Problem-Solved Example 25

How many atomic orbitals in d-sublevel and f-sublevel?

Solution

For d-sublevel : $l = 2$

So the number of atomic orbitals $= 2l + 1$

$= 2(2) + 1$

$= 5$

$\therefore$ There are 5 values of m_l (orientations = 5)

ie. $m_l = +2, +1, 0, -1, -2$

d-orbitals are : d_{xy}, d_{yz}, d_{xz}, d_{z^2} and $d_{x^2-y^2}$

For f-sublevel : $l = 3$

$\therefore$ Total number of atomic orbitals $= 2l + 1$

$= 2(3) + 1$

$= 7$

$\therefore$ There are 7 values of m_l (7 orientations)

ie. $m_l = +3, +2, +1, 0, -1, -2, -3$

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