About the Periodic Arch of the Elements

In his paper "Explaining the periodic table, and the role of chemical triads" [Found. Chem. Online: 28 January 2010], Eric Scerri mentioned the existence of at least *four* different candidate places for Hydrogen: Group 1 (alkali metals - Lithium, *etc.*), Group 17 (halogens - Fluorine, *etc.*), Group 14 (Carbon, *etc.*), or off the Periodic Table entirely, because it is so odd! The four-fold multiplicity (and maybe more) of candidate places for Hydrogen triggered in me the following thought: the excessive multiplicity of candidate places may have to do with the rectangular nature of the Periodic Tables under consideration there.

With the 'Periodic Arch' display attached herewith, Hydrogen is pretty much dead center. It is within touching range of the three element connections mentioned, as well as the 'ground' underneath the arch, corresponding to the fourth option mentioned: removal from the main body of the Periodic Table. Note, however, that the connection from Hydrogen to Carbon is not a connection to all of Group 14. The next element up is Silicon, also from Group 14, but above that come Cobalt and Rhodium, from Group 9, and then Ytterbium and Nobelium from Group 16.

Why am I not sticking with the 'Groups' previously defined? For one thing, I am not sure that there are enough of them. Why should there be only 18, and not 32? And if 32 would be more appropriate, is that too many to be useful?

And why did I put those particular elements in the newly defined group? My rationale is that, from the point of view of the Periodic Arch, the newly defined group comprises the 'keystone elements'. The terminology 'keystone' is suggestive of importance. Certainly all those elements are important facilitators of molecule formation, because they can give or take electrons in equal numbers. More abstractly, Hydrogen is certainly the 'keystone' for all of present-day physical analysis of atoms. And Carbon is certainly the 'keystone' for all of organic chemistry and biological life. And Silicon is certainly the 'keystone' for present-day technological life. Cobalt is not so famous, but it lies between Iron and Nickel, and is functionally better than either of them: harder, more corrosion resistant, and more heat resistant. And, like Iron, it is much strengthened by the addition of a trace of Carbon – that other keystone element. We humans are currently more than three millennia into our 'Iron Age', which, with the help of Carbon and other trace additives, has morphed into our 'Steel Age'. Had Cobalt been more plentiful on this planet, this might have been our 'Cobalt/Steel Age'. Next up, Rhodium, is also not so famous, probably because it is not so plentiful, but it is known to be good for plating and alloying. The remaining keystone elements, Ytterbium, and Nobelium, probably offer some interesting properties that we don't completely know about yet.

As for Helium, on the Periodic Arch it falls between noble gasses on one side, and alkaline earths close by on the other side, and it is also near the 'ground', the 'off the Table' limbo to which troublesome elements might be banished.

So overall, the Periodic Arch type of display of the elements completely skirts the issues that arise over where to place Hydrogen and Helium: they are both in the middle, near to everything mentioned as deserving their proximity.

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