

Q15. For the electrons of oxygen atom, which of the following statements is correct?

- (a)  $Z_{\text{eff}}$  for an electron in a 2s orbital is the same as  $Z_{\text{eff}}$  for an electron in a 2p
- (b) An electron in the 2s orbital has the same energy as an electron in the 2p
- (c)  $Z_{\text{eff}}$  for an electron in 1s orbital is the same as  $Z_{\text{eff}}$  for an electron in a 2s orbital.
- (d) The two electrons present in the 2s orbital have spin quantum numbers  $m_s$  but of opposite sign.

**Sol. (d)**

- (a) Electrons in 2s and 2p orbitals have different screening effect. Hence, their  $Z_{\text{eff}}$  is different.  $Z_{\text{eff}}$  of 2s orbital  $>$   $Z_{\text{eff}}$  of 2p orbital  
Therefore, it is not correct.
- (b) Energy of 2s orbital  $<$  energy of 2p orbital.  
Hence, it is not correct.
- (c)  $Z_{\text{eff}}$  of 1s orbital  $\neq$   $Z_{\text{eff}}$  of 2s orbital  
Hence, it is incorrect.
- (d) For the two electrons of 2s orbital, the value of  $m_s$  is  $+\frac{1}{2}$  and  $-\frac{1}{2}$ .  
Hence, it is correct.