Quantum number, Electronic configuration and Shape of orbitals

151. (d) K=$4s^1$, Cr=$3d^5$ $4s^1$, Cu=$3d^{10}$ $4s^1$

152. (a)

	s	*p*	*d*	*f*	*g*	*h*
l = 0	1	2	3	4	5	

Number of orbitals $= 5 \times 2 + 1 = 11$

153. (a) It is the ground state configuration of chromium.

154 (d) n=4, l=3, m=-2, s=+1/2

155. (b) $n = 4 \rightarrow 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4s^2, 4p^6, 4d^{10}, 4f^{14}$

So $l = (n-1) = 4 - 1 = 3$ which is *f* orbit contain 7 orbital.

156. (d) 2*p* have contain maximum 6 electron out of which there are 3 are of + 1/2 spin and 3 are of – 1/2 spin

157. (a) For 4*f* orbital electron, $n = 4$

$l = 3$ (Because 0, 1, 2, 3)

s, *p*, *d*, *f*

m = + 3, + 2, +1, 0, – 1, – 2, – 3

s = +1/2

158. (b) $24Cr \rightarrow 1s^2, 2s^2, \underset{l=1}{2p^6}, 3s^2, \underset{l=1}{3p^6}, \underset{l=2}{3d^5}, 4s^1$

(We know that for *p* the value of $l = 1$ and for d, $l = 2$)

For $l = 1$ total number of electron = 12

For $l = 2$ total number of electron = 5.

159. (c) Atomic number of potassium is 19 and hence electronic configuration will be $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1$

Hence for $4s^1$ electron value of Quantum number are

Principal quantum number $n = 4$

Azimuthal quantum number $l = 0$

Magnetic quantum number $m = 0$

Spin quantum number $s = +1/2$

160. (d) According to Hund's rule electron first fill in unpaired form in vacant orbital then fill in paired form to stabilized the molecule by which $1s^2, 2s^2, 2p_x^2$ is not possible. According to Hund's rule. Because $2p_x, p_y, p_z$ have the same energy level so electron first fill in unpaired form not in paired form so it should be $1s^2, 2s^2, 2p_x^1, 2p_y^1$.

161. (c) It is governed by Aufbau principle.

162. (d) The electronic configuration of atomic number

$24 = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^5, 4s^1$

163. (b) The maximum number of electron in any orbital is 2.

164. (c) According to pauli principle 2 electron does not have the same value of all four quantum number. They have maximum same value are 3.

165. (a) Number of orbitals $= n^2 = 4^2 = 16$.

166. (d) We know from the Aufbau principle, that 2*p* orbital will be filled before 3*s* orbital. Therefore, the electronic configuration $1s^2, 2s^2, 2p^2, 3s^1$ is not possible.

167. (d) Each orbital may have two electrons with opposite spin.

168. (d) Maximum no. of electrons in a subshell $= 2(2l + 1)$ for *f*-subshell, *l* = 3 so 14 electrons accommodated in *f* -subshell.

169. (b) Each orbital has atleast two electron.

170. (a) Nucleus of 20 protons atom having 20 electrons.

171 : **(c) 14**

Maximum number of electrons in 5f orbitals

f-orbital: l = 3 → number of orbitals = 2l + 1 = 7
Each orbital can hold 2 electrons → total = 7 × 2 = 14

172 **(d) 10Maximum number of electrons in an atom with l = 2 and n = 3**

l = 2 → d-orbital
Number of orbitals = 2l + 1 = 5
Each orbital can hold 2 electrons → total = 5 × 2 = 10

173 **(c) Excited state of neon atom Given configuration:** $1s^2\ 2s^2\ 2p^5\ 3s^1$

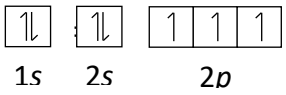
Total electrons = 2 + 2 + 5 + 1 = 10 electrons
Fluorine (F, Z = 9) → 9 electrons
Neon (Ne, Z = 10) → 10 electrons
Step 1: Compare with ground states
Ground state of F: $1s^2\ 2s^2\ 2p^5$ → 9 electrons
Ground state of Ne: $1s^2\ 2s^2\ 2p^6$ → 10 electrons
Step 2: Analyze given configuration
For **Ne**, $2p^6$ should be fully filled, but here we have $2p^5$ and $3s^1$ → one electron from 2p excited to 3s
This is an **excited state of neon**
:

174. (b) For $m = 0$, electron must be in *s*-orbital.

175. **(d) $2dz^2$ orbital** is a **single d-orbital**

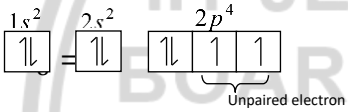
Each orbital can hold **maximum 2 electrons** (with opposite spins)

176. (c) In this type of electronic configuration the number of unpaired electrons are 3.



177. (a) Atomic number of *Cu is* 29 so number of unpaired electrons is 1

$Cu = (Ar)$ 

178. (b) 

179. **(b) 10**

Maximum number of electrons in 3d subshell

d-subshell: l = 2 → number of orbitals = 2l + 1 = 5
Each orbital can hold 2 electrons → total = 5 × 2 = 10

180. **(c) 2(2l+1)**

Maximum number of electrons in a sub-shell

Number of orbitals in a subshell: 2l + 1
Each orbital can hold 2 electrons → maximum electrons = 2 × (2l + 1)