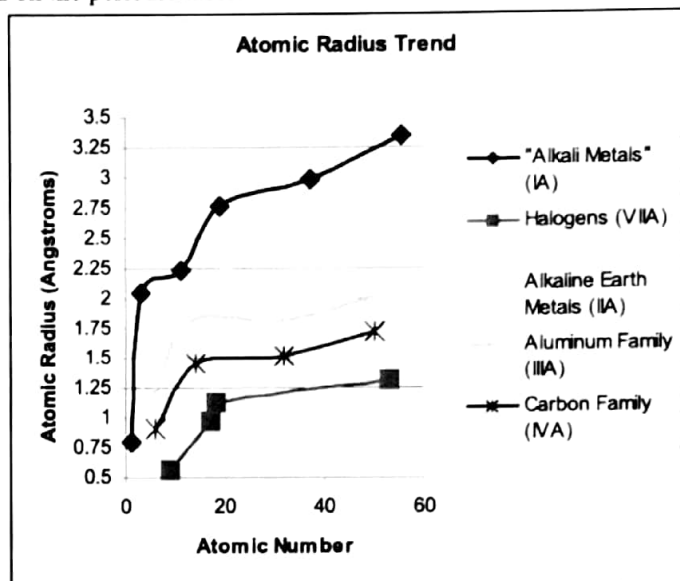
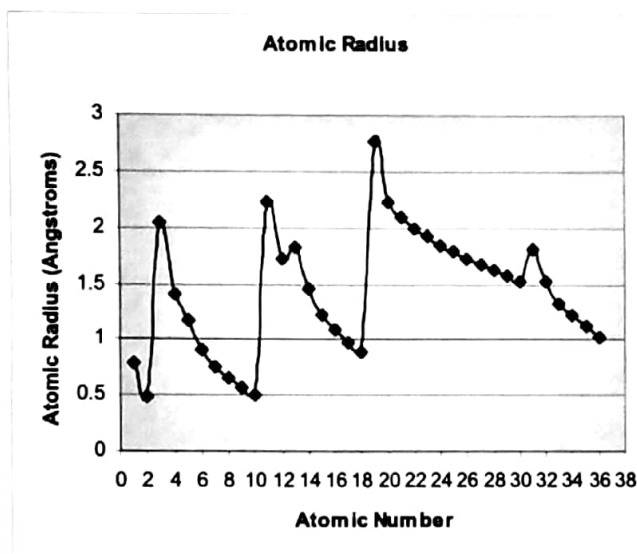


The following charts represent the Atomic Radii trends found on the periodic table.



Questions:

1. What is the general periodic trend for atomic radius? - decrease left $\rightarrow$ right (increase; $R \rightarrow L$)
2. What is the general group trend for atomic radius? - increase; top $\rightarrow$ bottom
3. What makes the sodium atom different from the magnesium atom? 1 proton; 1 electron in 3s (properties)
4. As you increase across the period, what happens to the number of electrons? Protons? both increase by one

5. Calculate Z_{eff} for Sulfur and Chlorine

$$\text{S: } 1s^2 2s^2 2p^6 3s^2 3p^4 \Rightarrow 16 - ((2 \cdot 1) + (8 \cdot 0.85) + (5 \cdot 0.35)) = 5.45$$

$$\text{Cl: } 1s^2 2s^2 2p^6 3s^2 3p^5 \Rightarrow 17 - ((2 \cdot 1) + (8 \cdot 0.85) + (6 \cdot 0.35)) = 6.10$$

6. Explain why the Neon atom is the smallest atom in the 2nd energy level

Noble gases have maximum protons, valence e^- shielders. This creates greater Z_{eff} values so the e^- in Neon are pulled closer to the nucleus

7. Why is Gallium a bigger atom than Zinc? Use your Z_{eff} calculations to prove your answer.

$$\text{Ga: } 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^1 = 31 - ((10 \cdot 1) + (18 \cdot 0.85) + (2 \cdot 0.35)) = 5$$

$$\text{Zn: } 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} = 30 - ((10 \cdot 1) + (18 \cdot 0.85) + (2 \cdot 0.35)) = 8.85$$

8. Does Z_{eff} explain why the atomic radii increase as you progress down a column? Explain.

No. Z_{eff} is mostly constant in a family due to similar valence shell e^- configuration

This creates similar Z_{eff} values. Family properties are based on pull differences due to distance

9. Explain why the atomic radii of Helium and Neon are so close when considering Neon has 1 more energy level.

$$\text{He: } 1s^2 \Rightarrow 2 - (1 \cdot 0.35) = 1.65$$

$$\text{Ne: } 1s^2 2s^2 2p^6 \Rightarrow 10 - ((2 \cdot 0.85) + (7 \cdot 0.35)) = 5.85$$

Neon has a larger Z_{eff} value and therefore with a greater pull is able to pull the e^- closer to the nucleus.