



INDIAN SCHOOL DARSAIT
DEPARTMENT OF CHEMISTRY



Subject: Chemistry	Topic :Structure of atom	Date of Worksheet: 26.5.2019
Resource Person: Rohitha	Date of Submission: _____	
Name of the Student: _____	Class &Division: XI	Roll Number: _____
1.	Calculate the energy and radius of the first orbit of He^+ ion.	1
2.	Why is energy of electron negative?	1
3.	Why atomic spectra are called finger prints of an atom?	1
4.	Define electromagnetic spectrum.	1
5.	What are the main features of Planck's quantum theory of radiation?	2
6.	An electron beam from an accelerator is with kinetic energy $1.6 \times 10^{-17}\text{J}$. What is its de Broglie wavelength?	2
7.	Calculate the uncertainty in the velocity of a cricket ball if the mass is 200 g. Uncertainty in the position is 1pm.	2
8.	Calculate the de Broglie wavelength of a bullet of mass $2.2 \times 10^{-3}\text{ Kg}$ fired with a velocity of 300 m/s.	2
9.	Calculate the wavelength of the photon that is emitted when an electron in Bohr's orbit $n=2$ returns to the orbit $n=1$ in the hydrogen atom.	2
10.	a)Why are half filled and completely filled orbitals more stable? b) How many subshells are there with $n=3$?	2
11.	Calculate the energy of each of the photons which i) correspond to light of frequency $3 \times 10^{15}\text{ Hz}$. ii) have wavelength of 0.50 \AA	2
12.	What are the possible values of l and m for a) $n=3$ b) $n=2$? Draw the shapes (boundary surfaces) of the following orbitals. (i) $2p_y$ (ii) $3d_{z^2}$ (iii) $3d_{x^2-y^2}$	2
13.	i) State $(n+1)$ rule. ii) Give reason: Energy of the electron is quantized.	2
14.	How many electrons are possible in a) $4p$ b) $5p_z$ c) $n=3, l=2$ d) $n=4, l=2, s=+\frac{1}{2}$	2
15.	What is the energy 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.	a)Based on Bohr Bury rules arrange the following orbitals in the increasing order of energy.(i) $5f, 4d, 7s, 7p$ (ii) $5p, 4d, 5d, 4f, 6s$ b) How many electrons in an atom may have the following quantum number? (i) $n=4, m_s=+\frac{1}{2}$ (ii) $n=3, l=0$ c) What are the atomic numbers of elements whose outermost electrons are represented by (i) $3s^1$ (ii) $2p^3$ (iii) $3d^6$	3
17.	a)List the quantum numbers of a) unpaired electron in F, b) valence electrons in P, Ca.	3

18.	A photon of wavelength 4×10^{-7} m strikes on metal surface, the work function of the metal being 2.13 eV. Calculate (i) the energy of the photon (eV) (ii) the kinetic energy of the emission, and (iii) The velocity of the photoelectron ($1 \text{ eV} = 1.6020 \times 10^{-19} \text{ J}$).	3
19.	a) What do you understand by quantum numbers? What is their significance? b) Describe the orbital: a) $n=2, l=0$ b) $n=6, l=4$ c) $n=2, l=3$	5
20.	a) Differentiate i. Absorption and emission spectrum. ii. Orbit and orbital b) Define i. Photoelectric effect. ii. Black body radiation	5
21.	a) 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. b) The approximate mass of an electron is 10^{-27} g . Calculate the uncertainty in its velocity if the uncertainty in its position were of the order of 10^{-11} m .	5
22.	a) Which is more stable a) Mn^{2+} or Mn^{3+} b) Fe^{2+} or Fe^{3+} ? Give reason. b) Which rule is disobeyed while writing electronic configuration of carbon as $1s^2, 2s^2, 2p_x^2$? State the rule and write the correct configuration. c) Electronic configuration in Copper is $[\text{Ar}] 4s^1 3d^{10}$ and not $[\text{Ar}] 4s^2 3d^9$. Why? d) Among the following pairs of orbitals which orbital will experience the larger effective nuclear charge? (i) $2s$ and $3s$, (ii) $4d$ and $4f$, (iii) $3d$ and $3p$.	5
23.	a) Explain Bohr's atom model. What are its limitations? b) Which of the four quantum numbers (n, l, m_l, m_s) determine a) the energy of electron in a hydrogen atom and in a many electron atom b) size of the orbital c) shape of the orbital d) orientation of the orbital e) Spin of orbital?	5
24.	a) State uncertainty principle and explain its significance. b) What are degenerate orbitals? c) How many electrons in an atom have the following quantum numbers? i) $n=4, m_s = -1/2$ ii) $n=3, l=0$	5
25.	a) Why are orbits known as energy levels? b) Write electronic configurations of atoms of Cr (at.no. 24) and Cu (at.no. 29). c) Explain, giving reasons, which of the following sets of quantum numbers are not possible. (a) $n=0, l=0; m_l = 0, m_s = +1/2$ (c) $n=1, l=0; m_l = 0, m_s = -1/2$ (b) $n=1, l=1; m_l = -0, m_s = +1/2$ (d) $n=2, l=1; m_l = 0, m_s = +1/2$	5
26.	a) The energy associated with the first orbit in the hydrogen atom is $-2.18 \times 10^{18} \text{ J/atom}$. What is the energy associated with the fifth orbit? b) Calculate the radius of Bohr's fifth orbit for hydrogen atom. c) State (i) Hund's Rule of maximum Multiplicity (ii) Aufbau Principle (iii) Pauli's exclusion principle	5