

Answer on the question #66682, Chemistry / Other

Question:

Using group 2 of the periodic table as an example, can you describe the variation in the following properties. Electronic configuration, Atomic radii and melting and boiling points.

Answer:

Group 2 elements include beryllium Be, magnesium Mg, calcium Ca, strontium Sr, barium Ba, and radium Ra, called alkaline earth metals. Here are the electronic configurations of these elements:

Be $1s^2 2s^2$

Mg $[\text{Ne}] 3s^2$

Ca $[\text{Ar}] 4s^2$

Sr $[\text{Kr}] 5s^2$

Ba $[\text{Xe}] 6s^2$

Ra $[\text{Rn}] 7s^2$

As one can notice, valence shell of all the metals has two electrons on s-level. The rest of the electronic configuration is identical to the structure of noble gas of previous period: helium, neon, argon, krypton, xenon and radon. As the number of electrons in atom increases, atomic radii increase also:

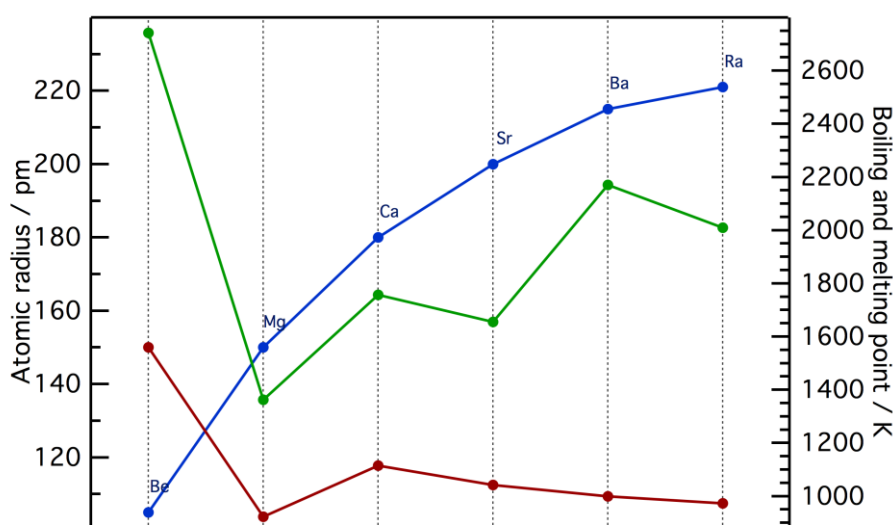


Figure 1. Atomic radius (blue), boiling (green) and melting (red) points of Be, Mg, Ca, Sr, Ba and Ra.

As the ionic radius increases, the attraction between the delocalized electrons and the metal cations decreases. This explains the general decrease of the melting and boiling points of metals. Non-monotonic character of the dependencies of melting and boiling points can be caused by different packing type of metals: hexagonal for Be and Mg and cubic for Ca, Sr, Ba and Ra.