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The LANTHANIDES *and breaking the* MADELUNG RULE



by Miles Mathis

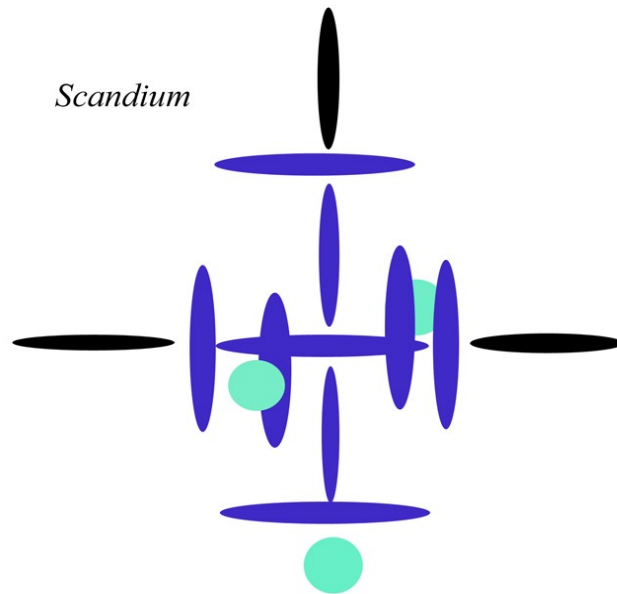
The Lanthanides are the first external row on the Periodic Chart, pulled out from number 57, group 3. They are also called the Rare Earth elements, because they are rare. We are told they fill the 4f electron shell, but is that true? I will show that it is not. The Lanthanides are rare for another reason.

We see the first problem when we are told

Strictly speaking, both lanthanum and lutetium have been labeled as [group 3 elements](#), because they both have a single valence electron in the d shell. [Wiki]

On the Periodic Table, Lanthanum is group 3, but Lutetium is group 17. Why should group 17 act like group 3? And why would the single valence electron imply group 3? Shouldn't it imply group 1? Current theory doesn't explain exactly how that works, but I have in my previous paper on [building the nucleus](#) and will continue to do so below. According to current theory, all the Lanthanides are “sort of” group 3, since the other lower group 3 elements Scandium and Yttrium are grouped with them as Rare Earth. But my diagramming has proved that is false. Only elements with three protons in the outer level should be called group 3.

First of all, why are group 3 elements rare? Even Scandium is rare. Why? To understand it, we have to study a diagram of the nucleus of Scandium.

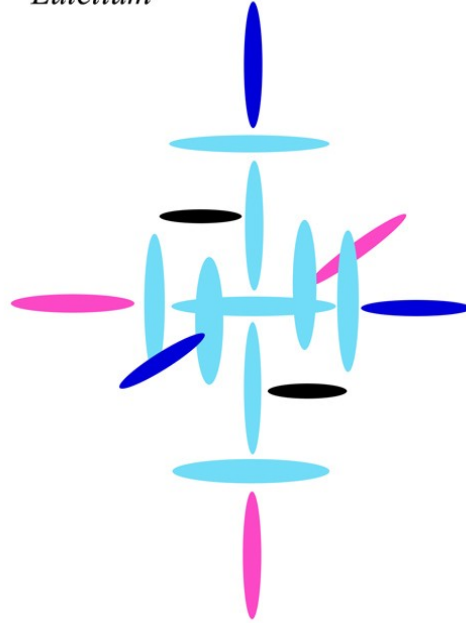


That is the only configuration of Scandium that is stable. The inner blue disks are Argon, and the black disks are protons in the holes. The green circles are neutrons, which block the open outer holes, creating balance and stability. The reason this is rare is that when the element is created in the star, protons can go anywhere. If there is only one proton in the carousel level (the four around the center disk), that creates imbalance and the nucleus doesn't persist. If a proton goes in the inner holes, imbalance. If the two protons go next to each other, again, imbalance. The protons *have* to go opposite. Since only one of many configurations is stable, all group 3 elements are rare. Even though Scandium is not made radioactive by its remaining imbalance, the fact that we have a proton on one end and a neutron on the other does give Scandium a wobble. This prevents easy forming of compounds, though it doesn't prevent it altogether. This is why it dissolves slowly or not at all in many acids.

You can now see why Scandium is +3. It is explained at the primary level by the protons, not the electrons. Yttrium and Lanthanum have the same diagram as Scandium, but with Krypton and Xenon bases, respectively. You can also see why we are told we have “a single valence electron in the d shell.” There is no d shell, as I have shown, but the proton on top in my diagram acts to achieve the same thing. That single proton sticking out in the wind acts as the valence.

So how do I explain Lutetium's similarity to these group 3 elements? Well, since the Lanthanides are built from Xenon, we can put six protons in *each* of those outer holes. Each disk in Xenon contains three alphas, so the hole in any disk isn't full until we have six protons in it. Our six protons act like three alphas, continuing the building-block process. With Lutetium, we have 17 extra protons to deal with (above Xenon). First we fill the outer holes with 6. Then we fill the two inner holes, to get us past the radioactivity of Promethium (see [my analysis of Technetium](#) in a previous paper). Then we fill the outer holes with 6 more. That takes us to 14 and gives us a stable Erbium, which is rare, but which has 6 stable isotopes. Instead of double filling the inner two holes, Lutetium triple fills three outer holes, mimicking group 3 elements. One of the holes that Lutetium triple fills is the top hole, so once again we have the appearance of “a single valence electron” without any need for a sub-shell 5d.

Lutetium



And that is why Lutetium acts like group 3. It has three extra protons in the outer level. But since it has 15 protons in the outer level total ($6+6+3$), it is not really group three. It just has the same characteristics in compound as group 3.

But let us return to Lanthanum, to look at the “electron configuration.” We will correct the current configuration by looking at the nucleus rather than at the electrons. A correct analysis of Lanthanum is that it has four shells. The first shell is the center disk, which is made of three alphas—therefore six protons and six electrons. These can be divided into two sub-shells, if you like; but you can't split them into different shells. In other words, with Xenon and all elements built up from Xenon, all the “s” electrons are in level 1 to begin with. They aren't filled later and can't be assigned to higher shells. Xenon simply has six level 1 electrons, not 2.

As I said, you can split those 6, but the split is 2 and 4. Since we have a stack of three alphas, like pancakes or sandwiches, the central alpha could be given a separate sub-shell all to itself. It will have a different (smaller) angular momentum than the other two in some situations. But the other two alphas will match angular momenta, and so they can't be separated in the lists.

Then we go to shell 2 or level 2, which I have assigned to the carousel alphas. They all have the same angular momentum and so they can't be divided into sub-shells. Then shell 3, which is the two disks up and down and the two caps top and bottom. We can split into two sub-shells here, since the two caps will act slightly differently as a matter of angular momentum than the two pillars. Then shell 4, which we have seen has only 3 protons with Lanthanum. Shell 4 may be divided into three sub-shells, those being the *the filling of* the caps, carousel, and pillars. So we see that the Lanthanides are not filling the 4f sub-shell; they are filling the 4 shell, and we have to re-evaluate everything else.

Let us re-name the sub-shells, to prevent confusion. There can be no s sub-shell above level 1, so we ditch that. The other letters have to be jettisoned for the same reason: p has been assigned to the number 6 and d to the number 10, and we don't need those here. We need 4, 2, and 2. The four carousel positions, the two inner positions, and the two caps. Since we can put six protons in each hole above Xenon, we could increase that to 24, 12 and 12, but that is unnecessary at this point. Let us call the carousel level c, the inner holes n, and the top and bottom t. The valence electrons will then go to level t.

The Lanthanides fill level 4, but they cross sub-shells c, n, and t. There is no level f.

In this way we can explain why the Madelung rule is false. The Madelung rule tells us that we fill sub-shells in order of energy levels. Unfortunately, several of the Lanthanides break the Madelung rule by filling a 5d place before 4f is full. The current model can't explain this, but my diagram does so. Cerium is simply the diagram above, adding a proton to the bottom hole. This makes Cerium quite stable and “square”, which is why it is the most abundant of the Rare Earths. The carousel tends to spin more quickly than the nucleus spins the other way (although it can do both), so the t level tends to be the valence level. However, in some circumstances (cold, for instance) the valence is 4, for obvious reasons. Regardless, we can see why the Madelung rule breaks down here: there is no f level or d level, so the rule cannot distinguish them. Cerium is filling holes with protons to maintain the optimum balance, not to sort energy levels. The last proton that goes in (and therefore its electron also) will have a greater energy than the next to last, simply because my t level has more angular momentum than my c level. All the rules have to be revamped. The Madelung rule is fair guess in some situations, but it is basically false. It is false because the sub-shells it is tracking don't exist.

In closing, let us look at the Lanthanide Contraction. This is based on an experimental finding that the ionic radius (or something like it) gets smaller as we go up from Lanthanum to Lutetium. The current explanation is this [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.

Since the electrons aren't really outside the nucleus, we know that is false. We also don't have 4f electrons, since we don't have a 4f level. No, the Lanthanide contraction must be caused by something else, and I would suggest it is due simply to the use of the Xenon base. Remember that Xenon is composed of triple alphas, so our nuclear interior has a lot of mass to start with. Since the contraction doesn't start with Xenon, we may assume that Xenon is only approaching some mass limit, but that it hasn't yet reached it. This limit is only reached after we stack four more protons on top, with Cerium. At that point several factors come together to create a contraction. One, extra mass in the outer shell slows the angular speed of the whole nucleus. This slowing lessens the centrifugal force out. Two, the extra mass increases the gravity of the nucleus. Three, the extra protons, recycling more charge, increase the rate of flow of charge through the interior. This clears charge out of the inner levels more efficiently. So we have less charge, more gravity, and less centrifugal effect. At some point, gravity will overcome the given charge level, and will begin squeezing it out. The more charge that is squeezed out, the closer the alphas can huddle. This is probably what we see with Cerium.

You will say, “Then why don't we see this across each period? Why don't we see a contraction from Titanium to Bromine, for instance?” Because in period 4 of the table, our central structure is made of Argon, which is made of single alphas. We don't have enough mass to start contraction. Same for period 5. It would appear that we only reach the limit with triple alphas, or Xenon.

You will say, “But that is just a theory. You have shown no math here to prove that any limit is reached with Cerium.” True. The math is difficult and I don't yet see how to do it, so at this time I am simply proposing the mechanism. But I will point out two things. First, the current explanation also comes with no math: it is a bald proposal. Second, my proposal is already much more logical than theirs. I have falsified theirs in two ways already. They are now free to try to falsify my explanation, and we will see which one remains standing. I will also continue to work on the math. This experimental fact that contraction begins at Cerium is a huge hint to both the math and the mechanics of the nucleus, and we should use it as a hook for the nuclear equations. It already tells us (in cryptic form) the ratio of gravity to charge in the nucleus. I will try to unwind those equations in future papers.

As a last little sweep-up, I will answer one more question. My tough reader will say, “Haven't you said there is no charge in the nucleus? Isn't that how you got rid of the strong force?” No, I said there was not charge in the way we have been told, repelling all baryons. I showed in [my first paper](#) on the subject how to channel charge out of the interior of the Helium nucleus. Then I showed how to build elements up from alphas. So large parts of the nucleus are charge free, or charge diminished. But we still have channels of charge through the nucleus, as I have shown. The spin of the protons and alphas acts to channel charge through and around the nucleus, making it stable. So the charge I am talking about above would be *between* the stacked alphas, not inside them. And it would be *through* the protons, not between them.