Atomic Radius Encyclopedia Article

Atomic Radius

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Atomic Radius

The radius of an **atom** is defined as half the distance between the nuclei of two atoms in a pure sample of the substance. The measurements have been obtained through x- ray diffraction techniques. The **periodic table** displays two significant relationships about the radii of atoms: 1) as elements increase in **atomic number** in a period, going from Group IA to Group 7A, the atomic radius decreases; 2) as elements in the same group increase in atomic number, the atomic radius increases. The largest atom has a radius that is only twice the size of the smallest.

The reason that the radii of the atoms within a period decreases relates to the electric force between the positively charged **nucleus** and the negatively charged electrons orbiting it. The number of protons in the nucleus is increased from Group IA to Group 7A. Adding protons to the nucleus results in a greater electric force. When the force of attraction increases, the electrons are drawn closer to the nucleus.

The reason that the radius of the atom increases within a group as the period number increases is the location of outer electrons in higher **energy** levels. These electrons have a higher probability of being located farther from the nucleus, resulting in a larger atomic radius. There is also a shielding effect by the core electrons, decreasing the force of attraction between the nucleus and the **valence** electrons.