REVIEW QUESTIONS

Q1. Some of these sets of quantum numbers (n, ℓ, m_ℓ, m_s) could not occur. Explain why.

a) $(3, 3, 2, -\frac{1}{2})$ (c) $(1, 0, 0, 1)$ (e) $(2, 1, 2, +\frac{1}{2})$

b) $(2, 0, 0, +\frac{1}{2})$ (d) $(2, 0, 0, +\frac{1}{2})$ (f) $(3, 2, +3, -\frac{1}{2})$

Q2. Give the n, ℓ and m_ℓ values for

a) Each orbital in the 6f sublevel

b) Each orbital in the $n = 6$ sublevel.

Q3. One electron has the set of quantum numbers $n = 3$, $\ell = 1$, $m_\ell = -1$ and $m_s = +\frac{1}{2}$; another electron has the set $n = 3$ $\ell = 1$; $m_\ell = 1$ and $m_s = +\frac{1}{2}$.

a) Could the electrons be in the same atom? Explain.

b) Could they be in the same orbital? Explain.

Q4. If an electron has $m_\ell = -2$, list the restrictions on its other quantum numbers.

Q5. Give the electronic configurations of these ions and indicate which ones are isoelectronic.

(a) Ca^{2+} (b) K^+ (c) O^{2-} (d) Al^{3+}.

Give the n, ℓ, and m_ℓ values for the electron which was added or removed from these ions.

Q6. Assign a set of four quantum numbers for

a) each electron in a boron atom ($Z = 5$)

b) p orbitals in sulfur, S ($Z = 16$)

c) S orbital in Vanadium, V ($Z = 23$)

Q7. Assign a set of four quantum numbers for

a) the electrons removed from Al atom to form Al^{3+} ions

b) the valence electron in a Nickel atom ($Z = 28$)

c) the 3d electron in a cobalt atom ($Z = 27$)

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