

1. Periodic Table and Electronic Configuration

Shell & Subshell

Shell Number	1	2	3	4
Shell Name	K	L	M	N
Number of Electrons	2	8	18	32
Sub shell	s	s p	s p d	s p d f
Number of electrons	2	2 6	2 6 10	2 6 10 14

[Sub shell: The regions where electrons are found in the shell around nucleus. s, p, d, f are the sub shells and they are from the words sharp, principal, diffuse and fundamental respectively.]

Block	Period	Group
Last electron filling subshell is the block Eg: s,p,d,f	The highest shell number in the subshell E.C is the period	<ul style="list-style-type: none"> ✓ s block – the electrons in the last s subshell ✓ p block – the number of electrons in p subshell +12 ✓ d block – the number of electrons in d subshell + the number of electrons in the nearest s subshell

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Properties

✓ s block: 1, 2 group elements, electron emitters (metals), First group shows +1 and Second group shows +2 oxidation states, low ionization energy, low electronegativity, forms ionic compounds, high reactivity, oxide/hydroxide compound shows basic property.

✓ f block: Inner transition elements, arranged separately in lower part of periodic table on 6th and 7th period. These have no groups.
First row: Lanthanoids, Second row: Actinoids
Different oxidation state, Actinoids are radio active elements and used as catalyst in petroleum industry and as fuel in nuclear reactor. Lanthanoids are rare in earth surface and are called Rare earth elements.

? Find the Block, Period, Group of elements having atomic number 4, 7, 12, 15, 20, 22, 26, 28, 30.

Sub shell electronic configuration (E.C)

It is written in the order of 1s, 2s, 2p, 3s, 3p, 3d, 4s, 4p, 4d, 4f, 5s, 5p, 5d, 5f. But electrons filling in this are in the order of 1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f.

Eg: Li-3: $1s^2 2s^1$ N-7: $1s^2 2s^2 2p^3$
Na-11: $1s^2 2s^2 2p^6 3s^1$ Ar-18: $1s^2 2s^2 2p^6 3s^2 3p^6$
Mn-25: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^2$

The reduced form of E.C can be written by using the symbol of most prefix noble gas.
Eg: K-19: $[Ar]4s^1$

✓ Give stability to last d sub shell in the case of Cr-24 and Cu-29. For this gave 1 electron to d subshell from the nearest s subshell.

Cr-24: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$
Cu-29: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$

Eg:

Element	Block	Period	Group
Li-3: $1s^2 2s^1$	s	2	1
Al-13: $1s^2 2s^2 2p^6 3s^2 3p^1$	p	3	13
Co-27: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7 4s^2$	d	4	9

✓ p block: 13 to 18 group elements, solid/liquid/gas state elements, includes Noble gases, Metals, Non metals, Metalloids. Shows +ve and -ve oxidation states.

✓ d block: 3 to 12 group elements (Transition elements), Metals, Properties are identical in group and period, different oxidation states (in $FeCl_2$ Fe has +2 oxidation state and in $FeCl_3$ Fe has +3 oxidation state), Produces coloured compounds (Copper Sulphate: Blue, Potassium permanaganate:Violet, Ferrous Sulphate:Green)
? Find oxidation state of Mn in $MnCl_2$, MnO_2 , Mn_2O_3 , Mn_2O_7

? Find oxidation state of Mn in $MnCl_2$, MnO_2 , Mn_2O_3 , Mn_2O_7