ASSIGNMENT- 2

ATOMIC STRUCTURE

(Q1 – Q10) Given below are four options against each question. Choose the option which you consider the most appropriate as your answer.

Q1. It is impossible to know simultaneously the position and momentum of a moving particle with absolute exactness at any instant .This is called
    (i) Aufbau principle   (ii) Heisenberg principle
    (iii Hund's rule   (iv) Pauli's exclusion principle

Q2. The ratio of energy of a photon of $2000A^0$ wavelength radiation to that of $4000A^0$ radiation is
    (i) 1/4   (ii) 4
    (iii) 1/2   (iv) 2

Q3. Orbital angular momentum depends upon -
    (i) l   (ii) n and l
    (iii) n and m   (iv)   m and s

Q4. The number of radial nodes for 3p orbital is
    (i) 3   (ii) 4
    (iii) 2   (iv) 1
Q5. In which of the following pairs, the ions are iso – electronic?
    (i) Na^+, Mg^{2+} (ii) Al^{3+}, O^{2-}
    (III) Na^+, O^{2-} (iv) N^{3-} , Cl^-

Q6. The number of electrons in 3d sub-shell for an element with atomic number 26 is:
    (i) 4   (ii) 6
    (iii) 8   (iv) 10

Q7.   The total number of electrons present in all the s- orbital, all the p- orbital and all the d- orbital of Cs^+ ion are respectively
    (i) 8, 26, 10   (ii) 10, 24 20
    (iii) 8, 22 24   (iv) 12, 20, 22

Q8. The electronic configuration of an atom /ion can be defined by:
    (i) Aufbau principle   (ii) Hund's rule
    (iii) Pauli's Exclusion principle   (iv) All the above

Q9. Azimuthal quantum number defines:
    (i) e/m ratio of electrons   (ii) spin of electron
    (iii) angular momentum of electron   (iv) magnetic momentum of electron

Q10. Quantum numbers n=2, l=1 represents:
    (i) 1s orbital   (ii) 2s orbital
    (iii) 2p orbital   (iii) 3d orbital

Q11. Table tennis ball has a mass 10 g and a speed of 90 m/s. If speed can be measured within an accuracy of 4% what will be the uncertainty in speed and position?

Q12. What is the wavelength of the light emitted when the electron in a hydrogen atom undergoes transition from the energy level with n=4 to energy level n=2? (Given $Rh = 109678 \text{ cm}^{-1}$)

Q13. Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800 A^0. Calculate the Threshold frequency.

Q14. An electron is in one of the 3d orbital. Give the possible values of n,l and m for the electron.

Q15. Answer the following questions:
    (a) Why are 2d and 4f orbital not possible?
    (b) Chlorophyll present in green leaves of plants absorbed light at 4.620×10^{14} Hz.Calculate the wavelength of radiation in nanometer. Which part of the electromagnetic spectrum does it belongs to?
    (c) How many sub shells are associated with n=4?

Q16. (a) If the velocity of the electron in Bohr's first orbit is $2.19 \times 10^6 \text{ ms}^{-1}$, calculate the de Broglie wavelength associated with it.
    (b) What are the discrepancies of Bhor's model?

Q17. (a) State and explain Hund's rule of maximum multiplicity.
    (b) Half and fully filled orbitals are more stable than the incompletely filled orbital, why?

Q18. Hydrogen atom has only one electron, so mutual repulsion between electrons is absent .However, in multi electron atoms mutual repulsion between the electrons is significant. How does it affect the energy of electron in the orbital of the same principal quantum number in multi electrons atoms?

Q19. State and explain Pauli's Exclusion principle.

Q20. What do you mean by quantum numbers? Write their significance as well.

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