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| **HY/CHAK/1122/D 13-OCT-2022** | | | |
| **HALF YEARLY EXAMINATION (2022-23)** | | | |
| **Subject: CHEMISTRY(ANSWER KEY)**  **Grade: XI** | | Max. Marks:70Time: 3Hrs | |
|  | **SECTION A** | | |
| 1 | (d)0.5 M | | 1 |
| 2 | 1. 5, 0, 0, + 1/2 | | 1 |
| 3 | (d)CO2 | | 1 |
| 4 | (b)0.01 M | | 1 |
| 5 | (d)Neither Oxidised nor reduced | | 1 |
| 6 | (d)ClO2 – | | 1 |
| 7 | 1. Molarity | | 1 |
| 8 | (b)CO2 | | 1 |
| 9 | (d)+ 2, + 3 | | 1 |
| 10 | 1. Square planar | | 1 |
|  | **SECTION B** | |  |
| 11 | 1M | | 1 |
| 12 | Dipole moments of each H–Be bond are equal and are in opposite directions. Therefore, they nullify each other | | 1 |
| 13 | 14 | | 1 |
| 14 | n = 5, l = 2. | | 1 |
| 15 | HAu(III)Cl4. | | 1 |
| 16 | p-nitrophenol is held by strong intermolecular H-bonding while O-nitrophenol has weak forces between them due to intramolecular H-bonding. | | 1 |
| 17 | 44.128 g | | 1 |
| 18 | Fluorine is so highly reactive that it displaces oxygen from water | | 1 |
| 19 | Give one example each of a molecule in which empirical formula and molecular formula is (i) H2O or any other (ii) C6H12O6 | | 1 |
| 20 | In HNO3 , N is in its highest OS hence it acts as oxidizing agent while in HNO2 it is in its intermediate OS and can act both as reducing and oxidizing agent. | | 1 |
|  | **SECTION C** | |  |
| 21 | Empirical formula = CH2O and molecular formula= C6H12O6 | | 2 |
| 22 | What are the quantum numbers for?  a) 2p electrons in Nitrogen : n=2 ; l=1 ; ml= - 1 , 0 , 1  b) 19th electron of chromium : n=4 ; l=0 ; ml = 0 | | 2 |
| 23 | O(a)=6−6=0O(b)=6−7=−1 O(c)=6−7=−1C=4−4=0 | | 2 |
| 24 | Assign reasons for the following:   1. B2 : [σ1s]2[σ\*1s]2[σ2s]2[σ\*2s]2[π2px]1[π2py]1   C2 : [σ1s]2[σ\*1s]2[σ2s]2[σ\*2s]2[π2px]2[π2py]  Since, B2 has two unpaired electrons, therefore, B2 is paramagnetic C2 has no unpaired electron, therefore, C2 is diamagnetic   1. H2 and F2 both atoms in the molecule have the same electronegativity and so they share the electrons between them equally. The two atoms in HFhave differing electronegativities, and so they do not share the bonding pair of electrons equally. | | 2 |
| 25 | 1. 1s < 2s= 2p <3s= 3p. 2. 36 | | 2 |
| 26 | 1. Dipole moment is the product of magnitude of charge and the distance of separation between them. SI unit is Cm 2. Water has strong intermolecular H-bond hence a liquid whereas H2S has weak dipole dipole forces hence is a gas at room temperature. | | 2 |
| 27 |  | | 2 |
|  | **SECTION D** | |  |
| 28 |  | | 3 |
| 29 | Account for the following:   1. This is so because **half filled d orbitals have extra stability** 3. According to Hund’s rule, the electrons occupy the degenerate orbitals singly first | | 3 |
| 30 | 1. BrF5 : square pyramidal 2. XeF4 : square planar 3. NH4 +: tetrahedral | | 3 |
| 31 | 1. It is impossible to determine the velocity and exact position of an electro simultaneously. 2. As per the Heisenberg's uncertainty principle, ∆*x*∆*v*⩾*h/*4πm As uncertainty in velocities is same, the one with more mass will have less uncertainty in position. i.e. more accuracy in position. So, neutron has more accuracy in position | | 3 |
| 32 | 3% *𝐻*2*𝑆𝑂*4H2SO4 by mass means that 93 g of *𝐻*2*𝑆𝑂*4H2SO4 is present in 100 g of solution. Vol. of 100 g of solution =MassDensity=1001.84=54.3=MassDensity=1001.84=54.3 mL Moles of *𝐻*2*𝑆𝑂*4=9398=0.95H2SO4=9398=0.95 mol Molarity =0.95×100054.3=17.5=0.95×100054.3=17.5 M (ii) Applying molarity equation. *𝑀*1*𝑉*1acid1=*𝑀*2*𝑉*2acid2M1V1acid1=M2V2acid2 17.5*𝑀*×*𝑉*1=0.5*𝑀*×2.5*𝐿*17.5M×V1=0.5M×2.5L *𝑉*1=0.5×2.517.5V1=0.5×2.517.5 =0.071 L = 71 mL | | 3 |
| 33 | Al + 4H2O Al(OH)4 + 4H+ + 4ē ] X 3  MnO4¯ + 4H+ + 3ē MnO2 + 2H2O ] X 4  3Al(s) + 4MnO4¯ (aq) + 4H+ + 4H2O ⎯→ 4MnO2(s) + 3Al(OH)4¯ (aq) | | 3 |
| 34 |  | | 3 |
|  | **SECTION E** | |  |
| 35 | 1. For n + 2 , the permitted values of l are 0 and `. This means that the second shell has only s- and p-orbitals and no d-orbitals are present. Similar for n = 3, the permissible values of l are 0, 1, 2. Thus, only s, p and d orbitals are permitted and no f-orbital is present . 2. [ψ]2 is known as probability density and **determines the probability of finding an electron at a point within the atom.**     **OR**   1. i) 2s ii) 4p | | 5 |
| 36 | 1. A reactant which is present to a lesser extent and hence gets consumed completely during the chemical reaction. 2. 32 g of oxygen     **OR**   1. The atomic mass of He is 4 amu. 2. **of He will contain  52/4  = 13 atoms** 3. **if two elements form more than one compound, then the ratios of the masses of the second element which combine with a fixed mass of the first element will always be ratios of small whole numbers**. | |  |
| 37 | 1. **MgO has higher lattice energy because each ion carries two-unit charge whereas in NaCl each ion carries one-unit charge**.   In the formation of ethyne (C2H2), both the carbon atoms undergo sp hybridisation having two unhybridised orbitals (2px and 2py). One sp hybrid orbital of one carbon atom overlaps axially with sp hybrid orbital of the other carbon atom to form C-C sigma bond, while the other hybridised orbital of each carbon atom overlaps axially with the half filled s orbital of hydrogen atoms forming o bonds. Each of the two unhybridised p orbitals of both the carbon atoms overlaps sidewise to form two K bonds between the carbon atoms. Thus, ethyne has a linear geometry with π bond angle of 180°.    **OR**   1. PF5 is AB5 type of molecule which has trigonal bipyramidal geometry hence the bond angle are 90o and 120o while all bond angles in PF6 -  are 90o since it has octahedral geometry.   The hybridisation in both CH4 and NH3 is sp3, yet CH4 is tetrahedral and NH3 is of pyramidal shape because (a) it contains three single bonds and no lone pair (b) it contains three single bonds and one lone pair (c) the number of surrounding atoms is three. | |  |

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