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| **FT/CHQP/1121/A 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. | If Avogadro number NA, is changed from 6.022 × 1023 mol–1 to 6.022 × 1020 mol–1, this would change | | |
|  | A) The mass of one mole of carbon | B) the ratio of chemical species to each other in a balanced equation | |
|  | C) The ratio of elements to each other in a compound | D) The definition of mass in units of grams. | |
| 2. | For the second period elements the correct increasing order of first ionization enthalpy is | | |
|  | A) Li < Be < B < C < O < N < F < Ne | B) Li < Be < B < C < N < O < F < Ne | |
|  | C) Li < B < Be < C < O < N < F < Ne | D) Li < B < Be < C < N < O < F < Ne | |
| 3. | The structure of SF4 is | | |
|  | A) Octahedral | B) See Saw | |
|  | C) Trigonal bipyramidal | D) Tetrahedral | |
| 4. | Orientation of orbital given by quantum no | | |
|  | A) ℓ | B) n | |
|  | C) ml | D) ml and ms | |
| 5. | Position of lone pairs in ClF3 is on | | |
|  | A) axial | B) Equatorial | |
|  | C) both (A) and (B) | D) Any position | |
| 6. | In which of the following option the order of arrangement does not agree with the variation of property indicated against it? | | |
|  | A) I < Br < F < Cl (increasing electron gain enthalpy | B) Li < Na < K < Rb (increasing metallic radius) | |
|  | C) Al3+ < Mg2+ < Na+ < F – (increasing ionic size) | D) B < C < N < O (increasing first ionisation enthalpy) | |
| 7. | Molarity of liquid HCl, if density of solution is 1.17 g/cc is | | |
|  | A) 36.50 M | B) 18.25 M | |
|  | C) 32.05 M | D) 42.10 M | |
| 8. | The orbital diagram in which the Aufbau principle is violated is | | |
|  | (A) | B) | |
|  | C) | D) | |
| 9. | Which of the following has maximum number of lone pairs associated with Xe? | | |
|  | A) XeF2 | B) XeO3 | |
|  | C) XeO4 | D) XeF6 | |
| 10. |  | | |
|  | A) 5-(2,2-Dimethyl butyl)3-Ethyl decane | B) 5-(2-Ethyl butyl)-3,3-dimethyl decane | |
|  | C) 6-(2,2-Dimethyl butyl)8-ethyl decane | D) none of them | |
| 11. | 20.0 g of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 g magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample?  (At. wt. of Mg = 24) | | |
|  | A) 96 | B) 60 | |
|  | C) 84 | D) 75 | |
| 12. | Correct increasing order of metallic character: Si, Be, Mg, P | | |
|  | A) P < Si < Be < Mg | B) Si < P < Be < Mg | |
|  | C) Si < Be < P < Mg | D) Si < Be < Mg < P | |
| 13. | The total number of spectral lines obtained in the Lyman series when an electron jumps from 6th level are | | |
|  | A) 15 | B) 6 | |
|  | C) 10 | D) 4 | |
| 14. | Number of σ and π bonds in CH≡C−CH2−CH=CH2 is | | |
|  | A) 11 and 2 | B) 9 and 4 | |
|  | C) 10 and 3 | D) 8 and 5 | |
| 15. | Based on VSEPR theory, the number of 90-degree F — Br — F angles in BrF5 is | | |
|  | A) 0 | B) 2 | |
|  | C) 4 | D) 8 | |
| 16. | Consider the ground state electronic configurations given below:  P: (1s2, 2s2, 2p5); Q: (1s2, 2s2, 2p4); R: (1s2, 2s1); S: (1s2, 2s2, 2p6, 3s1); T: (1s2, 2s2, 2p6).  Arrange these configurations in order of increasing ionization energies. | | |
|  | A) P < Q < R < S < T | B) S < R < Q < P < T | |
|  | C) T < S < R < Q < P | D) P < R < T < S < Q | |
| 17. | Suppose the elements X and Y combine to form two compounds XY2 and X3Y2. When 0.1 mole of XY2 weighs 10 g and 0.05 mole of X3Y2 weighs 9 g, the atomic weights of X and Y are | | |
|  | A) 40 , 30 | B) 60 , 40 | |
|  | C) 20 , 30 | D) 30 , 20 | |
| 18. | Which of the following is the correct IUPAC name? | | |
|  | A) 3-Ethyl-4, 4-dimethylheptane | B) 4,4-Dimethyl-3-ethylheptane | |
|  | C) 5-Ethyl-4, 4-dimethylheptane | D) 4,4-Bis(methyl)-3-ethylheptane | |
| 19. | The total number of π-bond electrons in the following structure is | | |
|  | A) 12 | B) 16 | |
|  | C) 4 | D) 8 | |
| 20. | Which of the following species have the same shape?  (1) CO2  (2) CCl4 (3) O3 (4) NO2─ | | |
|  | A) (1) and (4) | B) (1) and (2) | |
|  | C) (2) and (3) | D) None of them | |
| 21. | Correct name of the given compound | | |
|  | A) 2-Ethyl 5-methyl hexane | B) 2-Methyl 5-ethyl hexane | |
|  | C) 2,5-Dimethyl heptane | D) 3,6-Dimethyl heptane | |
| 22. | The first Ionisation enthalpies of Na, Mg, Al and Si are in the order: | | |
|  | A) Na < Mg > Al < Si | B) Na > Mg > Al > Si | |
|  | C) Na < Mg < Al < Si | D) Na > Mg > Al < Si | |
| 23. | The hybridization of orbitals of N atom in NO3–, NO2+ and NH4+ are respectively | | |
|  | A) sp2, sp3, sp | B) sp, sp2, sp3 | |
|  | C) sp2, sp, sp3 | D) sp, sp3, sp2 | |
| 24. | Electronegativity of carbon atoms depends upon their state of hybridisation. In which of the following compounds, the carbon marked with asterisk is most electronegative? | | |
|  | A) CH3-CH2-\*CH2-CH3 | B) CH3-\*CH=CH-CH3 | |
|  | C) CH3-CH2-\*C≡CH | D) CH3-CH2-CH=\*CH2 | |
| 25. | In which of the following ionization processes the bond energy decreases and the magnetic behaviour changes from paramagnetic to diamagnetic? | | |
|  | A) N2 → N2+ | B) O2 → O2+ | |
|  | C) C2 → C2+ | D) O2 → O22─ | |
|  | **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. | In which case is number of molecules of water maximum? | | |
|  | A) 18 mL of water | B) 0.18 g of water | |
|  | C) 0.00224 L of water vapours at 1 atm and 273 K | D) 10–3 mol of water | |
| 27. | Bohr model can explain spectrum of | | |
|  | A) the hydrogen atom only | B) an atom or ion having one electron only | |
|  | C) the hydrogen molecule only | D) the sodium atom only | |
| 28. | The formation of the oxide ion, O2– (g), from oxygen atom requires first an exothermic and then an endothermic step as shown below:  Thus, process of formation of O2– in gas phase is unfavorable even though O2– is isoelectronic with neon. It is due to the fact that, | | |
|  | A) oxygen is more electronegative. | B) addition of electron in oxygen results in larger size of the ion. | |
|  | C) electron repulsion outweighs the stability gained by achieving noble gas configuration. | D) O– ion has comparatively smaller size than oxygen atom. | |
| 29. | A gaseous hydrocarbon gives upon combustion 0.72 g of water and 3.08 g of CO2. The empirical formula of the hydrocarbon is: | | |
|  | A) C2H4 | B) C3H4 | |
|  | C) C6H5 | D) C7H8 | |
| 30. | Which is the Heisenberg’s uncertainty principle? | | |
|  | A) | B) | |
|  | C) Δ x Δ p ≥ h | D) none of them | |
| 31 | Among the following the maximum covalent character is shown by the compound | | |
|  | A) MgCl2 | B) SnCl2 | |
|  | C) NaCl | D) AlCl3 | |
| 32. | Which is the correct arrangement according to the second ionization energy of Nitrogen and oxygen atom? | | |
|  | A) N = O | B) N > O | |
|  | C) N < O | D) none of them | |
| 33. | Which one of the following pairs is isostructural (i.e. having the same shape and hybridization)? | | |
|  | A) [NF3 and BF3] | B) [NH4+ and BF4─] | |
|  | C) [BrCl3 and BCl3] | D) [NH3 and NO3─] | |
| 34. | The oxide of a metal contains 40% of oxygen. The valency of metal is 2. What is the atomic weight of the metal? | | |
|  | A) 24 | B) 13 | |
|  | C) 40 | D) 36 | |
| 35. | Which one of the following conversions involve change in both hybridization and shape? | | |
|  | A) NH3 → NH4+ | B) CH4 → C2H6 | |
|  | C) H2O → H3O+ | D) BF3 → BF4– | |
| 36. | The correct IUPAC name for the compound is | | |
|  | A) 4-ethyl-3-propylhex-1-ene | B) 3-ethyl-4-ethenylheptane | |
|  | C) 3-ethyl-4-propylhex-5-ene | D) 3-(1-ethylpropyl)hex-1-ene. | |
| 37. | Correct arrangement for electron gains enthalpy for group 16 element is | | |
|  | A) O > S > Se > Te > Po | B) Po > S > Se > Te > O | |
|  | C) O > Po > Se > Te > S | D) S > Se > Te > Po > O | |
| 38. | If the radius of first Bohr orbit is *x*, then de Broglie wavelength of electron in 3rd orbit is nearly | | |
|  | A) 2π*x* | B) 6π*x* | |
|  | C) 9*x* | D) *x*/3 | |
| 39. | Which of the following analogies is correct? | | |
|  | A) Nitrogen: 1s2 2s2 2p3  Argon:1s2 2s2 2p6 | B) NH3: Trigonal pyramidal  XeO3: Trigonal pyramidal | |
|  | C) p-nitrophenol: highly steam volatile  0-Nitrophenol: less steam volatile | D) O2: diamagnetic  N2: paramagnetic | |
| 40. | The molecule having smallest bond angle is: | | |
|  | A) PCl3 | B) NCl3 | |
|  | C) AsCl3 | D) SbCl3 | |
| 41. | The energy of an electron in the first Bohr orbit of H atom is −13.6 eV. The possible energy value(s)  of the excited state(s) for electron in Bohr orbits of hydrogen is(are) | | |
|  | A) −3.4 eV | B) − 4.2 eV | |
|  | C) −6.8 eV | D) −9.8 eV | |
| 42. | Which one of the following has the shortest carbon carbon bond length? | | |
|  | A) Benzene | B) Ethene | |
|  | C) Ethane | D) Ethyne | |
| 43. | A, B & C are three elements with atomic number Z-1, Z, Z+1 respectively B is an inert gas. Which of the three has least value of ionization enthalpy? | | |
|  | A) Z – 1 | B) Z | |
|  | C) Z + 1 | D) Z-1 and Z+1 | |
| 44. | In which of the following ionization processes the bond energy increases and the magnetic behaviour changes from paramagnetic to diamagnetic? | | |
|  | A) O2 → O2+ | B) C2 → C2+ | |
|  | NO → NO+ | D) N2 → N2+ | |
|  | 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.   1. Both A and R are true and R is the correct explanation of A. 2. Both A and R are true but R is not the correct explanation of A. 3. A is true but R is false. 4. A is false but R is true. | | |
| 45. | 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. | | |
| 46. | Assertion (A): it is impossible to determine the exact position and exact momentum of an electron simultaneously.  Reason(R): The path of an electron in an atom is clearly defined. | | |
| 47. | 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. | | |
| 48. | Assertion (A): Among the two O–H bonds in H2O molecule, the energy required to break the first O–H bond and the other O–H bond is different. Reason (R) : This is because the electronic environment around oxygen is the same even after breakage of one O–H bond. | | |
| 49. | Assertion (A) : Boron has a smaller first ionisation enthalpy than beryllium. Reason (R) : The penetration of a 2s electron to the nucleus is more than the 2p electron hence 2p electron is more shielded by the inner core of electrons than the 2s electrons. | | |
|  | **SECTION-C** | | |
|  | **Read the passage given below and answer the following questions:**  A large number of orbitals are possible in an atom. Qualitatively these orbitals can be distinguished by their size, shape, and orientation. An orbital of smaller size means there is more chance of finding the electron near the nucleus. Similarly shape and orientation mean that there is more probability of finding the electron along certain directions than along others. Atomic orbitals are precisely distinguished by what are known as quantum numbers. Each orbital is designated by three quantum numbers labelled as n, l and ml .   1. Principal quantum number(n) 2. Azimuthal quantum number(l) 3. Magnetic quantum number(ml) 4. Spin quantum number (ms) | | |
| 50. | Orientation of orbital given by quantum no | | |
|  | A) ℓ | B) n | |
|  | C) ml | D) ml and ms | |
| 51. | 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 = 1, s = +1/2 | |
|  | C) n = 3, *l* = 1, m = 0, s = +1/2 | D) n = 3, *l* = 2, m = 0, s = +1/2 | |
| 52. | Number of orbitals in a subshell is equal to | | |
|  | A) n - ℓ-1 | B) (2ℓ + 1) | |
|  | C) n2 | D) (2ℓ + 2) | |
| 53. | Match the following:  The IE1 and IE2 of few elements designated by Roman numerical are shown below:  Element I.E.1 I.E.2  I 2372 5251  II 520 7300  III 900 1760  IV 1680 3380  Which metal of the above elements is likely to be?  (a) a reactive metal  (b)a reactive non-metal  (c) a noble gas  (d) a metal that forms a stable binary halide of the formula AX2 ( X = halogen ). | | |
|  | A) (I) b (II) a (III) d (IV) c | B) (I) d (II) b (III) c (IV) a | |
|  | C) (I) c (II) a (III) d (IV) b | D) (I) c (II) d (III) a (IV) b | |
| 54. | In the periodic table, with the increase in atomic number, the metallic character of an element | | |
|  | A) decreases in a period and increases in a group | B) increases in a period and decreases in a group | |
|  | C) increases both in a period and the group | D) decreases in a period and the group. | |
| 55. | Which of the following is the correct order of dipole moment? | | |
|  | A) NH3 < BF3 < NF3 < H2O | B) BF3 < NF3 < NH3 < H2O | |
|  | C) BF3 < NH3 < NF3 < H2O | D) H2O < NF3 < NH3 < BF3 | |

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