the Lanthanide contraction*



by Miles Mathis

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*This paper replaces my earlier paper on the Lanthanides*

After a long break, it is time I returned to the Periodic Table. Many readers probably wish I would concentrate more on one subject, or at least one area of physics or chemistry. Possibly, they think I would get more done that way. They are mistaken. I would indeed get more done in that one field, and if that is their field, of course that would satisfy them more personally. But by skipping around, I actually maximize my production. How? One, I stay fresh. I don't get bored by staying in one place too long, so my creativity stays at a peak. Two, I cross-pollinate my ideas. My readers have seen how often a discovery in one sub-field helps me in another sub-field, even when those two fields aren't adjacent. All of science (and life) is ultimately of a piece, so anything I learn anywhere will help me everywhere else. Three, being interested in a wide array of topics gives me a bigger net, and with a bigger net I am better able to capture solutions across the board. Knowledge isn't just a matter of depth, it is a matter of breadth. In philosophy classes, we were taught this as part of the hermeneutic circle: the parts feed the whole and the whole feeds back into all the parts. Therefore a whole person must be a better problem solver than a partial person or specialist. It is like a computer with more circuits and more connections. Such a computer is smarter, by definition. It benefits from more cross-checks, more analogies, more references, and more total data. Four, as an added benefit, this wide-ranging curiosity helps make my writing more colorful. I can pull in quotes, adages, and references from many subjects, keeping not only myself but hopefully you from getting bored. Instead of reading a dry scientific treatise, you can follow me in a little physical adventure, complete with new discoveries, personal asides, joy, venom, and hopefully the occasional laugh. Therefore, the last thing you should want is to shackle me to one set of problems. If you did, I would soon dry up. The greatest danger to any intelligence or creativity is the attempt to limit it.

So here we are at Period 6 today. The question in my title concerning Hafnium may have never

occurred to you, even if you are a professional chemist. Pulling the Lanthanides out of Period 6 seems to drop Hafnium into Group IV B, and no one asks why that Group isn't part of the Noble Gasses. But since Hafnium is 18 slots above Xenon, the question is well worth asking. Remember, Krypton is 18 slots above Argon, and Xenon is 18 slots above Krypton. So why doesn't Hafnium follow that pattern?

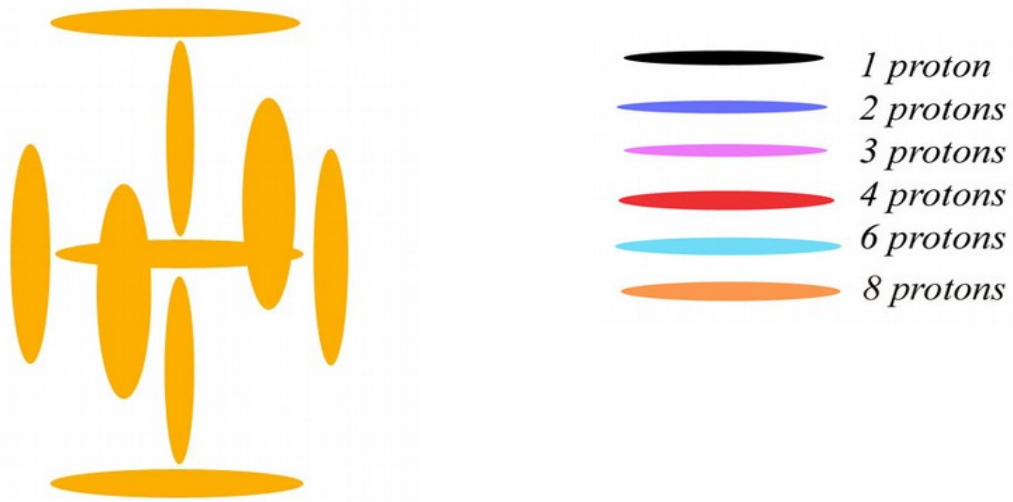
The mainstream can't really answer that question, which is why the Periodic Table is set up like it is. One of the reasons they drop the Lanthanides out is to prevent you from asking it. I encourage you to type the question into Google. You will find you get nothing. Curiously, the first thing that comes up is [my paper on Mercury](#), where I hint at the problem. But since I don't solve it there, I will try to solve it here.

Another reason they drop the Lanthanides out is to get Radon in Group 0. They manufacture and push a  $2n^2$  rule, since this seems to them to explain Radon as a Noble Gas. Since this also puts Gold in Group 1 B, they think they have hit on something, and they have stuck with it. But of course to do that, they have to leave the first Lanthanide, Lanthanum, in the Table. That has never made any sense. If you included Lanthanum with the Lanthanides, and dropped them all out, that would put Hafnium in Group III B, and drop Radon back to Group VII A or XVII. So leaving Lanthanum in Period 6 while dropping the rest of the Lanthanides out is done mostly to get Hafnium under Zirconium, which it resembles in chemical reactions.

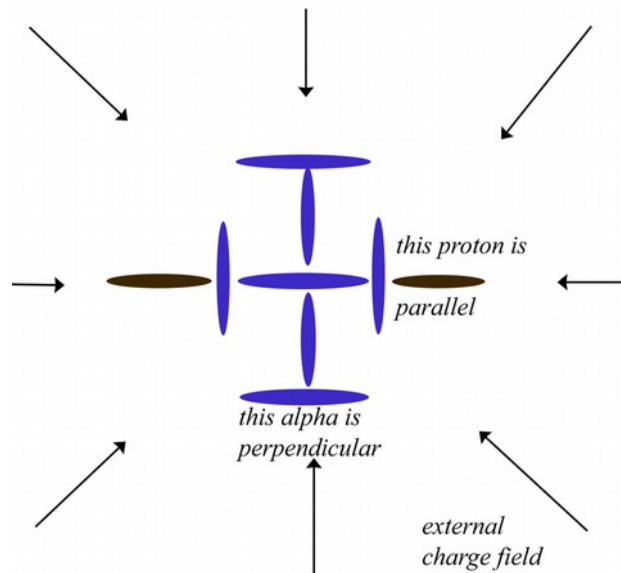
Again, I have shown that the  $2n^2$  rule doesn't work, and they know that. That rule would give us the sequence 2, 8, 18, 32. If we use their addition rule, we then get the sequence 2, 10, 38, 70. To get the current Noble Gasses, you need the sequence 2, 8, 8, 18, 18, which then gives you 2, 10, 18, 36, 54. They have never explained why 8 comes up twice and then 18 twice. From my diagrams, we now see that the  $2n^2$  rule doesn't apply. None of the Noble Gasses are built on it. Helium is 2, Neon is  $2 \times 5$ , Argon is  $2 \times 9$ , Krypton is  $4 \times 9$ , and Xenon is  $6 \times 9$ . There is no Noble Gas at  $8 \times 9$ , because the 8 stack is not stable in the charge wind. There is no Noble Gas at 86 because 32 is never part of the mechanics or the structure or the math.

Since Gold has 25 protons in the 4<sup>th</sup> level, it is not Group 11, either. It is similar to Silver for other reasons. Silver is  $2+6+3$  and Gold is  $4+6+6+6+3$ . Which makes them similar in the outer level. In short, the Periods are based on filling 9 positions, and the Groups are based on filling 8 positions. Since bonds are determined in the outer positions, we get these chemical matches like Gold and Silver. But they do not indicate equal levels.

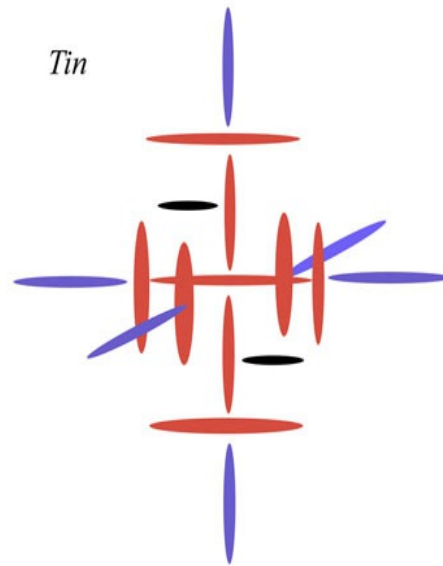
I will now show the same thing with Hafnium, which is not really Group 4. To show that, let us go back to Radon. Since [I have shown that Radon is not a Noble Gas](#), none of that matters anymore. Radon doesn't need to be under Xenon, so getting it there achieves nothing. To get a Noble Gas above Xenon would require we build a nucleus like that of Xenon, with no fourth nuclear shell. So if we had a Noble Gas at number 72, it would look like this:



That is the configuration of Argon, Krypton, and Xenon, but with eight protons in each disk instead of two, four, or six. Each of those orange disks includes four alphas or eight protons. Since Hafnium doesn't act like a Noble Gas, we may assume that isn't its configuration. Besides, I have already shown in previous papers why four alphas in a stack aren't stable. That is why I don't draw Oxygen as just one orange disk, for example, and why Neon doesn't have an orange core. Four alphas in a stack might be created in a star for short periods of time, but the configuration isn't stable because it captures more charge crosswind than is channeled through the interior. Remember, charge channeling is the glue that keeps the nucleus together. But this four stack of alphas wouldn't have any protons top or bottom pulling in charge, so it would rely only on ambient field potential create by the overall spin of the nucleus. In this way, it would act like a Noble Gas. The protons top and bottom of the nucleus would be perpendicular to the incoming charge field, and so they would draw charge weakly.

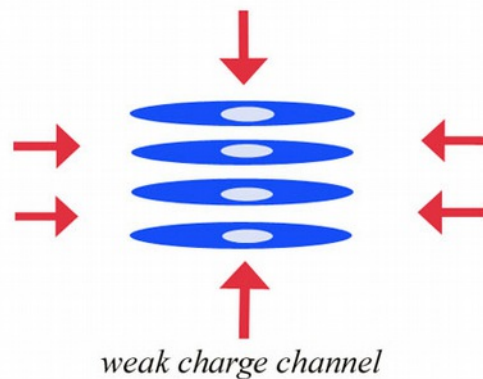


To draw charge in strongly, the nucleus needs protons positioned parallel to the charge field top and bottom, like this:



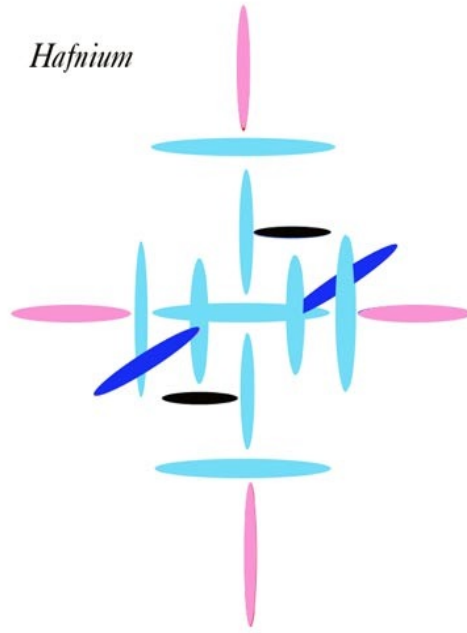
The blue disks top and bottom point up and down into the incoming charge vortices, so they facilitate the pulling of charge into and through the nucleus. Since any stack of alphas by itself doesn't have those pole protons, the stack will channel weakly. This is why Helium channels weakly, for instance.

So any stack will be channeling weakly, but it will be getting hit by charge from the sides (E/W in these diagrams). The more alphas that are stacked, the more charge it is getting hit with from the sides. Once you stack four alphas, the external charge overwhelms the charge being channeled, and the nucleus can't hold together.



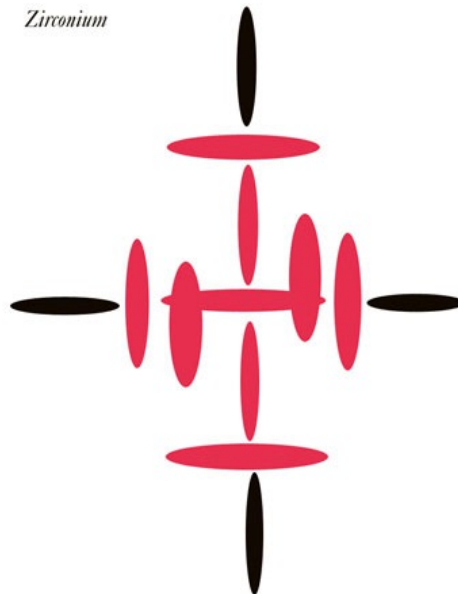
This is why the number 72 is not a Noble Gas. To create stability at that number, the nucleus has to do something else. This is why the rules change completely above Xenon. Therefore, we assume Hafnium must still have a Xenon base. And so we may deduce Hafnium has this configuration:

*Hafnium*



Its low density requires the single protons in the inner levels, and its similarity to Zirconium is indicated by the square configuration, with the same color disks in the four outer positions N, S, E and W. Since the lavender disks represent three protons, two of them will protect one another's accompanying electrons; but the electron with the third proton will be unprotected, and will become a so-called valence electron, prime for ionization. This is why both Hafnium and Zirconium commonly have an oxidation state of +4.

*Zirconium*

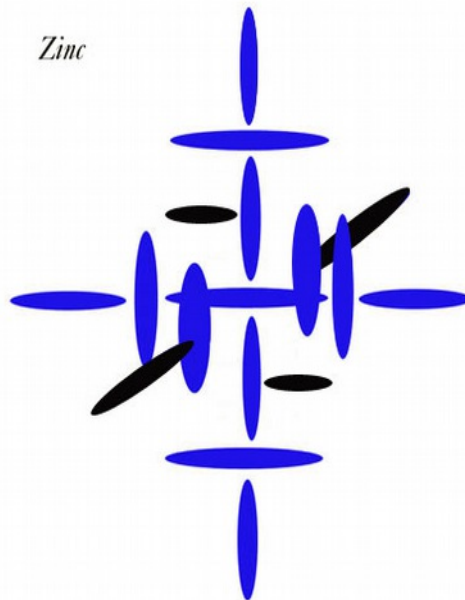


You may say, “What about the blue disks of Hafnium? Why are they just disregarded here?” Well, because they contain only two protons, while the lavender disks represent three, the charge channels in those two directions are weaker. Since charge always has a summed direction, bonding tends to take place in a plane in the first instance. A weaker field in a secondary plane will tend to be ignored in

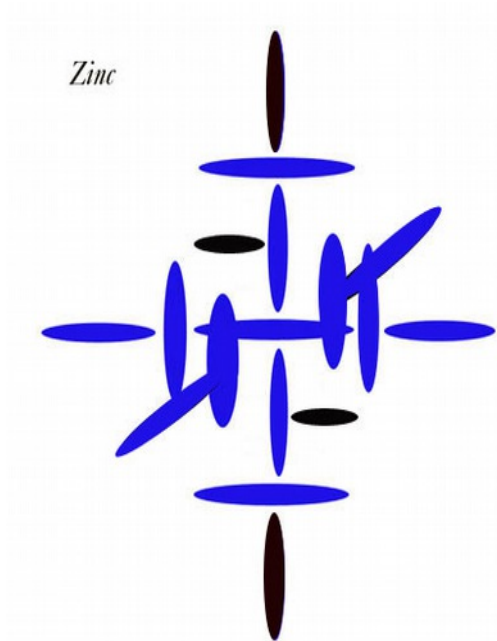
many common bonding situations.

You will say, “Not if the nucleus is spinning. In that case, an incoming ion on the E/W plane would feel a variable field.” True, but bonds to the carousel level normally occur with solids, which are not spinning. While gasses can bond, they normally bond at axial [N/S] positions, not carousel [E/W] positions. At axial positions, the spin doesn't create these variations. We will study this more closely in subsequent papers.

So despite Hafnium's similarity to Zirconium in chemical reactions, it is not really Group IV B, it is Group XVIII. We can see why it acts somewhat like Zirconium and Titanium. What other elements could it be related to? What about Cadmium and Zinc, two elements in Group 12.

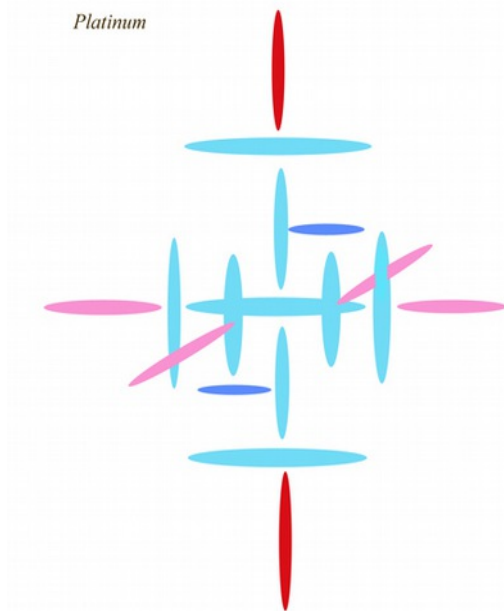


If we build Zinc like that, it appears to have similarities to Hafnium. This is confirmed by several known facts, including the use of both Hafnium and Zinc as induced gamma emitters. However, the reason Hafnium is less like Zinc than it is like Zirconium is due to the fact that Zinc isn't normally built like that. It is built like this:



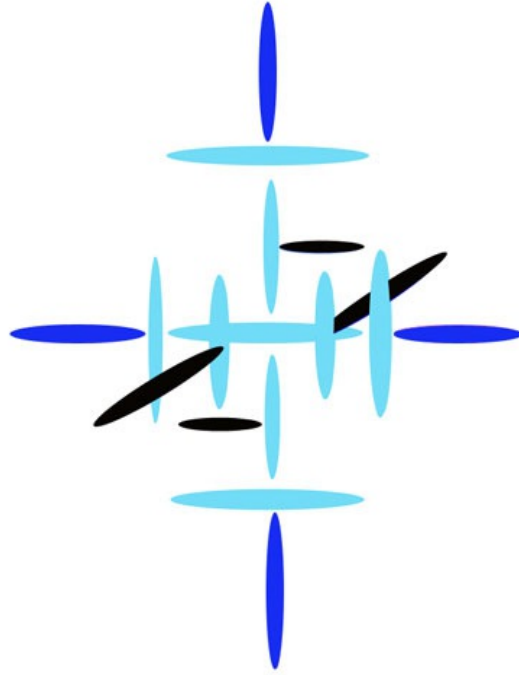
In that case, you can see why Zinc is normally +2. Zinc bonds in the top and bottom positions, via the single protons. In the previous diagram of Zinc, it wouldn't bond with Oxygen as a gas, since it would be spinning on the carousel level. Gasses can't bond to one another on the carousel level, for obvious reasons.

What about Platinum? Should Hafnium be like Platinum? What if we just add one proton to the six outer positions? Well, that has the same number as Platinum, but it isn't Platinum. Platinum has two protons in the inner positions, instead of one like Hafnium. This gives Platinum only four more than Hafnium in the outer positions, and breaks the similarity.

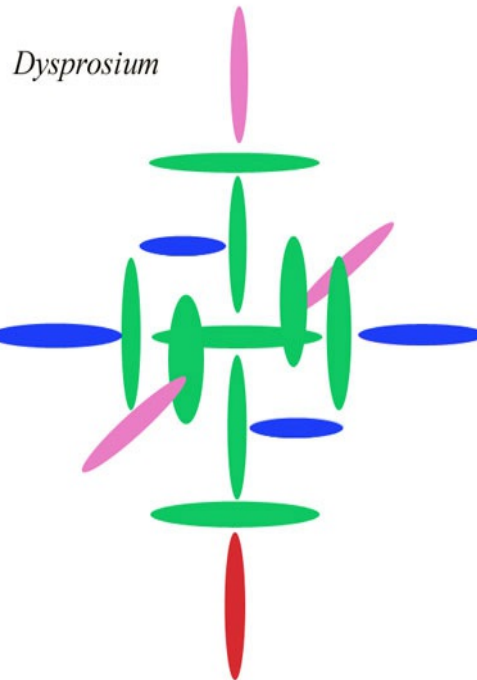


As you see, Platinum isn't really much like Hafnium at all. What about Dysprosium? If we build

Dysprosium like this, it looks like Hafnium:



But again, Dysprosium isn't normally built like that. That wouldn't give us an oxidation state of +3. It is built like this:



That looks pretty as a matter of colors, but it should look odd to you. Not only is it not similar to Hafnium in any appreciable way, but those green inner disks are something you haven't seen before. That indicates five protons in each disk, which isn't a stack of alphas. It is two alphas plus a single proton. We haven't seen that before, since we don't find a Noble Gas at number 45. That green core of



nine disks doesn't apparently exist on its own (or at least not here on Earth). The number 45 on the Periodic Table is Rhodium, and it isn't built anything like that. There are no green disks in my diagram of Rhodium. So why would I build the Lanthanides with a green core like that?

One, because it is the only way I could explain the +3 oxidation numbers of the Lanthanides; and two, because it gives us an easy explanation of the Lanthanide contraction. In a previous paper, I had made a suggestion for the Lanthanide contraction based on the greater core size of Xenon, but that was just a hunch and I didn't insist on it. Once I began diagramming more of the Lanthanides and trying to match them to known chemical reactions, I found they couldn't logically be built up from Xenon. So I tried building them up from Krypton, but that failed for the same reason: both Xenon and Krypton have an even number of protons in the core (54 and 36). To explain the +3 oxidation states of the Lanthanides, I needed a core with an odd number, which led me to the green core you see.

This explains the Lanthanide contraction in two ways: one, it allows us to show the reason that the Lanthanides progress differently than the elements just above them. If the Lanthanides and the rest of Period 6 were all based on Xenon, it is not clear why they would contract differently. Two, it shows why the Lanthanides don't fit the pattern of the elements below them in Period 5, which are all based on alphas in the core, and are therefore based on even numbers. What I mean is, in lower Periods, the oxidation number changes with the Group, progressing as you move across the Table. But mysteriously this doesn't happen with the Lanthanides. I will show below that this is because only the Lanthanides are based on the this non-Noble core with an odd number of protons in each disk.

Although Lanthanum is included in Period 6, the biggest contraction actually takes place between Barium and Lanthanum (and then again between Lutetium and Hafnium). Since Caesium and Barium are made from Xenon and the Lanthanides aren't, it explains why the switch happens there. But what is the physical cause of the switch? Why not make the Lanthanides from Xenon?

To figure it out, let us start with Caesium and work our way up. Caesium is already a clue, since we know Caesium melts at 28° C. That is one the oddities of the Periodic Table, not easily explained by the mainstream. Since Rubidium also has a low melting point, we can see that it is a feature of Group 1. But why should the melting point get lower as the nucleus gets bigger? If we diagram Caesium, it is easy to see why.

*Caesium*

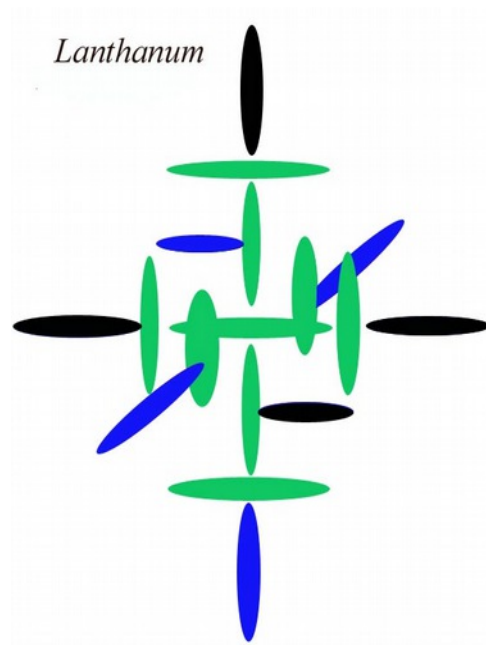


The cyan disks represent 3 alphas or 6 protons, so the Xenon core of Caesium has a lot of channeling potential. As Xenon, it was not living up to that potential, since no protons were in the fourth or outer level to pull charge in. But Caesium has the one proton on the pole to help start the charge channeling. Now, if we are wondering why Caesium is a liquid at near room temperature, we must look at the way Caesium bonds to itself. Although Caesium is highly reactive with smaller nuclei like Oxygen—since it has a weak charge channel that very much wants and matches Oxygen—it doesn't have enough charge strength to bond well to itself. You see, that open upper hole on the north pole very much wants to be filled, because then the through potential on the axis can be completed. This makes Caesium highly reactive. But once the hole is filled, the through channel is still weak. Even with the through charge, Caesium is still only channeling at 1/6<sup>th</sup> its potential. We *could* fit six protons in each outer hole, but when bonding to itself, Caesium only has one top and bottom. So we have two large and heavy nuclei, each with 133 nucleons, held together by the bond created by only one proton. That bond is weak: too weak to maintain rigidity in the bond. And so we have a liquid. Caesium also has a very low boiling point for a metal, which also indicates the bond is weak. Boiling indicates breaking of the bond.

Barium is the same configuration as Caesium, but with a proton on the north pole as well. This doubles the bond strength when Barium bonds to itself, raising the melting point by 700 degrees!

Now, the question becomes, why can't Lanthanum be built by simply putting a proton in the carousel level, as we would do with Yttrium? It can't, *because Yttrium isn't built that way either*. As it turns out, Yttrium also has a contraction problem, one the mainstream can't easily explain and doesn't often tell you about. Yttrium doesn't fit in the contraction sequence of Period 5. It has an atomic radius of 180, when it should have an atomic radius of about 185. This indicates that Yttrium is not composed from Krypton, like Rubidium and Strontium are. Like the Lanthanides, its atomic radius indicates a variant structure. But let's go back to Lanthanum to discover its structure first.

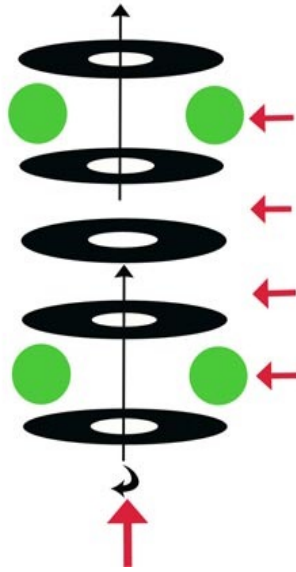
Clearly, Group 3 has problems due to a spin imbalance created by trying to put a single proton in the carousel level. Even if we put a neutron opposite it, we can't create balance. Not only does the neutron not weigh the same, it doesn't have the same charge channeling capability. Even if we turn its pole into the hole, it will channel at only 67%, as we have seen in previous papers. So no Group 3 elements can be built that way. If we instead build Lanthanum like we did Dysprosium, using a green core of 45 protons, we then have twelve protons left to distribute instead of three.



That is my best guess at this time for the configuration of Lanthanum. That explains the oxidation number and reason for contraction. It bonds where you see the three black outer protons. It contracts because it has a different core and far more outer protons than Barium. But it begs other questions, such as whether and how it creates balance, given the imbalance in the inner level. That was the only way to create an oxidation number of +3 for Lanthanum. A balanced inner level would have given +2 or +4. This form may be the most stable due to the fact that the inner level balances with the pole positions. See how the inner level is equal and opposite to the pole levels, with the pole being blue on bottom while the upper inner position is also blue. This gives the atom a top-to-bottom balance along the axis.

My best readers will remember [I solved the problem of Technetium](#) by showing that both those inner holes needed to be filled. Starting with Period 5, we have to start filling those holes or the nucleus unwinds due to centrifugal forces from the carousel level. I showed that you can't fill just one hole, you have to fill both or neither. One filled hole and one open hole create a top to bottom charge imbalance that destroys the nucleus from the inner level out. Once I discovered that, I initially assumed that the numbers in the inner levels needed to be equal, but later discovered that is not the case. It appears that although we can't leave one completely open while filling the other, we can put a different number in each hole, as long as we don't vary by more than one. Actually, I have already used that rule before, in [my paper on Period 4](#). There I explained the liquid state of Bromine by putting two above and one below. I also drew Iron with a different number of neutrons in those positions. So you shouldn't really be shocked to find me doing the same here with Lanthanum.

So we have seen why Group 3 has a problem and how it has solved it. But we still need to ask how and why the green disks are created, and why they can't give us a Noble Gas at number 45. So, how are they created in the first place? Well, I assume that a single proton gets sandwiched in between two alphas in the high heat and pressure environment of a star or galactic core.



But if that is so, why haven't we seen it before? Why doesn't it give us a Noble Gas in between Krypton and Xenon, and why don't we see smaller elements built with it, like a Group 1 element of number 46 that acts like Potassium? I would suggest it is because the five stack isn't as stable as the stacks of alphas. That inner proton isn't held in place by neutrons, as the other protons are, so under lower pressure outside the star it may turn and cause a break-up of the stack. The ambient charge field outside a star can't create the pressure needed to keep the number 45 Noble Gas glued together. It appears that even plugging 4<sup>th</sup> level protons in the outer holes of this beast can't keep it together outside a star. It needs a great deal of charge channeling through it to keep it together, and so it isn't stable until we have 12 protons plugged into the 4<sup>th</sup> level, as above with Lanthanum. The green core needs at least that many 4<sup>th</sup> level protons and that much charge in order to hold together.

You will say that is just theorizing backwards from the diagram—which I admit—but it gives us something to start with. At least we can see why the 5-stack might be unstable, given my previous mechanics. I have shown [in previous papers](#) how the alphas are stabilized by inner neutrons, keeping the protons from turning. Since the fifth proton would not have that stabilization, it would be kept from turning only by the charge pressure in the star. Once the atom escaped from the high-pressure environment, the nucleus would dissolve. Only if the green core took on the extra 4<sup>th</sup> level protons while in the star, could it create its own charge channels capable of creating its own stability. In that case it would be stable even after being released by the star.

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OK, now let's return to the Lanthanide Contraction. The Lanthanide Contraction is actually misnamed, because the peculiar thing about the Lanthanides is that they don't contract much at all as we go from Lanthanum to Lutetium. Lanthanum has an atomic radius of 187, Cerium drops to 182, but then the Lanthanides contract very little after that. Praesodymium stays at about 182, we drop to 180 by Samarium, 176 by Holmium, and Lutetium is still 174. So we drop only eight points from Cerium to Lutetium. That is 14 positions. Compared to the contraction of the first three Groups in any Period, that is very little contraction.

Before we go on, I want to address a question my readers may have here. Someone might say, “why are the radii getting smaller as the nuclei are getting bigger? Isn't that counterintuitive?” Well, you

have to remember that we are looking at *atomic* radius here, not nuclear radius. The atomic radius includes what they think are orbiting electrons. I have shown there are no orbiting electrons, orbiting the entire nucleus. Electrons are orbiting the pole of a specific proton. But we do have distances of electron capture, and that is what the mainstream is really measuring when they give you these atomic radii. That is the radius at which the last electron is captured. It is the radius of the effective charge vortex, in other words. If you think about it, you will see why this radius would get smaller as the nucleus gets bigger. A bigger nucleus recycles a larger and stronger charge field, and that charge field can more easily capture passing electrons. So as the nucleus gains charge strength, the electron capture radius lowers.

You will say, "That is still counterintuitive. Shouldn't a stronger charge field be able to reach further out into the external field, grabbing electrons at a greater distance?" Well, in some ways that visualization is true. The bigger nuclei *can* reach out and affect particles at a greater distance. But because the field lines are all photon field lines, we have to follow the photons first. Charge is a field of photons. The electrons will travel in that field of photons, like a boat in a stream. So we have to ask, how does a stronger recycled charge field affect those photon field lines? It actually hugs them closer to the nucleus. A more powerful intake vortex *pulls the same field line lower*. So we should study a given electron following a given field line. With a smaller nucleus, that field line will be further from the nucleus. If we suddenly make the nucleus larger and more powerful, keeping the same electron on the same field line, both will drop lower, closer to the nucleus. That is the cause of the apparent orbital contraction.

This also allows my diagrams to explain anomalies in the contraction, like the elements in Group 8-13 in Period 5 or Group 11-13 in Period 4. Although they have larger nuclei, Copper, Zinc and Gallium aren't recycling charge as well as the elements before them. If you return to [my Period 4 paper](#), you will see that Cobalt and Nickel are pulling in charge at both poles with two protons on each end (pole positions). But Copper only has one proton on the North pole. That means less charge intake. Zinc has one proton top and bottom, as you see in the diagram above, giving it even worse charge intake than Copper. Since Germanium has two top and bottom plus a full set on the carousel level pulling charge out, its channeling jumps back up, giving us a radius even smaller than Nickel, as we would expect.

Now that you understand that, let us return to the Lanthanides. Before I show you my solution, let me remind you of the mainstream solution to Lanthanide contraction. We are told [Wiki],

The effect results from poor shielding of nuclear charge (nuclear attractive force on electrons) by 4f electrons; the 6s electrons are drawn towards the nucleus, thus resulting in a smaller atomic radius.

That makes no sense on any level, as you will soon see. First of all, it doesn't even address the data. To finesse the data, the mainstream first switches from atomic radius to ionic radius. This acts to massage the Lanthanum contraction data to better fit their theory. However, like all else concerning orbital theory, it is all still a mess. For example, we are told:

When an atom loses an electron to form a cation, the lost electron no longer contributes to shielding the other electrons from the charge of the nucleus; consequently, the other electrons are more strongly attracted to the nucleus, and the radius of the atom gets smaller.

If you can make sense of that, you deserve a prize. In ionization, it is *outer* electrons that are released to form a cation. The core electrons don't take part in ionization. Well, if outer electrons are released

in ionization, how does their loss lower the amount of shielding of the nucleus? The valence or outer electrons aren't *between* the core electrons and the nucleus, so they couldn't have been shielding charge to start with. I will be told that “between” doesn't mean anything with orbitals, but that is just hedging by mainstream theorists. It is the claim that their theories don't have to make any mechanical sense. What they are really doing here is inverting logic and then forcing it down your throat as physics.

The same applies to the first quote from Wikipedia, which is also a product of garbled logic. To start with, it is *ad hoc* and begs the question “why are the  $4f$  electrons in Lanthanides poor shielders, while  $4f$  electrons in Hafnium (and above) are not?” I will be told it is because Hafnium has more of them, but that logic is not borne out by lower Periods, where inner levels do not shield better or worse based on number. Why would  $4f$  electrons vary their shielding but  $4d$ 's wouldn't? The theorists are using this shielding with the Lanthanides but then ignoring it with other Periods and levels. There is apparently “poor shielding” only when and where they want it.

It also ignores data in that Lanthanum itself has *no*  $4f$  electrons, so the big radius change between Barium and Lanthanum [222 to 187] can't be explained that way. Neither can the big change between Lutetium and Hafnium [174 to 159]. Both have fourteen  $4f$  electrons, so there can be no variation in  $4f$  shielding.

But shielding never made any sense to start with. It contradicts many of the other fundamentals of mainstream orbital theory. If electrons act as point particles and charge is virtual, how is shielding mechanically created? You can't shield anything with probabilities. And even if you allow the electrons to have real radii and positions at a  $dt$ , they don't fill enough space to shield anything. The amount of charge they could block is negligible.

But we know the theory of shielding is false before even studying any of that, since the entire theory of electron orbitals and bonding is false. [I have shown](#) that the theory never had a leg to stand on, and is cobbled together from upside-down field definitions and equation finessing. External orbitals like this were never stable no matter how they defined the charge field, and the mainstream has never shown any reason they would be. Bohr simply *told* everyone they were in the early days, and everyone decided to accept it. But [his proofs are threadbare](#) and they have never been improved upon. They have been accepted not because they contain any sense, but only because no has been able to come up with anything better.

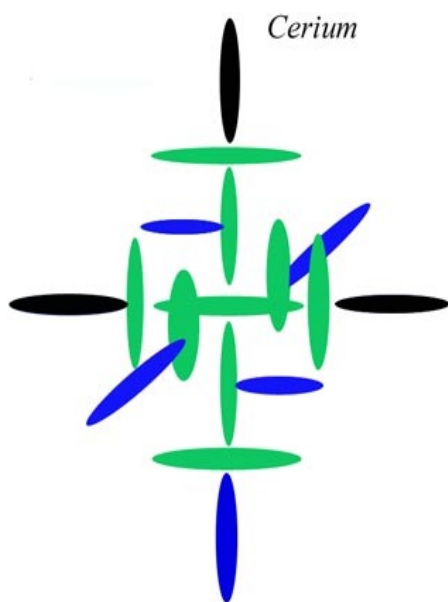
Until now. We have seen that my theory of charge recycling allows us to explain everything mechanically, and we will continue to see it here with Lanthanide contraction. The huge jump in radius between Barium and Lanthanum and between Lutetium and Hafnium tells us something extraordinary is happening. I have shown that it is explained by the different cores. The Lanthanides have the green 5-stack core, while the other elements of Period 6 are built from the cyan 6-stack core of Xenon. You can immediately see why this would have a huge effect on charge recycling, but be careful—it may not be the effect you think. Although Barium has 54 protons in the core and Lanthanum has only 45, Barium has only two protons pulling in charge. Lanthanum has 12 protons pulling charge through, including three at the poles and three on the inner axis. This latter fact is more important than the core difference. The biggest core in the world isn't much use in channeling charge without  $4^{\text{th}}$  level protons pulling charge in—as we see with the Noble Gasses. Xenon has a huge core, for all the good it does.

We can compare Lutetium and Hafnium in the same way. In my diagrams, Hafnium has 18 protons in the  $4^{\text{th}}$  level pulling charge through, but Lutetium has 26 [five more than Dysprosium—see diagram

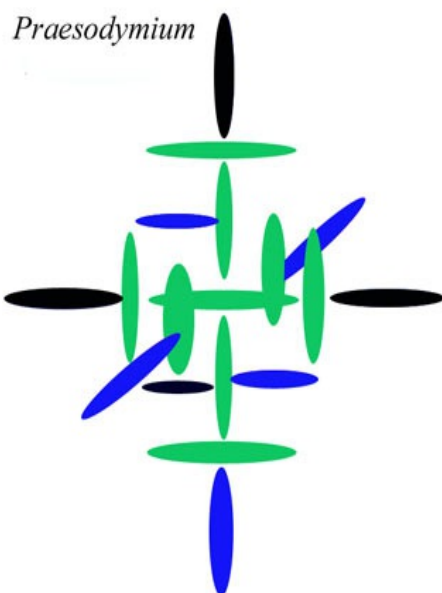
above]. In this case, the 9 more in the core of Hafnium trump the 8 more in the 4<sup>th</sup> level of Dysprosium, giving Hafnium more charge power.

Now that we are deep in the Lanthanides, it would be a good time to ask why they all act like Group 3 elements. Or, why do they all have a main oxidation number of 3? That is as strange as anything else about them, and I would say it is stranger than the so-called contraction. Of course the mainstream doesn't have anything mechanical for us here. They tend to dodge the question, as you might expect. Obviously, you can't explain it with 4*f* shielding.

We must assume the +3 state is linked to this discovery we made about the core. Both mysteries are solved by the same discovery. But can I show you the mechanical link? We have already diagrammed Lanthanum and Dysprosium, so let us look first at Cerium. Since Cerium is one number up from Lanthanum, we would expect at first glance it would oxidize at +4. But it doesn't. Which means it must have a configuration something like this:



Since we have more protons on the axis, Cerium should be denser than Lanthanum, and it is. Which brings us to Praseodymium:



At first glance, that would seem to have more density than Cerium, due to the five protons in the inner level. But Praseodymium has fewer neutrons down there than Cerium. Go to your chart and you will see that number 59 has only one more neutron than number 58. That is very rare. It only happens a few times on the Periodic Table. This equalizes the density of Cerium and Praseodymium. And I hope you can see where Praseodymium needs a neutron to maintain balance.

But why are the Lanthanides taking such trouble to maintain this +3 configuration, adding protons below instead of adding them to the 4<sup>th</sup> level? Well, the elements don't see it that way. They aren't doing what they are doing to maintain a +3 oxidation number. They are doing what they are doing *because it is the only thing they can do*. What I mean is, we already understand why Lanthanum is +3. It is plus three because it is trying to find a variant structure to replace the failed Group 3 structure made with Xenon. Three protons in the 4<sup>th</sup> level simply aren't stable. To create an element at 57, the star has to do something else. And so we are given Lanthanum. Well, all the bigger Lanthanides have to be built on top of Lanthanum in a star. And if we *were* going to put a new proton in the 4<sup>th</sup> level instead of in the inner level, we would have to put it on the North pole. Since Lanthanum is blue South and black North, and since the poles are where charge is coming in, that is where a new proton will naturally be arriving. But Lanthanum doesn't *want* another proton on the N pole. Why? Because that would equalize charge down the axis. It would balance the N/S incoming charge, giving us two parcels coming up and two parcels coming down. Although that works with other elements, it doesn't work with the Lanthanides. Why? Because, again, we have those 5-stacks in the core, fouling up everything. They foul it up by creating a pulsed charge through the stacks. Because the alphas are channeling in a different manner than the single protons, the charge is being pulsed through 3-1-3, 3-1-3, 3-1-3.\* In the other cores, this isn't true. The cores created by the Noble Gasses channel through 3-3-3-3-3-3 always, with no pulse.

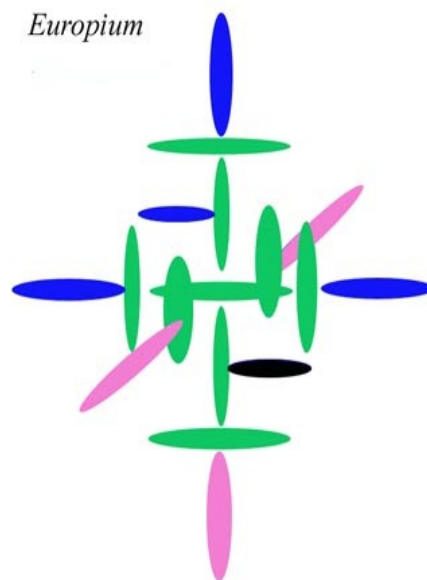
This is a problem because more charge is being channeled through the South pole, as we have seen in many previous papers. The ambient charge field here on Earth is not balanced. This is what causes loss of parity in beta decay, as well as many other phenomena. That being so, the pulse coming down won't match the pulse going up. This green core creates interference along the axis. This interference prevents us from putting the same number of protons N and S. All Lanthanides have a differential, as you have seen, with more protons on the South pole. The *cause* of this is the odd number of nucleons



in each disk or stack, but it has the by-product or side effect of keeping all the Lanthanides on the +3 oxidation number.\*\*

You will say, “We don't care about the unequal field here on Earth, since the Lanthanides aren't made here.” True, but in the stars where the Lanthanides *are* made, we also find unequal charge. Balanced charge fields are extremely rare, just as a matter of statistics. This means that it is possible that Lanthanides are made on a different basis in other stars, but the Lanthanides we know of were built in stars where the charge field was not equal.

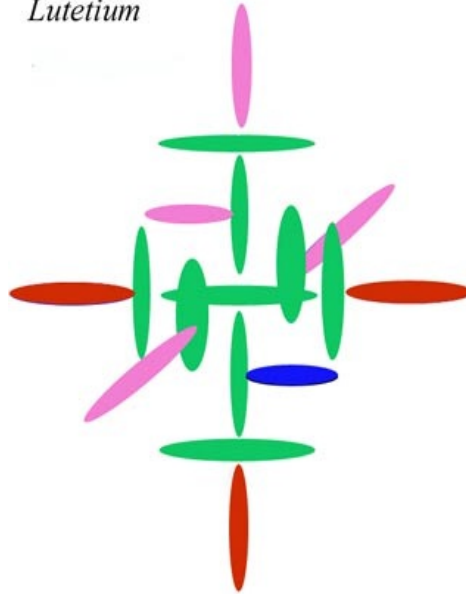
We have more evidence of my diagrams from Europium, whose density goes way down compared to Samarium. That is because Samarium has gone all blue in the inner levels, with two protons on both sides of each inner hole. That only gives us four parcels of charge through a hole that can take five, but remember, this 5-stack contains a single proton, and that proton is not part of an alpha. This means that there is charge leakage around that inner proton (in the sandwich), so the 5-stack can't really channel 5 proton's worth of charge. The inner proton *channels*, but it doesn't *spin up* the charge a fifth amount. So the charge *strength* of the 5-stack stays at 4. Therefore, Europium is actually at its inner limit. It can't put any more protons in the inner levels. So it switches to a different plan, one more like we saw with Dysprosium:



We can see why that is considerably less dense, since it has more mass out in the 4<sup>th</sup> level and less on the axis. We can also see that Europium now has enough protons to work with that it can bump up all the numbers in the 4<sup>th</sup> level by one. In this way, it avoids having the same number at each pole. Instead of 1 North and two South, it has 2 north and 3 South. That solves the problem of equal charge.

This means that once again Europium isn't doing what it is doing to find a +3 oxidation number. That is just a side-effect of a deeper mechanics. To try to understand this better, let us look at the last Lanthanide, Lutetium:

*Lutetium*



Again, Lutetium has solved the equal charge problem by bumping all the 4<sup>th</sup> level numbers up by one. Instead of 2 North and 3 South, it has 3 North and 4 South. But why does the number 72 element Hafnium switch back to a Xenon core, like Barium? Why not just put more protons below in the diagram above, as Samarium did? Because our green core has hit its limit. It can't take 27 protons in any configuration. Why not? Well, it has to do with our new rule of 9. We have seen that the Periodic Table is actually built on a rule of 9. There are nine positions in the core, as you see. The green core has  $5 \times 9 = 45$  protons. But if we subtract out the protons in the stack that aren't in alphas, we are down to 36. And, notice that the number 27 is also a multiple of 9, being  $3 \times 9$ . That number comes from the fact that the nucleus is recycling charge in both directions, from both poles. So that sandwiched proton will be channeling charge from both poles. For that reason, we have to subtract it out twice. It is in the green-core architecture nine times and *fails to increase* channeling in both directions. Therefore, we subtract 18 from 45, to get 27. The green core can take 26 protons worth of charge channeling, but not 27.

\*Because the alpha includes the inner neutrons, it is 3 nucleons tall. The proton is one nucleon tall.

\*\*The Lanthanides can bond +2 or +1 sometimes because not every bonding situation will require use of the top and side positions.