

Answer on Question #83074 – Chemistry – General Chemistry

Questions

4. What are the first two quantum numbers for the electrons located in subshell 4d?
5. What are the first three quantum numbers for the electrons located in subshell 2s?
6. How many electrons can be held in a sublevel $l = 3$?
7. How many electrons can be held in the energy level $n = 4$?
8. How many electrons in an atom can share the quantum numbers $n = 4$ and $l = 3$?

Answers

4. $n = 4$ (principal quantum number), $l = 2$ (orbital quantum number).
5. $n = 2$ (principal quantum number), $l = 0$ (orbital quantum number), $m_l = 0$ (it is the only possible magnetic quantum number for s orbital).
6. If $l = 3$, then $m_l = -3, -2, -1, 0, 1, 2, 3$ (7 possible values), and $m_s = -1/2, 1/2$ (2 possible values). $2 \times 7 = 14$ – it is the number of electrons can be held in a sublevel $l = 3$.
7. If $n = 4$, then $l = 0, 1, 2, 3$ (4 possible values). For $l = 0$, $m_l = 0$ (1 possible value), for $l = 1$, $m_l = -1, 0, 1$ (3 possible values), for $l = 2$, $m_l = -2, -1, 0, 1, 2$ (5 possible values), for $l = 3$ $m_l = -3, -2, -1, 0, 1, 2, 3$ (7 possible values). $m_s = -1/2, 1/2$ (2 possible values). Therefore the number of electrons, that can be held in the energy level $n = 4$ equals $(1 + 3 + 5 + 7) \times 2 = 32$.
8. If $n = 4$ and $l = 3$, then $m_l = -3, -2, -1, 0, 1, 2, 3$ (7 possible values), and $m_s = -1/2, 1/2$ (2 possible values). $2 \times 7 = 14$ – it is the number of electrons in an atom, that can share the quantum numbers $n = 4$ and $l = 3$.

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