

## Answer on Question#43509 – Physics – Atomic Physics

### Question

List the possible subshells for the  $n = 6$  shell.

### Answer

The shell whose principal quantum number  $n = 6$ , includes the following subshells

Quantum numbers				Subshell	No. of orbitals in subshell
n	l	$m_l$	$m_s$		
6	0	0	$+1/2$ $-1/2$	6s	1
	1	-1, 0, +1	$+1/2$ $-1/2$	6p	3
	2	-2, -1, 0, 1, 2	$+1/2$ $-1/2$	6d	5
	3	-3, -2, -1, 0, 1, 2, 3	$+1/2$ $-1/2$	6f	7

So, the  $n = 6$  shell includes three subshells, namely **6s**, **6p** and **6d**.

Subshell 6s involves 1 orbital, subshell 6p involves three orbitals ( $6p_x$ ,  $6p_y$  and  $6p_z$ ) and subshell 6d involves five orbitals ( $6d_{xy}$ ,  $6d_{xz}$ ,  $6d_{yz}$ ,  $6d_{x^2-y^2}$  and  $6d_{z^2}$ ).

Though the 6f subshell is theoretically possible for  $n = 6$  shell, atoms with such subshell do not exist.