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| **FT/CHQP/1123/A 15-JUN-2023** | | | | | | |
| **FIRST TERM EXAMINATION (2023-24)** | | | | | | |
| **Subject: CHEMISTRY**  **Grade: XI** | | **Max. Marks:70**  **Time: 3Hrs** | | | | |
| **Name:** | | | **Section:** | **Roll No:** | | |
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|  | **SECTION A** | | | | | |
| 1 | Which of the following cannot be represented by resonance?   1. Dimethyl ether 2. Toluene 3. Phenol 4. Carboxylate anion | | | | 1 | |
| 2 | The structure of 4-Methylpent-2-en-1-ol is:   1. CH3CH2CH=CHCH2OH 2. (CH3)2C=CHCH2CH2OH 3. (CH3)2CHCH=CHCH2OH 4. CH3CH(OH)CH-CH=C(CH3)2 | | | | 1 | |
| 3 | The addition of carbonyl compound to HCN is an example of   1. Nucleophilic substitution 2. Electrophilic addition 3. Nucleophilic addition 4. Electrophilic substitution | | | | 1 | |
| 4 | Which of the following is a temporary effect?   1. Electrometric effect 2. Resonance 3. Hyperconjugation 4. None of the above | | | | 1 | |
| 5 | Choose the odd one from the following:   1. Position isomerism 2. Geometrical isomerism 3. Chain isomerism 4. Functional group isomerism | | | | 1 | |
| 6 | Which of the following contains the carbonyl group?   1. Aldehyde 2. Ketone 3. Ester 4. All of the above | | | | 1 | |
| 7 | **Identify the following compound.**       1. propan-2-al 2. propanone 3. propanal 4. Ethanol | | | | 1 | |
| 8 | If the concentration of glucose (C6H12O6) in blood is 0.9 g L–1, what will be the  molarity of glucose in blood?  a) 5 M  b) 50 M  c) 0.005 M  d) 0.5 M | | | | 1 | |
| 9 | Classify the compound based on the functional group present.     1. Ketone 2. Carboxylic acid 3. Ester 4. Ether | | | | 1 | |
| 10 | The volumes of hydrogen & oxygen when combined in a simple ratio of 2:1. This is explained by \_\_\_\_\_\_\_\_  a) Law of Multiple Proportions  b) Avogadro’s Law  c) Law of Definite Proportion  d) Gay Lussac’s Law of Gaseous Volumes | | | | 1 | |
| 11 | Two samples of lead oxide were separately reduced to metallic lead by heating in a current of hydrogen. The lead weight from one oxide was half the weight obtained from the other oxide. The data illustrates:   1. Law of reciprocal proportions 2. Law of definite proportion 3. Law of multiple proportions 4. Law of constant proportion | | | | 1 | |
| 12 | 6.02 ×1020 molecules of urea are present in 100 mL of its solution. The concentration of the solution is-   1. 0.02 M 2. 0.01 M 3. 0.001 M 4. (d) 0.1 M | | | | 1 | |
| 13 | Choose the correct answer out of the following choices.   1. Assertion and reason both are correct statements and reason is the correct explanation for assertion. 2. Assertion and reason both are correct statements, but reason is not correct explanation for assertion. 3. Assertion is a correct statement, but the reason is wrong statement. 4. Assertion is a wrong statement, but the reason is correct statement   **Assertion:**The empirical mass of ethene is half of its molecular mass. **Reason:** The empirical formula represents the simplest whole-number ratio of various atoms present in a compound | | | | 1 | |
| 14 | **Assertion**: No of moles of H2 in 0.224 L of hydrogen is 0.01 mole.  **Reason**: 22.4 L of H2 at STP contain 6.023 × 1023 moles: | | | | 1 | |
| 15 | **Assertion:** The energy of resonance hybrid is equal to the average of energies of all canonical forms. **Reason:**  Resonance hybrid cannot be presented by a single structure. | | | | 1 | |
| 16 | **Assertion:** But-1-ene and 2-methylprop-1-ene are position isomers. **Reason:**  Position isomers have the same molecular formula but differ in position of the functional group or C = C. | | | | 1 | |
|  | **SECTION B** | | | |  | |
| 17 | 100g of H 2 reacts with 100g of oxygen to form water. Identify the limiting reagent. Find out the mass of water obtained. | | | | 2 | |
| 18 | Arrange the following compounds in the increasing order of acid strength?  **(i)**  CI3C-COOH, NO2CH2COOH  **(ii)**  CH3CHFCH2COOH , CH3CH2CHFCOOH, F-CH2CH2CH2COOH | | | | 2 | |
| 19 | Hydrogen gas is prepared in the lab by reacting dilute HCl with zinc.  Zn+2HCl→ZnCl2+ H2  Calculate the volume of hydrogen gas liberated at STP when 32.65 g of zinc reacts with HCl. (Atomic mass of Zn = 65.3 u) | | | | 2 | |
| 20 | 1. Define inductive effect. 2. In which C–C bond of CH3CH2CH2Br, the inductive effect is expected to be the least.   **OR**  a) Define the electromeric effect.  b) Why is resonance hybrid more stable than resonating structures? | | | | 2 | |
| 21 | Giving justification, categorize the following molecules/ions nucleophile or electrophile.  BF3, H2O, NO2+ C2 H5O- | | | | 2 | |
|  | **SECTION C** | | | |  | |
| 22 | 1. Out of molarity and molality, which one is a better method for determining the concentration of a solution and why? 2. How many grams of KClO3 must be decomposed to prepare 3.36 liters of oxygen at STP?2KClO3 → 2KCl + 3O2(K=39u , Cl=35.5u , O =16u) | | | | 3 | |
| 23 | Commercially available sulphuric acid contains 93% by mass and has a density of  1.84 g/cm3 . Calculate the molarity of the solution and the volume of concentrated acid required to prepare 2.5L of 0.50 M of H2SO4. | | | | 3 | |
| 24 | Draw the resonance structures of  (i)CH3COO-  (ii) C6H5NH2 | | | | 3 | |
| 25 | a) State law of multiple proportions.  b) C and O combine to give two compounds in which the percentage of carbon in the first compound is 42.9% and 27.3% in the second compound. Show that the data follows the law of multiple proportions.  **OR**   1. Define atomic mass unit. 2. The average atomic mass of a sample of an element X is 16.2 U. What are the percentages of isotopes 16X and 18X in the sample? (atomic number of X is 8) | | | | 3 | |
| 26 | Calculate the molality of 2 M solution of sodium nitrate (NaNO3). The density of solution is 1.25g/cm3. | | | | 3 | |
| 27 | 1. Draw all the possible metamers of the given compound(ether) C4H10O? 2. CH2=CH−CHO is more stable than CH3CHO. 3. Ammonia and water can act as nucleophiles despite of the absence of negative charges. | | | | 3 | |
| 28 | Write the bond line formulae for the following:  a) C4H8O2  b) CH3-CH2-CH2-CH2-CO-CH2Br  c) CNCH2CH2CN | | | | 3 | |
| 29 | **SECTION D**  Read the given passage and answer the questions that follow:  Stoichiometry is a section of chemistry that involves calculations based on chemical equations. Chemical equations are governed by laws of chemical combination. Mass of reactants is equal to mass of products. Compound obtained from different methods contain the same elements in the fixed ratio by mass. Mole is a counting unit, equal to 6.022 × 1023 particles. One mole is also equal to molar mass expressed in grams. One mole of every gas at STP has volume equal to 22.4 L. The reacting species which are consumed in the reaction completely is called limiting reagent which decides the amount of products formed. Using stoichiometric calculations, the amount of one or more reactant(s) required to produce a particular amount of product can be determined and vice-versa. The amount of substance present in a given volume of a solution is expressed in a number of ways, e.g., mass per cent, mole fraction, molarity and molality.  In the reaction 2A(g) + 4B(g) → 3C(g) +4D(g)  When 5 moles of A react with 6 moles of B, then:   1. Which is the limiting reagent? 2. Calculate the amount of C formed. 3. Define mole fraction. 4. What is the effect of temperature on the molarity of the solution? | | | | 4 | |
| 30 | There are many organic molecules whose behavior cannot be explained by a single Lewis structure. The resonance structures (canonical structures or contributing structures) are hypothetical and individually do not represent any real molecule. They contribute to the actual structure in proportion to their stability. Resonance is particularly important when the contributing structures are equivalent in energy.  The hyperconjugation effect is a long-term phenomenon in which electrons of an alkyl group’s C-H bond are permanently isolated to an unsaturated system atom or an atom with an unshared p orbital. Hyperconjugation is the reason for the stabilization of carbocation so that it allows the spreading of the positive charge.   1. Draw hyperconjugation structures of propene. 2. Write resonance structures of CH2=CH–CHO. Indicate the relative stability of the contributing structures. | | | | 4 | |
|  | **SECTION E** | | | |  | |
| 31 | 1. Write two points of differences between homolytic and heterolytic fission. 2. Identify the type of isomerism exhibited by the following compounds.   i))Butane ii)) Pentene iii) C3H6O  **OR**   1. What is carbocation? 2. Draw and Explain the Shape of methyl cation. 3. Why stability of carbocations follows the order: tertiary>secondary>primary? | | | | 5 | |
| 32 | 1. How are 0.50 mol Na2CO3 and 0.50 M Na2CO3 different? 2. Dinitrogen and dihydrogen react with each other to produce ammonia according to the following chemical equation:   N2 (g) + H2 (g) → 2NH3 (g)  (i) Calculate the mass of ammonia produced if 2.00 × 103 g dinitrogen reacts with  1.00 ×103 g of dihydrogen.  (ii) Will any of the two reactants remain unreacted?  (iii) If yes, which one and what would be its mass?  **OR**   1. What will be the mass of one 12C atom in g? 2. Two bottles of A and B contain 1M and 1m aqueous solutions (d=1g/ml) of sulphuric acid respectively. Which one is more concentrated and why?   c)A compound contains 4% hydrogen, 24%carbon and 71.65% chlorine. Its molar mass  is 98.9g, what are its empirical and molecular formulae? | | | | 5 | |
| 33 | 1. Write IUPAC name of following 2. C6H5 CH2COOH 3. CH3CH(OCH3)CHO       2. Write the structure of the following 3. 3-oxopentanal 4. 2,4-dimethylpentan3-one   **OR**   1. Write IUPAC name of following:   i)  ii)   1. HOOC-COOH 2. Write the structure of the following. 3. But-2-enal 4. 3-Methylcyclopentanone | | | | 5 |

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