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| **HY/CH/1119A 04/12/2019** | | | | | |
| **HALF YEARLY EXAMINATION- I (2019-20)** | | | | | |
| **Subject: CHEMISTRY**  **Grade: XI** | | Max. Marks: 70Time: 3 Hrs | | | |
| **Name:** | | | **Section:** | **Roll No:** | |
| ***General Instructions:***  *(a) All questions are compulsory.*  *(b) Section A: Q.no. 1 to 20 are very short answer questions (objective type) and carry 1 mark each.*  *(c) Section B: Q.no. 21 to 27 are short answer questions and carry 2 marks each.*  *(d) Section C: Q.no. 28 to 34 are long answer questions and carry 3 marks each.*  *(e) Section D: Q.no. 35 to 37 are also long answer questions and carry 5 marks each.*  *(f) There is no overall choice. However an internal choice has been provided in two questions of two marks,*  *two questions of three marks and all the three questions of five marks weightage. You have to attempt*  *only one of the choices in such questions.*  *(g) Use log tables if necessary, use of calculators is not allowed.*   * *This question paper consists of 5 printed pages.* * *All answers to be written in the answer sheet provided.* | | | | | |
|  | **SECTION – A** | | | |  |
|  | **Read the given passage and answer the questions 1 to 5 that follow:** | | | |  |
|  | Given the standard electrode potentials, Zn2+/Zn = – 0.76 V, Ag+/Ag = 0.80 V, Fe2+/Fe = 0.44 V Cu2+/Cu = 0.34 V. Cr3+/Cr = – 0.74V | | | |  |
| 1. | Arrange these metals in their increasing order of reducing power. | | | | 1 |
| 2. | Arrange Cu, Fe, Ag and Zn. in the order in which they displace each other from the solution of their salts. | | | | 1 |
| 3. | Find Ecell0 value for 2Ag(s) + Cu2+(aq) 🡪 2Ag + (aq) + Cu(s)and predict the reaction is feasible or not. | | | | 1 |
| 4. | A galvanic cell in which the reaction Zn(s) + 2Ag+(aq) → Zn2+(aq) +2Ag(s) takes place, which of the electrode is negatively charged? | | | | 1 |
| 5. | Write two functions of salt bridge. | | | | 1 |
|  | **Questions 6 to 10 are one-word answers:** | | | |  |
| 6. | 1. Using s, p, d notations, describe type orbital with the following quantum numbers :   i) n=3 ; *l*=2 ii) n=3 ; *l*= 0  Or  What is the maximum number of electrons that can be accommodated in an orbital with  n= 4, m*l* = +3? | | | | 1 |
| 7. | Arrange H2O, CH4 and NH3 in the increasing order of bond angle. | | | | 1 |
| 8. | 1. Describe the change in hybridisation (if any) of the Al atom in the following reaction.  *AlCl3 + Cl**– → AlCl4****-*** | | | | 1 |
| 9. | How many primary carbons are there in the following hydrocarbon?  Or  Write the bond line structural formulae for CH3-CH2-CH2-CH2-CO-CH2Br | | | | 1 |
| 10. | Write IUPAC names of C6H5-CH=CH-CHO. | | | | 1 |
|  | **Question number 11-15 are Multiple Choice Questions:**  **Note:** In the following questions only one options is correct | | | |  |
| 11. | Number of π bonds and σ bonds in the following structure is– Chemical Bonding and Molecular Structure   * (i) 6, 19 * (ii) 4, 20 * (iii) 5, 19 * (iv) 5, 20 | | | | 1 |
| 12. | 1. In NO3*-* ion, the number of bond pairs and lone pairs of electrons on nitrogen atom are    * (i) 2, 2    * (ii) 3, 1    * (iii) 1, 3   (iv) 4, 0 | | | | 1 |
| 13. | 1. In an electrophilic substitution reaction of nitrobenzene, the presence of nitro group -    * (i) deactivates the ring by inductive effect.    * (ii) activates the ring by inductive effect.    * (iii) decreases the electron density at ortho and para position of the ring relative to meta position by resonance.    * (iv) increases the electron density at meta position relative to the ortho and para positions of the ring by resonance. | | | | 1 |
| 14. | 1. One mole of any substance contains 6.022 × 1023 atoms/molecules. Number of molecules of H2SO**4** present in 100 mL of 0.02M H2SO4 solution is-    * (i) 12.044 × 1020 molecules    * (ii) 6.022 × 1023 molecules    * (iii) 1 × 1023 molecules    * (iv) 1.2044 × 1020 molecules | | | | 1 |
| 15. | 1. The first ionisation enthalpies of Na, Mg, Al and Si are in the order:    * (i) Na < Mg > Al < Si    * (ii) Na > Mg > Al > Si    * (iii) Na < Mg < Al < Si    * (iv) Na > Mg > Al < Si | | | | 1 |
|  | **Question number 16-20 are assertion-Reason based questions:**  **Note :** In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.   1. Both assertion and reason are true, and reason is the correct explanation of the assertion. 2. Both assertion and reason are true but reason is not the correct explanation of assertion. 3. Assertion is true but reason is not true. 4. Assertion is not true but reason is true. | | | |  |
| 16. | **Assertion:** Sodium metal and Sodamide (NaNH2) are strong bases. They react with ethyne to form sodium acetylide with the liberation of dihydrogen gas  **Reason:** These reactions are not shown by ethene and ethane. | | | | 1 |
| 17. | 1. **Assertion (A) :** Generally, ionisation enthalpy increases from left to right in a period. **Reason (R) :** When successive electrons are added to the orbitals in the same principal quantum level, the shielding effect of inner core of electrons does not increase very much to compensate for the increased attraction of the electron to the nucleus. | | | | 1 |
| 18. | **Assertion:** Toluene on Friedel Crafts methylation gives o– and p–xylene. **Reason (R)** : OH - group bonded to benzene ring increases electron density at o– and p– position. | | | | 1 |
| 19. | **Assertion:** The Shape of NH3 is trigonal planar  **Reason (R)** : In NH3 one lone pair and three bond pairs are present and due to the repulsion between lp-bp (which is more than bp-bp repulsion) the angle between bond pairs is reduced to 107° from 109.5°. | | | | 1 |
| 20. | **Assertion:** The observed order of carbocation stability is: (CH3)2 CH+ > (CH3)3C+.  **Reason:** Hyperconjugation interaction in (CH3)3C+ is lesser than in CH3)2 CH+ | | | | 1 |
|  | **SECTION – B** | | | |  |
| 21. | 1. What are the two necessary conditions to show geometrical isomerism? 2. Why is benzene extraordinarily stable though it contains three double bonds? Or   Explain the following with the help of suitable equation.   1. Friedal craft acylation 2. Wurtz reaction | | | | 2 |
| 22. | Addition of HBr to propene yields 2-bromopropane. Give mechanism of the reaction involved. | | | | 2 |
| 23. | 1. Butanal and butanone are the ozonolysis products of an alkene? What is the structural formula of the alkene? 2. Explain why the following systems is not aromatic? | | | | 2 |
| 24. | Explain why NH3 is pyramidal whereas CH­4 is tetrahedral although both nitrogen and carbon in NH3 and CH4 are sp3 hybridised?  Or  Predict the shapes of the following molecules/ions using VSEPR Theory: (i) BrF5 (ii) XeF4 | | | | 2 |
| 25. | Calcium carbonate reacts with aqueous HCl to give CaCl2 and CO2 according to the reaction, CaCO3 (s) + 2 HCl (aq) → CaCl2 (aq) + CO2(g) + H2O(l) What mass of CaCO3 is required to react completely with 25 mL of 0.75 M HCl? | | | | 2 |
| 26. | Write electronic configuration of Cr3+ and Al 3+ | | | | 2 |
| 27. | What are the quantum numbers for?   1. 19th electron of K 2. 21st electron of Sc | | | | 2 |
|  | **SECTION – C** | | | | 3 |
| 28. | How will you convert benzene into  (i) p-nitrobromobenzene  (ii) m- nitrochlorobenzene  (iii) p – nitrotoluene | | | | 3 |
| 29. | Balance the given redox equation in acidic medium by Half - Reaction method ( Ion – Electron method ) :  *Cr2O72**– ( aq )  + SO2(g) → Cr 3+( aq ) + SO42**– ( aq )*  OR  Balance the given redox equation in basic medium by Half - Reaction method ( Ion – Electron method ) :  *MnO4 – (aq) + I – (aq) → MnO2 (s) + I2(s)* | | | |  |
| 30. | What is resonance? Draw the resonating structures for Aniline showing electron shift using curved arrow notation. | | | | 3 |
| 31. | Give reason of the following   1. Halogens have the highest negative electron gain enthalpies in their respective periods. 2. The second ionization enthalpy of an element is higher than the first ionization enthalpy. 3. Cations are smaller in radii than their parent atom. | | | | 3 |
| 32. | 1. Write structural formulae of 2 – Formylbut – 3 - enenitrile 2. Chloroethanoic acid is stronger acid than ethanoic acid. Explain. 3. What are electrophiles Explain with examples   Or   1. Which of the two: O2NCH2CH2O– or CH3CH2O– is expected to be more stable and why ? 2. Write structural formula of 3-hydroxybutanoyl chloride 3. What are nucleophiles ? Explain with examples | | | | 3 |
| 33. | 1. H2O is polar but CO2 is non polar. Give reason 2. Out of NaCl and MgO, which has higher value of lattice energy and why? 3. Why is water liquid whereas H2S is a gas at room temperature?   Or   1. Which compound from each of the following pairs is more covalent and why? i. CuO or CuS ii. PbCl2 or PbCl4 2. Write the favourable factors for the formation of ionic bond. | | | | 3 |
| 34. | State the following with suitable example   1. Hund’s Rule of Maximum Multiplicity 2. Aufbau Principle 3. Pauli Exclusion Principle | | | | 3 |
|  | **SECTION – D** | | | |  |
| 35. | a. Which of the following has the highest boiling point? Why?  2-Methyl pentane, 2,3-Dimethyl butane, 2,2 - Dimethyl butane b. Arrange ethene, ethane and ethyne in decreasing order of acidic behaviour. Also give reason for this behaviour. c. A hydrocarbon 'A' adds one mole of hydrogen in the presence of Pt as catalyst to form n-hexane. 'A' is oxidized vigorously with KMnO4, a single carboxylic acid containing three carbon atoms is isolated. Give the structure and name of 'A' and explain the reactions.  Or  What happens when ( write the reaction involved) –   1. Bromobutane is treated with alcoholic potassium hydroxide 2. Sodium propanoate solution is electrolyzed 3. 3-methylpent-2-ene reacts with acidic KMnO4 4. Propyne reacts with water in the presence of H2SO4 and HgSO4 5. Ethyne is passes through red hot iron tube at 873K | | | | 5 |
| 36. | 1. Calculate the bond order of : N2 and O2 . Which is more stable at room temperature and why. 2. Draw diagrams showing the formation of a double bond and a triple bond between carbon atoms in C2H4 and C2H2 molecules.    1. Or 3. Use molecular orbital theory to explain why the Ne2 molecule does not exist. 4. Which hybrid orbitals are used by carbon atoms in the following molecules ?  (a) CH3 –CH=CH2 ; (b) CH3 -CHO 5. Describe the hybridisation in case of PCl5. Why are the axial bonds longer as compared to equatorial bonds? | | | | 5 |
| 37. | 1. 50g of Na2CO3 is treated with 200ml of M/5 solution of HCl. Find out the volume of CO2 evolved at S.T.P. Which substance is acting as the limiting reagent? 2. Calculate the Molality of 2 M aq solution of NaNO3(density of solution = 1.5 gm / cm3)?   Or   1. A sample of drinking water was found to be severely contaminated with chloroform, CHCl3, supposed to be carcinogenic in nature. The level of contamination was 15 ppm (by mass).  (a) Express this in percent by mass.  (b) Determine the molality of chloroform in the water sample 2. Calculate the Molarity of 4 m aq solution of NaNO3. (density of solution = 1.5 gm / cm3) | | | | 5 |

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