

Periodic Table

Totally 118 elements.

Periodic table classification

Periods \Rightarrow Left to Right (horizontal rows)

Groups \Rightarrow top to bottom (vertical columns)

Blocks \Rightarrow a set of elements unified by the orbitals their valence e^- (or) valencies lie in.

(based on e^- configuration, the periodic table can be divided into blocks denoting which sublevel is in the process of being filled. The s, p, d, f blocks

— x — x —

Ionization energy :- is the minimum energy required to remove an e^- from an atom or ion in the gas phase kJ/mol or (eV)

\uparrow $\&$ Left to right across an element because atomic radius decreases, so e^- are more attracted to the (closer) nucleus.

\downarrow from top to bottom, moving down a group a valence shell is added. The outermost e^- are further from the nucleus, so they are easier to remove.

The higher the n , the more difficult it is to remove an e^- .

increases left to right (Period) \rightarrow (Row)
bcz atomic radius generally decreases
moving across a period, so there is a
greater effective attraction b/w the
negatively charged e^- & positively
charged nucleus.

top to bottom I.E. \downarrow
valence e^- added into the new shell.
nucleus - valence shell e^- distance \uparrow ,
so attractive force of the nucleus on
the valence shell is decreased, so,

$$1 \text{ I.E.} < 2 \text{ I.E.}$$

1st, 2nd and subsequent I.E.

I.E. = definition

1st I.E. \rightarrow is that requires to remove the
next e^- and so on. The 2nd I.E. is
always greater.

* Removing the first e^- is relatively easy
bcz its loss gives the atom a stable e^- shell.

* Removing the 2nd e^- involves a new
electron shell that is closer and more
tightly bound to the atomic nucleus.

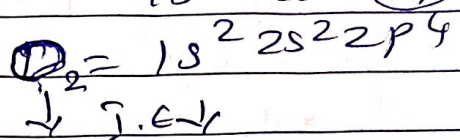
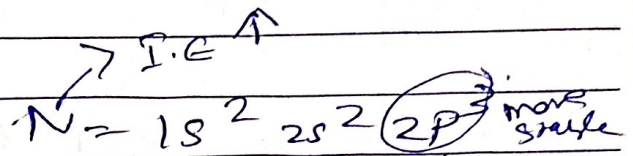
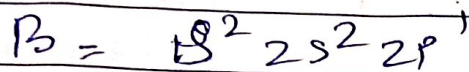
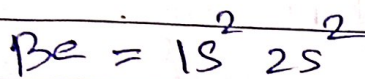
Exception.

1 I.E. of B is less than that of Be
1 I.E. of O is less than that of N.

The reason for the discrepancy is due to the e^- configuration of these elements and Hund's rule.

For Be 1. I.E e^- comes from the 2s orbital, although ionization of boron involves a 2p e^-

For both N & O the e^- comes from the 2p orbital



Electron affinity: - of a neutral atom or molecule is defined as the amount of energy released when an e^- is added to it to form a $-ve$ ion.