

PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
GEITA ADVENTIST SECONDARY SCHOOL
FORM FIVE HOLLIDAY PACKAGE 4th May 2020

CHEMISTRY

INSTRUCTIONS

Attempt all questions in this paper.

1. (a). What is a spectrum?
(b). Explain the main features of the three types of spectra.
2. A certain photochemical reaction is found to required $8.1 \times 10^{-19}\text{J}$ of energy per water molecule. Calculate the number of photons (per water molecule) of light with wave length of $2.21 \times 10^{-6}\text{m}$ that is required to initiate the reaction. (Plank's constant $h = 6.63 \times 10^{-34}\text{Js}$ and speed of light $C = 3.0 \times 10^8\text{m/s}$).
3. (a). Explain the meaning of the following terms:
 - (i). Hydrogen spectrum
 - (ii). Quntum numbers
 - (iii). Quantization of energy
 - (iv). Wave particle duality of matter
(b). State any two major postulates and two shortcomings of each of the atomic models according to:
 - (i). Rutherford
 - (ii). Bohr
4. (a). The atomic nuclei of atoms M and N contain the following neutrons and 7 protons, N:14 neutrons and 12 protons. Write down.
 - (i). The mass number of M and N
 - (ii). The atomic numbers of M and N
 - (iii). The electronic configurations of M and N.
5. (a). What is an orbital and how does it differ from an orbit?
(b). Sketch the shape of S-, and P-orbitals.

6. A 100 watt bulb is emitting monochromatic light having wavelength 6000Å. Calculate the number of photons emitted by the bulb in one minute.
7. Briefly explain what is meant by;
(i). Alpha particle (ii). Nuclear fission (iii). Radioisotope (iv). Nuclear fusion
8. What is meant by the following terms as used in the Lewis theory?
(a). Valence electron
(b). Lone pair of electrons
(c). Coordinate bond
(d). Multiple bonds
(e). Octet
9. Classify the following compounds as electrovalent or covalent and give in each case their Lewis structure and the reason for your classification.
(a). CCl_4
(b). MgCl_2
(c). NH_3
(d). CaCl_2
(e). HCl
10. How do the elements of period 3 react with nitric acid?
Write chemical equation for the action on heat on ammonium nitrate
hydrolysis of silicon hydride by aqueous sodium hydroxide

Account for the following fact giving related equation where necessary.
Red-hot iron decomposes steam reversibly.
Dilute hydrochloric acid is added gradually to sodium thiosulphate
Alkali earth metals are good reducing agents.
11. (a) Write the structural formula for the following:

2-methyl-2-butene. (iv) Dimethyl ether.
12. Give example, explain the meaning of the following
(i) Functional group (ii) Skeletal isomerism
13. State Markownikoff's rule.
14. (a) Give the name and formula of:

The most valuable ore of lead.

One soluble complex compound of lead.

15. Explain very briefly, using equations where possible, the extraction of copper from its commercial ore

16. (a) Briefly explain the IUPAC system of nomenclature of coordination compounds with reference to:

- i. Names of ligands
- ii. Oxidation state of central metal atom or ion.
- iii. Order of naming ligands.
- iv. Name the following complexes
- v. $[\text{Pt}(\text{en})_2\text{Cl}_2]^{2+}$ (iv) $[\text{Cu}(\text{H}_2\text{O})_2(\text{NH}_3)_2]\text{SO}_4$

17. Consider the complex compound of the formula $\text{Na}[\text{Cr}(\text{NH}_3)_2\text{Cl}_2(\text{C}_2\text{O}_4)]$

- i. What is the name of the central metal atom?
- ii. Name at least one neutral ligand in the complex
- iii. Give the name of each ligand in the complex
- iv. What is the name of the complex compound?
- v. What is the coordination number of the central metal atom?

18. (a) An electron in hydrogen atom finds itself in the fourth energy level.
(b) Write down a list of orbitals that it might be in.
(c) Can it be in all these orbitals at the same time? Give reason.
(d) What are the values of l for this energy level?

19. (a) Define Addition polymerization

(b) Using the example of polymerization of vinyl chloride to form PVC show.

- i) The chain initiation step
- ii) The chain propagation step
- iii) The chain termination step.

20. (a) Ozone (O_3) protects earth's inhabitants from harmful effect of ultra-violet (U.V) light from the sun. The effect is maximum for the u.v light of 50000\AA . Calculate the energy of this light (in eV).

(b) Write electronic configuration of the following atoms and ions.

- (i) ^{29}Cu (ii) $^{25}\text{Mn}^{2+}$ (iii) $^{47}\text{Ag}^+$ (iv) ^{80}Hg (v) ^{54}Xe

2. (a) Identify the following elements;

- (i) ^9_4X (ii) $^{28}_{14}\text{X}$ (iii) $^{27}_{13}\text{X}$

21. From which energy level do the transition of electron in the hydrogen spectrum with the following spectral series arises from?

(i) The third line in the Lyman series (ii) the second line in the Balmer series.

22. (a) Explain briefly the structure of an atom according to Dalton.

(i) What are isotopes?

Silver consists of two isotopes, $^{107}_{47}\text{Ag}$ and $^{109}_{47}\text{Ag}$, which have atomic masses of 106.91 and 108.91 respectively. The relative abundances of these isotopes are 51.88% for the $^{107}_{47}\text{Ag}$ atom and 48.12% for $^{109}_{47}\text{Ag}$ atom. Calculate the atomic mass of silver.

23. (a) Write the types of hybridization for each of the following inorganic compounds;

- (i) $[\text{Ni}(\text{H}_2\text{O})_5]^{3+}$ (ii) SF_6 (iii) SO_3 (iv) C_2H_4 (v) PH_3 (vi) SiCl_4

(b) Give **one molecular compound** which is formed by the following hybridized atomic orbitals.

- (i) sp^3 hybridized (ii) sp^1 hybridized (iii) sp^3d^2 hybridized

24. (a) Define the following atomic phenomena by giving examples.

Covalent bond (ii) Isotones (iii) Non polar compound (iv) An atom (vi) Dipole moment

Write short notes on quantum numbers

State the rules which govern the filling of electrons in orbitals of atoms

