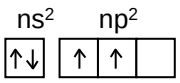
Introduction

Symbol	At. No	Valence shell configuration	Penultimate shell configuration
C	6	$2s^2\ 2p^2$	$C \rightarrow 2e^{\square}\ s^2$
Si	14	$3s^2\ 3p^2$	$Si \rightarrow 8e^{\square}\ s^2\ p^6$
Ge	32	$4s^2\ 4p^2$	Ge
Sn	50	$5s^2\ 5p^2$	Si $18e^{\square}$
Pb	82	$6s^2\ 6p^2$	Pb $s^2p^6d^{10}$

They belong to p-block.



General valence shell configuration:

Almost all properties will show a normal trend from C to Si, But, beyond Si, the trend or change slows down due to ineffective screening caused by d & f electrons.

General properties:

Abundance: Most abundant is Si. Even C is also more abundant. Least abundant is Ge.

Density: It increases down the group. C has higher density than Si due to its diamond form

Order: Si < C < Ge < Sn < Pb

M.Ps and B.P.s: They will decrease down the group due to decrease in the inter atomic attraction.

- C has highest M.P & B.P in the entire periodic table.
- Order of M.P.'s $\rightarrow$ C > Si >Ge > Sn < Pb
- Order of B.P.'s $\rightarrow$ C > Si < Ge > Sn > Pb

Sn has least M.P.

Pb has least B.P.

Atomic radius: Increases down the group.

- Normal increase from C to Si but slow increase from Si onwards. It is due to poor shielding of d e^- in Ge and d and f electrons in others.
- Thus, the difference in the atomic radii between Si & Ge is much smaller when compared to that of C & Si.
- Even lanthanide contraction accounts for smaller increase in atomic radii.

Ionisation potential: It decrease normally from C to Si.

Thereafter, the decrease is very slow.

Electronegativity: It decreases normally from C to Si but there after, it remains constant.

Metallic nature: It gradually increases from C to Pb.

C, Si are non-metals.

Ge is metalloid

Sn, Pb are metals

- Because of gradual increase in metallic nature, IVA group is best suitable for the study of periodicity in properties.

Oxidation states:

- Common oxidation state is + 4.
- Tin & lead will exhibit + 2 oxidation state also. + 2 is more common and more stable than + 4 for Sn and Pb due to inert pair effect.

Valency :

- Common valency is 4.
- Maximum valency of C is also 4 due to the absence of vacant d-orbitals.
- Si and other elements can exhibit a maximum valency of 6 due to the presence of vacant d–orbitals.

Catenation: The ability to form long chains or rings by the atoms of an element is called catenation.

- Catenation ability decreases due to decrease in the bond energy.
- Thus, C has highest catenation than any other element in the periodic table