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| **FT/CHQP/1121/B 26-SEP-2021** | | |
| **FIRST TERM EXAMINATION (2021-22)** | | |
| **Subject: CHEMISTRY**  **Grade: XI** | | Max. Marks: 35Time: 90 minutes |
| ***General Instructions:***  ***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.*** | |
| 1. | 2g of Oxygen (O) contains number of atoms same as in | |
|  | a) 4g of S | b) 7g of nitrogen |
|  | c) 0.5g of H2 | d) 12.3g of Na |
| 2. | For a given principal level n = 4, the energy of its subshells is in the order | |
|  | a) s < p < d < f | b) s > p > d >f |
|  | c) s < p < f < d | d) f < p < d < s |
| 3. | The most electronegative element in periodic table is | |
|  | a) Chlorine | b) fluorine |
|  | c) Oxygen | d) Sulphur |
| 4. | Which one of the following is not a form of chemical bonding? | |
|  | a) Covalent bonding | b) Metallic bonding |
|  | c) Hydrogen bonding | d) Ionic bonding |
| 5. | The I.U.P.A.C. name of | |
|  | a)3,3Diethyl-4-methyl-5-(1-methylethyl)octane | b) 4-(1-Methylethyl)-5- methyl-6,6-diethyloctane |
|  | c) 3,3Diethyl-4-Methyl-5-(1-methylethyl)octane | d) ) 4-(1-methylethyl)-5- methyl-6,6-diethyloctane |
| 6. | Which of the following structures is associated with the biggest jump between the second and the third ionization enthalpies? | |
|  | a) 1s22s22p6 | b) 1s22s22p1 |
|  | c) 1s22s22p63s1 | d) 1s22s22p63s2 |
| 7. | The C-C bond distance is longest in | |
|  | a) C2H2 | b) C2H4 |
|  | c) C2H6 | d) C2H2Br2 |
| 8. | Which of the following properties generally decreases along a period? | |
|  | a) I. E | b) atomic radii |
|  | c) electro positivity | d) Valency |
| 9. | The magnetic quantum number specifies | |
|  | a) Size of orbitals | b) Shape of orbitals |
|  | c) Orientation of orbitals | d) Nuclear Stability |
| 10. | Which one of the followings has maximum number of atoms? | |
|  | a) 1 g of Mg(s) [Atomic mass of Mg = 24] | b) 1 g of O2(g) [Atomic mass of O = 16] |
|  | c) 1 g of Li(s) [Atomic mass of Li = 7] | d) 1 g of Ag(s) [Atomic mass of Ag = 108] |
| 11. | Select the correct IUPAC name for: | |
|  | a) 1,4-dimethylcyclopentane | b) 1,3-dimethylcyclopentane |
|  | c) 2,5-dimethylcyclopentane | d) 2,3-dimethylcyclopentane |
| 12. | In which of the following the angle around the central atom is the largest? | |
|  | a) CH4 | b) H2O |
|  | c) NH3 | d) CO2 |
| 13. | Which of the following represents the given mode of hybridisation sp²-sp²-sp-sp from left to right? | |
|  | a) CH2 = CH-C ≡ N | b) HC ≡ C – C = CH |
|  | c) H2C = C = C = CH2 | d) |
| 14. | The maximum number of 900 angles between bond pair and bond pair of electrons is observed in | |
|  | a) sp3d2 hybridization | b) sp3d hybridization |
|  | c) Alkanes with 4 carbon atoms | d) Alkynes with 4 carbon atoms |
| 15. | With respect to energy level diagram of hydrogen atom in the ground state, which of the following statements in relation to the hydrogen atom is correct? | |
|  | a) 3s orbital is lower in energy than 3p orbital | b) 3p orbital is lower in energy than 3d orbital |
|  | c) 3s and 3p orbitals are of lower energy than 3d orbital | d) 3s, 3p and 3d orbitals all have the same energy |
| 16. | N2 and CO | |
|  | a) has same bond order of triple bond | b) have different bond order |
|  | c) cannot compare as elements are totally different | d) has same bond order of double bond. |
| 17. | The angular shape of ozone molecule consists of | |
|  | a) 1 sigma and 1 pi bond | b) 2 sigma and 1 pi bond |
|  | c) 1 sigma and 2 pi bonds | d) 2 sigma and 2 pi bonds |
| 18. | Identify the structure that represents | |
|  | a) 1,1,2,2- tetramethylethane | b) 2,3-Dimethylbutane |
|  | c) 1,1,2,2-Tetramethylethane | d) 2,3-diMethylButane |
| 19. | The correct order of size among Cl, Cl+, Cl- is | |
|  | a) Cl+ < Cl- < Cl | b) Cl- < Cl+ < Cl |
|  | c) Cl+ < Cl< Cl- | d) Cl- < Cl< Cl+ |
| 20. | In which of the compound of sulphur, it obeys the rule of octet? | |
|  | a) SF6 | b) H2SO4 |
|  | c) SCl2 | d) SF4 |
| 21. | How are the bond length and bond energies related? | |
|  | a) They are not related. | b) The lower the bond energy, the shorter the bond length. |
|  | c) The higher the bond energy, the shorter the bond length. | d) The higher the bond energy, the longer the bond length. |
| 22. | Which of the following sets of ions represents a collection of isoelectronic species? | |
|  | a) K+, Cl-, Ca2+, N3- | b) Li+,Na+,Mg2+, Ca2+ |
|  | c) N3-, O2-, F-,S2- | d) Na+, Mg2+, F-, O2- |
| 23. | The number of moles of hydrogen molecule required to produce 20 moles of ammonia through Haber’ s process is: N2 +3 H2 🡪2 NH3 | |
|  | a) 10 | b) 20 |
|  | c) 30 | d) 40 |
| 24. | The number of nodal planes in px orbital is | |
|  | (a) one | (b) two |
|  | (c) three | (d) zero |
| 25. | The outermost electronic configuration of the most electropositive element is | |
|  | a) ns2np1 | b) ns1 |
|  | c) ns2 | d) ns2np3 |
|  | **SECTION B** | |
|  | ***This section consists of 24 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.*** | |
| 26. | Which is the correct geometry and hybridisation of XeF4? | |
|  | a) Octahedral, sp3d2 | b) Square planar, sp3d2 |
|  | c) Trigonal bipyramidal, sp3d2 | d) Planar triangle, sp3d3 |
| 27. | The formation of the oxide O2- (g) requires first an exothermic (-142kJmol-1)for addition of first electron and then an endothermic (844kJmol-1) for addition of second electron. This is because | |
|  | a) Oxygen is more electronegative | b) oxygen has high electron affinity |
|  | c) O- ion will tend to resist the addition of another electron | d) O- has comparatively larger size than oxygen atom. |
| 28. | When 22.4 litres of H2 (g)is mixed with 11.2 litres of Cl 2(g), each at S.T.P., the moles of HCl(g) formed is equal to : | |
|  | (a) 1 mole of HCl (g) | (b) 2 moles of HCl (g) |
|  | (c) 0.5 moles of HCl (g) | (d) 1.5 moles of HCl (g) |
| 29. | Which of these is paramagnetic according to MOT?  B2, O2 ,C2,N2. | |
|  | a) B2, O2 | b) C2,N2 |
|  | c) N2,O2 | d) C2,B2 |
| 30. | The electronic configuration of Cu2+ ion is | |
|  | a) [Ar] 4s1 3d8 | b) [Ar] 4s² 3d10 4p1 |
|  | c) [Ar] 4s1 3d10 | d) [Ar] 3d9 |
| 31. | Which has the maximum number of molecules among the following? | |
|  | a) 44 g CO2 | b) 48 g of O3 |
|  | c) 8g of H2 | d) 64g of SO2 |
| 32. | Which of these has 3 bond pairs and 1 lone pair surrounding the central atom? | |
|  | a) BF3 | b) NH2 |
|  | c) PCl3 | d) H2O |
| 33. | The correct name of following compound is | |
|  | a) **2-Ethyl-3-methylpentane** | b) **3,4-Dimethylhexane** |
|  | c) **2-sec-Butylbutane** | d) **2,3-Dimethylbutane** |
| 34. | The energy of an electron in the first Bohr's orbit of a hydrogen atom is 2.18×10 −18 J. Its energy in the second orbit will be: | |
|  | a) -5.45 10 −19 J | b) -1.09×10 −18 J. |
|  | c) -4.36 ×10 −18 J | d) + 8.72 ×10 −18 J |
| 35. | Which of the following does not have valence electron in 3d shell? | |
|  | a) Fe(III) ( Atomic no 26) | b) Cr (I) ( Atomic no 24) |
|  | c) Mn(II) ( Atomic no 25) | d) Sc (III) ( Atomic no 21) |
| 36. | Hemoglobin contains 0.334% of iron by weight. The molecular weight of hemoglobin is approximately 67200. The number of iron atoms (at. wt. of Fe is 56) present in one molecule of hemoglobin are | |
|  | a) 1 | b)6 |
|  | c) 4 | d) 2 |
| 37. | \_\_\_\_\_\_\_\_ is the molecule with maximum dipole moment. | |
|  | a) CO2 | b) NF3 |
|  | c) CH4 | d) NH3 |
| 38. | **Which of the following compounds contain all the carbon atoms in the same hybridization state?** | |
|  | a) i,ii | b) i,iv |
|  | c) ii, iii | d) i, iii |
| 39. | What is the wavelength of light? Given energy = 2.91 × 10-19J, h = 6.36 × 10-34 Js,  c = 3.0 × 108 m/s? | |
|  | a) 6.56 nm | b) 656 nm |
|  | c) 0.656 nm | d) 65.6 nm |
| 40. | The increasing order of first ionization enthalpies of the elements Be,B,C,N and O is | |
|  | a) B<Be<C<O<N | b) B<Be<C<N<O |
|  | c) Be<B<C<N<O | d) Be<B<C<O<N |
| 41. | An organic compound containing C, H and O gave on analysis C – 40%,O-53.34% and H – 6.66%. Its empirical formula would be | |
|  | a) C3 H6O | b) CHO |
|  | c) CH2 O | d) CH4O |
| 42. | which of these statements is false? | |
|  | a) The canonical structure does not have a real existence. | b) Multiple bonds are shorter than their corresponding single bonds. |
|  | c) Every AB5 molecule has a square pyramid structure. | d) Complete and half filled subshells are very stable. |
| 43. | **Among halogens, the correct order of the amount of energy released in electron gain (electron gain enthalpy) is** | |
|  | a) **F > Cl > Br > I** | b) **F < Cl < Br < I** |
|  | c) **F < Cl < Br < I** | d) **F < Cl > Br > I** |
|  | In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.  (i) **(A)** is correct**, (R)** is correct; **(R)** is a correct explanation for **(A)**. (ii) **(A)** is correct, **(R)** is correct; **(R)** is not a correct explanation for **(A)**. (iii) **(A)** is correct, **(R)** is incorrect. (iv) **(A)** is incorrect, **(R)** is correct. | |
| 44. | Assertion (A): One atomic mass unit is defined as one twelfth of the mass of one carbon-12 atom.  Reason (R): Carbon-12 isotope is the most abundant isotope of carbon and has been chosen as standard. | |
| 45. | Assertion (A): The empirical mass of ethene is half of its molecular mass.  Reason (R): The empirical formula represents the simplest whole-number ratio of various atoms present in a compound. | |
| 46. | Assertion (A): All the carbon atoms in H2C = C = CH2 are sp2 hybridised  Reason (R): In this molecule all the carbon atoms are attached to each other by double bonds. | |
| 47. | Assertion(A):In the fourth energy level, there is no g shell  Reason(R): g shell has 9 orbitals | |
| 48. | Assertion (A):Nitrogen has higher ionization enthalpy than that of oxygen.  Reason (R): Nitrogen has smaller atomic size than that of oxygen. | |
| 49. | Assertion (A): ClF3 is almost T shaped.  Reason (R): Cl atom is surrounded by 2 lone pairs and 3 bond pairs. | |
|  | **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 is attempted, ONLY first 5 will be considered***  ***for evaluation*** | |
| 50. | Match the following   |  |  |  |  | | --- | --- | --- | --- | | **Elements** | **ΔiH1** | **ΔiH2** | **ΔegH** | | I | 520 | 7300 | -60 | | II | 419 | 3051 | -48 | | III | 2372 | 5251 | +48 | | IV | 1681 | 3371 | -328 | | |
|  | The arrangement of (as per the value given in table)   1. Most reactive metal, 2. Least reactive nonmetal 3. The most reactive nonmetal 4. The less reactive metal | |
|  | a) III, IV,I,II | b) IV,III,I,II |
|  | c) IV,III,II,I | d) II, III, IV,I |
| 51. | Which of the following analogies are correct | |
|  | a) 1s2,2s22p63s1: nonmetal, 1s2,2s22p5: metal | b) 1s2,2s22p63s23p2: excited state,  1s2,2s22p63s13p3: ground state |
|  | c) H2O: bent shape, NH3- Trigonal pyramidal | d) Ψ: probability density, Ψ2: wave function |
| 52. | Three elements with atomic number Z-1,Z,Z+1 are taken where Z is an inert gas  Complete the following analogy for Z-1 and Z+1 can be | |
|  | a) Z-1 has high ionization enthalpy & Z+1 has high electron gain enthalpy | b) Z-1 has low ionization enthalpy & Z+1 has high electron gain enthalpy |
|  | c) Z-1 has high ionization enthalpy & Z+1 has low electron gain enthalpy | d) Z-1 has low ionization enthalpy & Z+1 has low electron gain enthalpy |
| Case | Pauli observed that relativistic quantum field theory requires that particles with half-integer spin (s=1/2, 3/2, ...) must have antisymmetric wave functions and particles with integer spin (s=0, 1, ...) must have symmetric wave functions. Such observation is usually introduced as an additional postulate of quantum mechanics: The wave function of a system of electrons must be antisymmetric with respect to interchange of any two electrons. A consequence of such principle is that two electrons with the same spin cannot have the same coordinates, since the wavefunction must satisfy the following condition:  ψ(x1,x2) = −ψ(x2,x1) , and, therefore, ψ(x1,x1) = 0.  For this reason, the principle is known as the Pauli Exclusion Principle. | |
| 53. | Which of the following set of quantum numbers belong to highest energy? | |
|  | a) n = 4, l = 0, m = 0, s = + 1/2 | b) n = 3, l = 0, m = 0, s = + 1/2 |
|  | c) n = 2, l = 1, m = 1, s = + 1/2 | d) n = 3, l = 2, m = 1, s = + 1/2 |
| 54. | The orbital diagram in which Aufbau principle is violated is | |
|  | a) i | b) ii |
|  | c) iii | d) iv |
| 55. | The last entering electron in an element has quantum number n = 3, l = 2, m = + 2 and s = + 1 /2. The atomic number of the element will be | |
|  | a) 12 | b)21 |
|  | c) 29 | d) 39 |
|  | \*\*\* | |