SET NO - 2

Exam ID. | | | | | | |

Candidates must write the Set No. on the title page of the OMR Sheet.

DAV PUBLIC SCHOOLS, ODISHA ZONE –I
PA-II EXAMINATION, 2021-22

- **Check that this question paper contains 8 printed pages.**
- **Set number given on the right hand side of the question paper should be written on the OMR SHEET by the candidate.**
- **Check that this question paper contains 55 questions.**

CLASS – XI
SUB: CHEMISTRY

Time :90 Minutes **Maximum Marks: 35**

General Instruction:

1. ***The Question Paper contains three sections.***
2. ***Section A has 25 questions. Attempt any 20 questions.***
3. ***Section B has 24 questions. Attempt any 20 questions.***
4. ***Section C has 6 questions. Attempt any 5 questions.***
5. ***All questions carry equal marks.***
6. ***There is no negative marking.***

SECTION A

This section consists of 25 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

Q1. Which one of the following is lightest?

(A) 0.2 moles of hydrogen gas.
(B) 6.023×10^{22} molecules of nitrogen.
(C) 0.1 g of silver.
(D) 0.1 g mole of oxygen gas

Q2. The dehydration yield of cyclohexanol to cyclohexene is 75%. The yield obtained when 100 g of cyclohexanol is dehydrated will be:

(A) 82.35 g (B) 61.5 g (C) 38.34 g (D) 17.65 g

Q3. If 500 ml of a 5 M solution is diluted to 1500 ml, what will be the molarity of the solution obtained?

(A) 1.5 M (B) 1.66 M (C) 0.017 M (D) 1.59 M

Q4. If the density of a solution is 3.12 g ml^{-1}, the mass of 1.5 ml solution in significant figures is_____

(A) 4.7 g (B) 4680×10^{-3} g
(C) 4.680 g (D) 46.80 g

Q5. Which of the following statements is correct about the reaction given below? $4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$

(A)Total mass of iron and oxygen in reactants = total mass of iron and oxygen in product, therefore it follows the law of conservation of mass.
(B) Total mass of reactants = total mass of product; therefore, law of multiple proportions is followed.
(C) Amount of Fe_2O_3 can be increased by taking any one of the reactants (iron or oxygen) in excess.
(D) Amount of Fe_2O_3 produced will decrease if the amount of any one of the reactants (iron or oxygen) is taken in excess.

Q6. For principal quantum number n = 4, total number of the orbitals having l = 3 is:

(A) 3 (B) 7 (C) 5 (D) 9

Q7. The species which is not paramagnetic among the following is:

(A) Cl^- (B)Be^- (C) Ne^{2+} (D) As^+

Q8. The energy of second Bohr orbit of hydrogen atom is -328 $kJmol^{-1}$. Hence the energy of fourth orbit would be:

(A) -41 kJ mol^{-1} (B) -82 kJ mol^{-1} (C) -164kJ mol^{-1} (D) -1312kJmol^{-1}

Q9. Which one of the following ions has electronic configuration $[Ar]3d^6$

(A)Ni^{3+} (B)Mn^{3+} (C)Fe^{3+} (D)Co^{3+}

Q10. The ionic radii of N^{3-}, O^{2-}, F^-, Na^+ follow the order:

(A) $N^{3-} > O^{2-} > F^- > Na^+$ (B) $N^{3-} > Na^+ O^{2-} > F$

(C) $Na^+ > O^{2-} > N^{3-} > F^-$ (D) $O^{2-} > F^- > Na^+ > N^{3-}$

Q11. Which is a correct name according to IUPAC system?

(A) 4,5-Dimethyl hexane (B) 3-Ethyl-2-methylpentane

(C) 3,4-Dimethylpentane (D) 2-Ethyl-2-methylpentane

Q12. The first ionisation potential of Na, Mg and Si are 496, 737 and 786 kJ mol^{-1} respectively. The ionisation potential of Al will be closer to:

(A) 760 $kJmol^{-1}$ (B) 575 $kJmol^{-1}$ (C) 801$kJmol^{-1}$ (D) 419$kJmol^{-1}$

Q13. In a periodic table the basic character of oxides:

(A) increases from left to right and decreases from top to bottom.

(B) decreases from left to right and increases from top to bottom.

(C) decreases from right to left and increases from top to bottom.

(D) decreases from left to right and increases from bottom to top.

Q14. Hydrogen bonds are formed in many compounds e.g., H_2O, HF, NH_3. The boiling point of such compounds depends to a large extent on the strength of hydrogen bond and the number of hydrogen bonds: The correct decreasing order of the boiling points of above compounds is:

(A) $HF > H_2O > NH_3$ (B) $H_2O > HF > NH_3$

(C) $NH_3 > HF > H_2O$ (D) $NH_3 > H_2O > HF$

Q15. In PO_4^{3-} ion the formal charge on oxygen atom of P-O bond is:

(A) +1 (B) -1 (C) +0.75 (D)-0.75

Q16. Diamagnetic species are those which contain no unpaired electrons. Which among the following are diamagnetic?

(A) N_2 (B) N_2^{2-} (C) $\boldsymbol{O_2^-}$ (D) $\boldsymbol{O_2}$

Q17. XeF_2 is isostructural with:

(A) TeF_2 (B) ICl_2^- (C) $SbCl_3$ (D) $BaCl_2$

Q18. Syngas is a mixture of

(A) $CO_2 + H_2$ (B) $CO + H_2$ (C) $CO + N_2$ (D) $CO + O_2$

Q19. $TiH_{1.73}$ is an example of

(A) Ionic hydride (B) Covalent hydride

(C) Interstitial hydride (D) Electron rich hydride

Q20. In which of the following compounds carbon exhibit a valency of 4 but oxidation state of -2.

(A) CH_3Cl (B) $CHCl_3$ (C) CH_2Cl_2 (D) HCHO

Q21. CrO_5 has two (-O-O-) bonds. Oxidation number of Cr in CrO_5 is :

(A) +5 (B) +3 (C) +6 (D) +10

Q22. Which of the following compounds contain all the carbon atoms in the same hybridisation state?

(A) $CH \equiv C - C \equiv CH$ (B) $CH_3 - C \equiv C - CH_3$

(C) $CH_2 = C = CH_2$ (D) $CH_2 = CH - CH_2 - CH_3$

Q23. The IUPAC name of the compound $CH_3 - C(CH_3) = CH - COOH$ is

(A) 2-Methylbut-2-enoic acid (B) 3-Methylbut-3-enoic acid

(C) 3-Methylbut-2-enoic acid (D) 2-Methylbut-3-enoic acid

Q24. When $(CH_3)_3C$-, $(CH_3)_2CH$-, CH_3-CH_2- , are attached to a benzene ring or an unsaturated group, the increasing order of positive inductive effect is

(A) $(CH_3)_3C$- < $(CH_3)_2CH$- < CH_3-CH_2- (B) CH_3-CH_2-<$(CH_3)_2CH$-< $(CH_3)_3C$-

(C) $(CH_3)_2CH$- <$(CH_3)_3C$-< CH_3-CH_2- (D) $(CH_3)_3C$-< CH_3-CH_2-< $(CH_3)_2CH$-

Q25. Which of the following is a benzenoid aromatic compound?

(A) Furan (B) Thiophene (C) Pyridine (D) Aniline

SECTION-B

This section consists of 24multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

Q26. The decomposition of a certain mass of $CaCO_3$ gave 11.2 dm^3 of CO_2 gas at STP. The mass of KOH required to completely neutralize the gas is:

(A) 56g (B) 28g (C) 42 g (D) 20g

Q27. The percentage of an element M is 53 in its oxide of molecular formula M_2O_3..Its atomic mass is about:

(A) 45 (B) 27 (C) 18 (D) 36

Q28. The empirical formula and molecular mass of a compound are CH_2O and 180g respectively. What will be the molecular formula of the compound?

(A) $C_9H_{18}O_9$ (B) CH_2O (C) $C_6H_{12}O_6$ (D) $C_2H_4O_2$

Q29. The de Broglie wavelength associated with a ball of mass 1kg having kinetic energy 0.5J is:

(A) 6.626 x 10^{-34} m (B) 13.20 x 10^{-34} m

(C) 10.38 x 10^{-21}m (D) 6.676 x $10^{-34}A^0$

Q30. What is the maximum number of electrons that can be accommodated in an atom in which the highest principal quantum number is 4?

(A) 10 (B) 18 (C) 36 (D) 54

Q31. Which of the following statement is correct?

(A) Helium has the lowest first ionisation enthalpy in the periodic table.

(B) Chlorine has less negative electron gain enthalpy than fluorine.

(C) Mercury and bromine are liquid at room temperature.

(D) In any period, atomic radius of alkali metal is the lowest.

Q32. An element belongs to 3rd period and group-13 of the periodic table. Which of the following property will be shown by the element?

(A) Bad conductor of electricity (B) Liquid, metallic
(C) Solid, metallic (D) solid, non-metallic

Q33. The shape of SF_4 and XeF_2 respectively are:

(A) trigonal bipyramidal and trigonal bipyramidal
(B) see-saw and linear
(C) T-shape and linear
(D) Square planar and trigonal bipyramidal

Q34. Which of the following compound contains ionic, covalent and co-ordinate bonds?

(A) NaOH (B) NaCl (C) NaCN (D) NaNC

Q35. In which of the following compounds, an element exhibits two different oxidation states.

(A) NH_2OH (B) NH_4NO_3 (C) N_2H_4 (D) N_3H

Q36. Identify disproportionation reaction

(A) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ (B) $CH_4 + 4C1_2 \rightarrow CC1_4 + 4HCl$
(C) $2F_2 + 2OH^- \rightarrow 2F^- + OF_2 + H_2O$ (D) $2NO_2 + 2OH^- \rightarrow \boldsymbol{NO_2^-} + NO^-_3 + H_2O$

Q37. Consider the following reaction:

$x\ MnO_4^- + y\ C_2O_4^{2-} + z\ H^+ \rightarrow xMn^{2+} + 2yCO_2 + z/2\ H_2O$

The values of x, y, z in the reaction are respectively:

(A) 5, 2 and 8 (B) 5,2 and 16
(C) 2,5 and 8 (D) 2, 5 and 16

Q38. Which is used as a moderator in nuclear reactor?

(A) H_2O (B) Alum (C) D_2O (D) None of these

Q39. Which of the following series contains only electrophiles

(A) H_2O, SO_3, H_3O^+ (B) NH_3 , H_2O,$AlCl_3$
(C) $AlCl_3$, SO_3 NO_2^+ (D) H_2O,Cl^+, NH_3

Q40. Propanone and propanal are pair of

(A) Position isomer (B) chain isomer
(C) Functional isomer (D) Metamer

Q41. The structure of the isobutyl group is

(A) $CH_3 - CH_2 - CH_2 - CH_2 -$
(B) $CH_3 - C(CH_3)_2 -$
(C) $(CH_3)_2CH - CH_2 -$
(D) $CH_3 - CH_2 - CH_2 - CH_3$

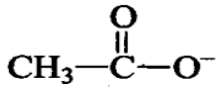
Q42. Hyper conjugation is most useful for stabilizing which of the following carbocation?

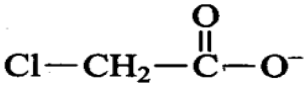
(A) Methyl (B) Tert. butyl (C) Neopentyl (D) Isopropyl

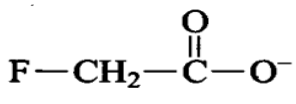
Q43. Identify the correct statement in the following:

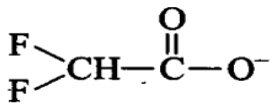
(A) Dimethyl ether and ethanol are chain isomers.
(B) Ethanoic acid and methyl methanoate are position isomers
(C) n-Butane and isobutane are functional isomers.
(D) Propan-1-ol and propan-2-ol are position isomers.

Q44. Ionic species are stabilized by the dispersal of charge. Which of the following carboxylate ions is the most stable?

(A) 

(B) 

(C) 

(D) 

Q45. Given below are two statements labelled as Assertion(A) and reason (R). Select the most appropriate answer from the options given below:
Assertion(A): Atomic mass of sodium is 23 u.
Reason (R): An atom of sodium is 23 times heavier than an atom of carbon-12 isotope.
(A) Both A and R are true and R is correct explanation of A.
(B) Both A and R are true but R is not correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

Q46. Given below are two statements labelled as Assertion(A) and reason (R). Select the most appropriate answer from the options given below:
Assertion(A): The energy of an electron is largely determined by its principal quantum number**.**
Reason (R): The principal quantum number (n) is a measure of the most probable distance of finding the electron around the nucleus.
(A) Both A and R are true and R is correct explanation of A.
(B) Both A and R are true but R is not correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

Q47. Given below are two statements labelled as Assertion(A) and reason (R). Select the most appropriate answer from the options given below:
Assertion(A): F is more electronegative than Cl.
Reason (R): F has higher electron affinity than Cl.
(A) Both A and R are true and R is correct explanation of A.
(B) Both A and R are true but R is not correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

Q48. Given below are two statements labelled as Assertion (A) and reason (R). Select the most appropriate answer from the options given below:

Assertion (A): The sulphur in SO_2 is sp^2 hybridized.

Reason (R): SO_2 has linear electron pair geometry.

(A) Both A and R are true and R is correct explanation of A.

(B) Both A and R are true but R is not correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

Q49. Given below are two statements labelled as Assertion(A) and reason (R). Select the most appropriate answer from the options given below:

Assertion(A): Heterolytic bond cleavage readily occurs in polar covalent bonds.

Reason (R) : Heterolytic bond fission occurs in such a way that the shared pair of electrons goes with one atom.

(A) Both A and R are true and R is correct explanation of A.

(B) Both A and R are true but R is not correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

SECTION-C

This section consists of 6 multiple choice questions with an overall choice to attempt any 5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

Q50. If 30 mol of H_2 and 20 mol of O_2 react to form water, what is left at the end of the reaction?

(A) 10 mol of H_2 (B) 5 mol of H_2 (C) 10 mol of O_2 (D) 5 mol of O_2

Q51. What is the mass percentage of carbon in carbon dioxide?

(A) 0.034% (B) 27.27% (C) 3.4% (D) 28.7%

Q52. Which one of the following statements is correct?

(A) Melting point and boiling point of HI are greater than those of HF.

(B) Boiling point of HI is less than that of HF but melting point of HI is greater than that of HF.

(C) Boiling point of HI is greater than HF but melting point of HI is less than that of HF.

(D) Melting point and boiling point of HI are less than that of HF.

CASE1: Read the passage given below and answer the following questions 53-55

In chemistry, molecular orbital theory is a method for describing the electronic structure of molecules using quantum mechanics. It was proposed early in the 20th century. Molecular Orbital Theory is primarily used to explain the bonding in molecules that cannot be explained by Valence Bond Theory. *Molecular orbital*

theory is more powerful than valence-bond theory because the orbitals reflect the geometry of the molecule to which they are applied.

Molecular orbital theory was developed in the years after valence bond theory had been established (1927), primarily through the efforts of Friedrich Hund, Robert Mulliken, John C. Slater, and John Lennard-Jones. MO theory was originally called the Hund-Mulliken theory. According to physicist and physical chemist Erich Huckel, the first quantitative use of molecular orbital theory was the 1929 paper of Lennard-Jones. By 1933, the molecular orbital theory had been accepted as a valid and useful theory.

The following questions are multiple choice questions. Choose the most appropriate answer:

Q53. Arrange the following molecules in decreasing bond length.

(A) $O_2 > O_2^- > O_2^+ > O_2^{2-}$ (B) $O_2^{2-} > O_2^- > O_2 > O_2^+$

(C) $O_2^{2-} > O_2^- > O_2^+ > O_2$ (D) $O_2^- > O_2^+ > O_2^{2-} > O_2$

Q54. Arrange the following molecules in the order of increasing stability.

(A) $N_2^+ < N_2 < N_2^- < N_2^{2-}$ (B) $N_2^{2-} < N_2^- < N_2 < N_2^+$

(C) $N_2^{2-} < N_2^- = N_2^+ < N_2$ (D) $N_2 < N_2^+ = N_2^- < N_2^{2-}$

Q55. Choose the incorrect statement from the following options.

(A) In bonding molecular orbital, electron density is low in the region between the nuclei of bonded atoms

(B) The energy of antibonding molecular orbital is higher than that of atomic orbitals from which it is formed

(C) Every electron in bonding molecular orbital contributes toward stability of the molecule

(D) Antibonding takes place when lobes of atomic orbitals have different signs.

******* ALL THE BEST *******