



INDIAN SCHOOL DARSAIT
DEPARTMENT OF CHEMISTRY



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| Subject: Chemistry | Topic: Structure of atom | Date : 11.5.17 |
| Resource Person: Jyothy Sukhadiya | | |
| Name of Student: _____ | Class & Division: XI : | Roll No: |

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| 1. | What are electromagnetic radiations? Give the characteristic properties of electromagnetic radiations. | 3 |
| 2. | What are black body radiations? | 1 |
| 3. | Explain Planck's quantum theory. | 2 |
| 4. | Find energy of each of the photons which (i) correspond to light of frequency 3×10^{15} Hz. (ii) have wavelength of 0.50 \AA . | 2 |
| 5. | Define i) Photoelectric effect ii) Threshold frequency iii) Work function | 3 |
| 6. | The work function of Cesium atom is 3.04×10^{-19} J. If Cesium element is radiated with a wavelength of 500 nm, calculate the kinetic energy of the ejected electron. ($h = 6.626 \times 10^{-34}$ Js) | 2 |
| 7. | Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800 \AA . Calculate the threshold frequency and work function of the metal. | 3 |
| 8. | Differentiate between Emission spectrum and Absorption spectrum | 2 |
| 9. | Explain line spectrum of hydrogen | 2 |
| 10. | Give reasons: a) Although hydrogen atom has one electron it's spectrum produces large number of lines. b) Line spectra is regarded as the 'finger prints of atoms' | 2 |
| 11. | List out the important postulates of Bohr model of hydrogen atom. | 2 |
| 12. | "Energy of an electron is quantized." Explain the statement. | 1 |
| 13. | Why is the energy of electron negative? | 1 |
| 14. | Calculate the energy absorbed, frequency and wavelength when an electron with energy 217.9×10^{-21} J jumps to an energy level with energy 544.8×10^{-20} J. | 3 |
| 15. | What is the wavelength of light emitted when the electron in a hydrogen atom undergoes transition from an energy level with $n = 4$ to an energy level with $n = 2$? | 2 |
| 16. | What are the limitations of Bohr's model of atom? | 2 |
| 17. | Explain: a) Stark effect b) Zeeman effect | 2 |
| 18. | If the velocity of an electron in Bohr's first orbit is 2.19×10^6 m/s, calculate the de-Broglie wavelength associated with it? (mass of electron = 9.1×10^{-31} kg) | 2 |
| 19. | State Heisenberg's uncertainty principle. Give its mathematical statement. | 2 |

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| 20. | Calculate the uncertainty in the position of an electron if the uncertainty in its velocity is 5.7×10^5 m/s. | |
| 21. | Calculate the uncertainty in the velocity of a wagon of mass 2000 kg whose position is known an accuracy of +10 m. | 2 |
| 22. | What is the physical significance of λ^2 ? | 2 |
| 23. | Differentiate between Orbit and Orbital. | 1 |
| 24. | What do you understand by quantum numbers? Give their significance. | 2 |
| 25. | State: a) Aufbau principle b) (n+l) rule or Bohr-Bury rule c) Hund's rule of maximum multiplicity d) Pauli's Exclusion Principle | 1 each |
| 26. | Which orbital fills first and why i) 3d or 4p ii) 3d or 4s | 2 |
| 27. | Draw the boundary surface diagram of 's' & 'p' and 'd' orbitals | 3 |
| 28. | Copper and Chromium show exceptional electronic configurations. Explain giving reasons | 2 |
| 29. | Using s,p,d and f notation, describe the orbital with the following quantum numbers- (a) $n=1, l=0$ (b) $n=3, l=1$ (c) $n=4, l=2$ (d) $n=4, l=3$ | 2 |
| 30. | a) How many electrons are possible in a) 4p b) 5pz c) $n=3, l=2$ d) $n=4, l=2, s=+\frac{1}{2}$ b) What are the values of n and l for the following orbitals: 4p, 3d, and 5f orbital. c) What are the atomic numbers of elements whose outermost electrons are represented by (i) $3s^1$ (ii) $2p^3$ (iii) $3d^6$ (iv) $3p^6$ | 2 each |
| 31. | How many electrons in an atom can have the following quantum numbers. (a) $n = 4, m = +1/2$ (b) $n = 3, l = 0$ | 2 |
| 32. | (a) What is the lowest value of n that allows g orbitals to exist? (b) An electron is in one of the 3d orbitals, Give the values of n, l and m_l for this electron. | 2 |
| 33. | Write the electronic configuration of the elements. P, S, Cl^- , O^{2-} | 2 |
| 34. | List the quantum numbers of a) unpaired electrons in F, Ni^{2+} b) valence electrons in P, Ca and K | 2 |
| 35. | i) Find the total number of electrons with +1/2 value for spin quantum number in Na^+ ? ii) Give the quantum number of the unpaired electron in Cl? | 2 |
| 36. | Explain, giving reason which of the following sets of quantum numbers are not possible? i) $n = 0, l = 0, m = 0, s = +1/2$ ii) $n = 1, l = 0, m = 0, s = -1/2$ iii) $n = 1, l = 1, m = 0, s = +1/2$ iv) $n = 2, l = 1, m = 0, s = -1/2$ | 2 |
| 37. | Which atoms are indicated by the following configurations? (a) $[He] 2s^1$ (b) $[Ne] 3s^2 3p^3$ (c) $[Ar] 4s^2 3d^1$ | 3 |
| 38. | Which is more stable and why? i) Fe^{2+} or Fe^{3+} ii) Mn^{2+} or Mn^{3+} | 2 |