

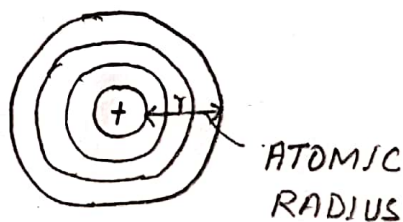
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TOPIC - Atomic radius, Ionic radius of an element
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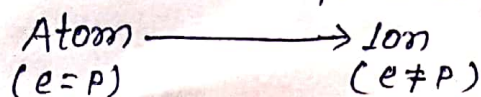
Atomic radius of an element

The linear distance between the centre of the nucleus and valence shell of an atom of the element is called atomic radius of that element. It is denoted by 'r'. It is expressed in nm ($10^{-9}m$) or Å ($10^{-10}m$). According to modern concepts, electrons are taken as diffused clouds, what we call orbitals. Therefore, atomic radius has no precise physical significance since

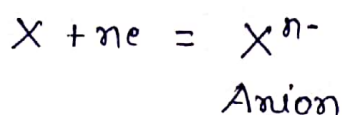
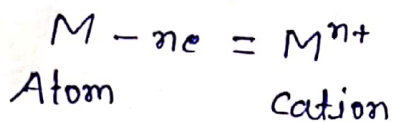


The electron density does not suddenly fall to zero at a particular distance from the nucleus or better to say that the atom has no definite boundary. At best, however, we can explain atomic radius of an element as the distance between the centre of nucleus and the point where electron density of its atom falls to zero. It is therefore at best explained on the basis of the physical state and the nature of bonds of an atom of the element.

Ionic radius: we know the atom is neutral because the number of electrons (or -ve charges) is equal to the number of protons (or +ve charges). When the number of electrons and protons are not equal, ions are formed from the atom -



Hence there are two types of ions - cation and anions. The number of protons is always greater than the number of electrons in cations whereas the number of electrons is always greater than the number of protons in anions. If the ion has n electrons more or less than its atom, then the ion has $-n$ and $+n$ charges e.g



So, we have cationic radius as well as anionic radius. The ionic radius is the distance between the centre of the nucleus of the ion and the point where electron density falls to zero. The cationic radius is always shorter than that of its atom, whereas anionic radius is always larger than that of its atom.