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| **HY/CHQP/1122/D 13-OCT-2022** | | | | | |
| **HALF YEARLY EXAMINATION (2022-23)** | | | | | |
| **Subject: CHEMISTRY**  **Grade: XI** | | Max. Marks:70Time: 3 Hrs | | | |
| **Name:** | | | **Section:** | **Roll No:** | |
| ***General Instructions:***  GENERAL INSTRUCTIONS: Read the following instructions carefully.  1. There are 37 questions in this question paper.  2. SECTION A - Q. No. 1 to 10 are multiple choice questions carrying 1mark each.  3. SECTION B - Q. No. 11 to 20 are very short answer questions carrying 1 mark each.  4. SECTION C- Q. No. 21 to 27 are short answer questions carrying 2 marks each.  5. SECTION D- Q. No. 28 to 34 are short answer questions carrying 3 marks each.  5. SECTION E- Q. No. 35 to 37 are long answer question carrying 5 marks.  6. All questions are compulsory.  7. Use of calculators is not allowed | | | | | |
|  | **SECTION A** | | | | |
| 1 | If the concentration of glucose (C6H12O6) in blood is 0.9 g L–1 , what will be the molarity of glucose in blood?   1. 5 M 2. 50 M 3. 0.005 M 4. 0.5 M | | | | 1 |
| 2 | Correct set of four quantum numbers for the valence electron of rubidium ( Z = 37) is :   1. 5, 0, 0, + 1/2 2. 5,1, 0, +1/2 3. 5, 1, 1, +1/2 4. 6, 0, 0, + ½ | | | | 1 |
| 3 | Which of the following molecules has maximum bond angle :   1. NH3 2. CH4 3. H2O 4. CO2 | | | | 1 |
| 4 | 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. 0.1 M | | | | 1 |
| 5 | In the reaction 6ClO2 – —→ 4ClO3 – + 2Cl–, Cl– ion is   1. Oxidised and Reduced 2. Reduced 3. Oxidized 4. Neither Oxidised nor reduced | | | | 1 |
| 6 | Which one undergoes disproportionation reaction?   1. HNO3 2. H2O 3. ClO4 – 4. ClO2 – | | | | 1 |
| 7 | Which of the following is dependent of temperature ?   1. Molarity 2. Molality 3. Mole fraction 4. Mass percentage | | | | 1 |
| 8 | Identify the molecule having sideways overlapping of atomic orbitals:   1. CH4 2. CO2 3. NH3 4. H2O | | | | 1 |
| 9 | The oxidation state of Fe in Fe3O4 is :   1. +2 2. + 3 3. 8/ 3 4. + 2, + 3 | | | | 1 |
| 10 | The shape of XeF4 molecule according to VSEPR theory is:   1. Square planar 2. Square pyramid 3. Tetrahedral 4. Pyramidal | | | | 1 |
|  | **SECTION B** | | | |  |
| 11 | At what concentration of Cu2+ (aq.) will electrode potential become equal to its standard electrode potential ? | | | | 1 |
| 12 | Explain why BeH2 molecule has zero dipole moment although the Be–H bonds are polar? | | | | 1 |
| 13 | Write the maximum number of electron in a subshell with l = 3 and n = 4. | | | | 1 |
| 14 | Which one is having higher energy?  n = 4, l = 3 or n = 5, l = 2. | | | | 1 |
| 15 | Using Stock notation, represent HAuCl4. | | | | 1 |
| 16 | Boiling point of p-nitrophenol is more than O-nitrophenol why? | | | | 1 |
| 17 | 1L of a gas at STP weighs 1.97g. What is molecular mass ? | | | | 1 |
| 18 | The displacement reactions of halogens using fluorine are not generally carried out in aqueous solution. Why? | | | | 1 |
| 19 | Give one example each of a molecule in which empirical formula and molecular formula is (i) Same (ii) Different. | | | | 1 |
| 20 | HNO3 acts as oxidizing agent while HNO2 can act both as reducing and oxidizing agent. Why? | | | | 1 |
|  | **SECTION C** | | | |  |
| 21 | A compound with molar mass 180g/mol contains C, H and O in the molar ratio 1:2:1. What are its empirical and molecular formulae? | | | | 2 |
| 22 | What are the quantum numbers for?  a) 2p electrons in Nitrogen  b) 19th electron of chromium | | | | 2 |
| 23 | Draw the Lewis structure and calculate the formal charge on all elements of CO3 2− ion. | | | | 2 |
| 24 | Assign reasons for the following:   1. B2 is paramagnetic while C2 is diamagnetic. 2. H2 and F2 are nonpolar whereas HF is polar | | | | 2 |
| 25 | 1. Arrange the following in increasing order of energy for hydrogen 1s, 3s, 2p, 3p, 2s. 2. Calculate the atomic number of an element having 4s2 4p6 configuration in its last orbit? | | | | 2 |
| 26 | 1. What do you understand by the term dipole moment? Give its SI units 2. Why is water liquid whereas H2S is a gas at room temperature? | | | | 2 |
| 27 | Calculate the momentum of a particle, which has a de Broglie wavelength of 1A0 | | | | 2 |
|  | **SECTION D** | | | |  |
| 28 | N2 molecule has greater bond dissociation energy than N2+ ion whereas O2 molecule has lower bond dissociation energy than O2+ ion. Explain in terms of MO theory. | | | | 3 |
| 29 | Account for the following:   1. Cr has electronic configuration [Ar]3d5 4s1 and not [Ar]3d4 4s2 2. In building up of atoms, the filling up of 4s orbitals takes place before the 3d orbitals. 3. The ground state configuration of Nitrogen is not written as 1s2 2s2 2px2 2py1 2pz0 | | | | 3 |
| 30 | Predict the shapes of the following molecules/ions using VSEPR Theory:   1. BrF5 2. XeF4 3. NH4 + | | | | 3 |
| 31 | 1. State Heisenberg’s Uncertainty Principle. 2. Which of the two, an electron or a neutron will show more accuracy in its position, if there is an equal uncertainty in their velocities? [ mass of electron = 9.1 × 10 – 31 Kg; mass of proton = 1.67 × 10 – 27 Kg] | | | | 3 |
| 32 | Commercially available sulphuric acid contains 93% by mass and has a density of 1.84g/cm3 . Calculate : (i)molarity of the solution (ii)volume of concentrated acid required to prepare 2.5L of 0.50 M H2SO4 | | | | 3 |
| 33 | Balance the following reaction in basic medium:  Al(s) + MnO4¯ (aq) ⎯→ MnO2(s) + Al(OH)4¯ (aq) | | | | 3 |
| 34 | Phosphorous and chlorine form two compounds. The first compound containing 22.54% by mass of phosphorous and 45.08% by mass of chlorine. In the second compound the percentages are 14.88 for phosphorous and 59.52 for chlorine. Show that this data is consistent with the law of multiple proportions. | | | | 3 |
|  | **SECTION E** | | | |  |
| 35 | 1. Why are 2d and 3f orbitals not possible? 2. What is the significance of ψ2 ? 3. Calculate the uncertainty in the velocity of wagon of mass 2000 kg whose position is known to an accuracy of + 10m.   **OR**   1. Which orbital experiences the lowest effective nuclear charge? i) 1s or 2s ii) 3p or 4p 2. Calculate the frequency and wavelength of the radiation in nanometers emitted when an electron in the hydrogen atom jumps from third orbit to the ground state. In which region of the electromagnetic spectrum will this line lie? | | | | 5 |
| 36 | 1. What is a limiting reagent? 2. Which out of the two weighs more – 32 g of oxygen or 0.5 moles of iron? 3. Boron occurs in nature in the form of two isotopes, 5 B 11 and 5 B 10 , having an average atomic mass of 10.81. Find the % abundance of the two isotopes.   **OR**   1. **H**ow many atoms are present in 52 u of He? 2. State the law of multiple proportion. 3. A mixture of 100g of H2 and 100g of O2 is ignited to form water. Identify the limiting reagent and calculate the amount of water formed. | | | |  |
| 37 | 1. Out of NaCl and MgO, which has higher value of lattice energy and why? 2. Explain the hybridization and shape of ethyne.   **OR**   1. The bond angles in PF5 are 90o and 120o while all bond angles in PF6 -  are 90o . Explain based on VSEPR theory. 2. Explain why NH3 is pyramidal whereas CH4 is tetrahedral although both nitrogen and carbon in NH3 and CH4 are sp3 hybridized? | | | |  |

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