Atoms

Answer Key

1. D

Explanation: The orbital that must be filled last is the one with the highest (n + ℓ) value. For 6*s* orbital, (n + ℓ) = 6; for 5*d*, (n + ℓ) = 7; for 4*f*, (n + ℓ) = 7; and for 6*p*, (n + ℓ) = 7. Since options (b), (c), and (d) all have the same (n + ℓ) value, we apply the rule that the one with the lower n value will be filled first. Going with these, it can be said that 6*p* orbital will be filled last.

2. C

Explanation: Based on the (n + ℓ) values calculated in No. 1, 6*s* is the 1st priority to be filled with electrons, followed by 4*f*, then 5*d*, and lastly, 6*p*.

3. A

Explanation: The set of quantum numbers (1, 1, 0, +½) is impossible because an ℓ value equal to 1 suggests that the orbital is a *p* orbital. Unfortunately, there is no *p* orbital in n = 1 (that's why there is no $1p^1$!), hence impossible!

4. C

Explanation: Based on the mnemonic device that we are using, the correct order of orbitals to use corresponds to that in option (c). Hence, it is the correct answer.

5. A

Explanation: The only *d* orbital in the electron configuration of Mn is the 3*d* orbital. Therefore, n = 3. Furthermore, there is only one ℓ value for *d* orbital, and that is 2. If we assign m_ℓ values to the five subshells of 3*d* from -2 to +2, the labeled electron in the figure will fall under -1. Therefore, the correct answer is option (a).