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| **HALF YEARLY EXAMINATION (2021-22) - AK** | | | | | | | |
| **Subject: Chemistry**  **Grade: 11** | | | Max. Marks: 35Time: 90 min | | | | |
| **Name:** | | | | | **Section:** | **Roll No:** | |
|  | **SECTION A** | | | | | |  |
|  | How many moles of magnesium phosphate, Mg 3(PO4 )2 will contain 0.25 mole of oxygen atoms? | | | | | | |
|  | **a.** | 1.25 x 10- 2 | | **b.** | 2.5 x 10 – 2 | | |
|  | **c.** | 0.02 | | **d.** | 3.125 x 10 – 2 | | |
| **2.** | Which of the following series of transitions in the spectrum of hydrogen atom fall in visible region? | | | | | | |
|  | **a.** | Balmer series | | **b.** | Paschen series | | |
|  | **c.** | Brackett series | | **d.** | Lyman series | | |
| **3.** | The period number in the long form of the periodic table is equal to | | | | | | |
|  | **a.** | magnetic quantum number of any element of the period | | **b.** | atomic number of any element of the period | | |
|  | **c.** | maximum principal quantum number of any element of the period | | **d.** | maximum azimuthal quantum number of any element of the period | | |
| **4.** | What is the maximum number of water molecules that can attach with one water molecule through intermolecular hydrogen bonds? | | | | | | |
|  | **a.** | 2 | | **b.** | 3 | | |
|  | **c.** | 4 | | **d.** | 1 | | |
| **5.** | Text  Description automatically generated | | | | | | |
|  | **a.** | 3-Oxo-hept-2-yne | | **b.** | Hept-3-yn-4-oxone | | |
|  | **c.** | Hept-4-yn-3-one | | **d.** | Hept-3-en-4-one | | |
| **6.** | In oxygen difluoride (OF2 ) and dioxygen difluoride (O2 F2 ) , the oxygen is assigned an oxidation number of: | | | | | | |
|  | **a.** | +1 and +2 respectively | | **b.** | +2 and +2 respectively | | |
|  | **c.** | +1 and +1 respectively | | **d.** | +2 and +1 respectively | | |
| **7.** | The kind of delocalization involving sigma bond in conjugation with pi electrons is called: | | | | | | |
|  | **a.** | Inductive effect | | **b.** | Hyperconjugation effect | | |
|  | **c.** | Electromeric effect | | **d.** | Mesomeric effect | | |
| **8.** | Predict the position of an element having the electronic configuration 1s2 2s2 2p6 3s2 3p6 3d5 4s1 | | | | | | |
|  | **a.** | Period 4, group 6 | | **b.** | Period 6, group 4 | | |
|  | **c.** | Period 3, group 1 | | **d.** | Period 4, group 5 | | |
| **9.** | Bohr’s model can explain | | | | | | |
|  | **a.** | the solar spectrum | | **b.** | the spectrum of hydrogen molecule | | |
|  | **c.** | spectrum of any atom or ion containing one electron only | | **d.** | the spectrum of hydrogen atom only | | |
| **10.** | 6.02 ×1020 molecules of urea are present in 100 mL of its solution. The concentration of the solution is | | | | | | |
|  | **a.** | 0.02 M | | **b.** | 0.01 M | | |
|  | **c.** | 0.001 M | | **d.** | 0.1 M | | |
| **11.** | The most stable free radical among the following is: | | | | | | |
|  | **a.** | A close-up of a logo  Description automatically generated with low confidence | | **b.** | A close-up of a logo  Description automatically generated with low confidence | | |
|  | **c.** | A close-up of a logo  Description automatically generated with low confidence | | **d.** | A picture containing text  Description automatically generated | | |
| **12.** | Identify the molecule having sideways overlapping of atomic orbitals : | | | | | | |
|  | **a.** | CH4 | | **b.** | CO2 | | |
|  | **c.** | NH3 | | **d.** | H2O | | |
| **13.** | The order of relative stability of the contributing structures are:  A picture containing text  Description automatically generated A picture containing diagram  Description automatically generated | | | | | | |
|  | **a.** | II > I > III | | **b.** | I > II > III | | |
|  | **c.** | III > II > I | | **d.** | II > III > I | | |
| **14.** | Which of the following compound has highest covalent character: | | | | | | |
|  | **a.** | LiCl | | **b.** | LiBr | | |
|  | **c.** | LiF | | **d.** | LiI | | |
| **15.** | Relation between wavelength ( ) λ and momentum ( ) P of a material particle is | | | | | | |
|  | **a.** | λ =hP | | **b.** | λ =h/ P | | |
|  | **c.** | λ = h + P | | **d.** | λ = h − P | | |
| **16.** | The electronic configuration of four elements are:  I. [Xe] 6 s1  II. [Xe] 4f14 5 d 1 6s2  III. [Ar] 4s2 4p5  IV. [Ar] 3d7 4s2  Which one of the following statements about these elements is not correct ? | | | | | | |
|  | **a.** | I is a strong reducing agent | | **b.** | II is a d-block element | | |
|  | **c.** | III has high electron affinity | | **d.** | IV shows variable oxidation state | | |
| **17.** | If the intermolecular distance between two adjacent copper atoms in solid copper is 256 pm, then the metallic radius of copper is | | | | | | |
|  | **a.** | 128 pm | | **b.** | 12.87 Å | | |
|  | **c.** | 74 pm | | **d.** | 74 Å | | |
| **18.** | Observe the effect carefully and predict the nature of the effect:  A picture containing clock, watch, gauge  Description automatically generated | | | | | | |
|  | **a.** | Negative electromeric effect | | **b.** | Resonance effect | | |
|  | **c.** | Inductive effect | | **d.** | Positive electromeric effect | | |
| **19.** | 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 | | |
| **20.** | Which of the following statements is not correct for σ and π bonds which is formed between two carbon atoms? | | | | | | |
|  | **a.** | free rotation of atoms about σ bond is allowed but not in case of a π bond | | **b.** | σ bond determines the direction between carbon atoms but a π bond has no primary effect in this regard | | |
|  | **c.** | σ bond is stronger than a π bond | | **d.** | bond energies of σ bond and π bond are of the order of 264 kJ/mol and 347 kJ/mol, respectively | | |
| **21.** | Which of the following is correct about the species (CH3)3 – C + | | | | | | |
|  | **a.** | It is planar | | **b.** | Its C + is sp2 hybridised | | |
|  | **c.** | A nucleophile can attack on its C + | | **d.** | All of the above | | |
| **22.** | Which of the following is diamagnetic? | | | | | | |
|  | **a.** | H2 + | | **b.** | O2 | | |
|  | **c.** | Li2 | | **d.** | He2 + | | |
| **23.** | Which of the following is dependent of temperature ? | | | | | | |
|  | **a.** | Mass percentage | | **b.** | Molality | | |
|  | **c.** | Mole fraction | | **d.** | Molarity | | |
| **24.** | In the Schrodinger equation, H is | | | | | | |
|  | **a.** | a mathematical operator called Hamiltonian operator | | **b.** | introduced by Schrodinger from the expression for the total energy of the system | | |
|  | **c.** | Both (a) and (b) | | **d.** | None of the above | | |
| **25** | The relationship between the dissociation energy of N2 and N2 + is: | | | | | | |
|  | **a.** | dissociation energy of N2 + > dissociation energy of N2 | | **b.** | dissociation energy of N2 = dissociation energy of N2 + | | |
|  | **c.** | dissociation energy of N2 > dissociation energy of N2 + | | **d.** | dissociation energy of N2 can either be lower or higher than the dissociation energy of N2 + | | |
| **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.** | The planar structure of BF3 can be explain by the fact that BF3 is: | | | | | | |
|  | **a.** | sp hybridized | | **b.** | sp2 hybridized | | |
|  | **c.** | sp3 hybridized | | **d.** | sp3 hybridized | | |
| **27.** | In the reaction, 4Na + O2 → 2Na2 O, sodium acts as a/an | | | | | | |
|  | **a.** | oxidising agent | | **b.** | reducing agent | | |
|  | **c.** | complexing agent | | **d.** | None of these | | |
| **28.** | The empirical formula and molecular mass of a compound are CH O2 and 180 g respectively. What will the molecular formula of the compound? | | | | | | |
|  | **a.** | C9H18O9 | | **b.** | CH2O | | |
|  | **c.** | C6H12O6 | | **d.** | C2H4O2 | | |
| **29.** | Homolytic fission of C-C bond in ethane gives an intermediate in which carbon is: | | | | | | |
|  | **a.** | sp3 hybridised | | **b.** | sp2 hybridised | | |
|  | **c.** | sp-hybridised | | **d.** | sp3d- hybridized | | |
| **30.** | The graph between | ψ 2 | and r (radial distance) is shown below. This represents  A picture containing chart  Description automatically generated | | | | | | |
|  | **a.** | 1s-orbita | | **b.** | 2p-orbital | | |
|  | **c.** | 3s-orbital | | **d.** | 2s-orbital | | |
| **31.** | What will be the molality of the solution containing 18.25 g of HCl gas in 500 g of water? | | | | | | |
|  | **a.** | 0.1 m | | **b.** | 0.1 M | | |
|  | **c.** | 0.5 m | | **d.** | 1 m | | |
| **32.** | Lewis dot structure of CO, NO2-1 and CO3 2- are I, II and III respectively  A picture containing chart  Description automatically generated  Which of the above structure(s) is/are wrong? | | | | | | |
|  | **a.** | Only I | | **b.** | Only II | | |
|  | **c.** | Only III | | **d.** | All of the above | | |
| **33.** | The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is : | | | | | | |
|  | **a.** | - COOH , - SO3H , - CONH2 , - CHO | | **b.** | - SO3H , - COOH , - CONH2 , - CHO | | |
|  | **c.** | - COOH , - CONH2 , - CHO , - COCl | | **d.** | - COOH , - SO3H, - CHO, - CONH2 | | |
| **34.** | Uncertainty in the position of an electron (mass = 9.1 × 10− 31 kg) moving with a velocity 300 ms−1 , accurate upon 0 001 . % will be | | | | | | |
|  | **a.** | 19.2 × 10 − 2 m | | **b.** | 5.76 × 10 −2 m | | |
|  | **c.** | 1.93 ×10 − 2 m | | **d.** | 57.6 × 10 −2 m | | |
| **35.** | In the reaction, 2KClO3 → 2KCl + 3O2 , the elements which have been oxidised and reduced respectively are: | | | | | | |
|  | **a.** | chlorine and oxygen | | **b.** | oxygen and chlorine | | |
|  | **c.** | potassium and oxygen | | **d.** | oxygen and potassium | | |
| **36.** | Which has maximum number of molecules? | | | | | | |
|  | **a.** | 7 g of N2 | | **b.** | 16 g of NO2 | | |
|  | **c.** | 2 g of H2 | | **d.** | 16 g of O2 | | |
| **37.** | In the following redox reaction,    the values of coefficients x y, and z respectively, are | | | | | | |
|  | **a.** | 3 ,8 ,2 | | **b.** | 3 8 7 | | |
|  | **c.** | 3 ,2, 4 | | **d.** | 3, 1 ,8 | | |
| **38.** | Consider the following compounds,  Diagram  Description automatically generated  Which of the following option is/are true regarding I and II ? | | | | | | |
|  | **a.** | I shows + R -effect, whereas II shows –R-effect | | **b.** | I shows –R -effect, whereas II shows + R-effect | | |
|  | **c.** | Both I and II show +R -effect | | **d.** | Both I and II show −R -effect | | |
| **39.** | An electron can move only in those orbits for which its angular momentum is integral multiple of | | | | | | |
|  | **a.** | h/ 4π | | **b.** | h /2π | | |
|  | **c.** | h /√2π | | **d.** | h⋅2π | | |
| **40.** | In oxidation process, | | | | | | |
|  | **a.** | oxidation number decreases | | **b.** | number of electrons decreases | | |
|  | **c.** | oxygen content decreases | | **d.** | number of ions decreases | | |
| **41.** | The number of molecules in 18 mg of water in terms of Avogadro number, NA is | | | | | | |
|  | **a.** | 10−3NA | | **b.** | 10−2NA | | |
|  | **c.** | 10- 1NA | | **d.** | 10 NA | | |
| **42.** | Two electrons occupying the same orbital are distinguished by | | | | | | |
|  | **a.** | magnetic quantum number | | **b.** | azimuthal quantum number | | |
|  | **c.** | spin quantum number | | **d.** | principal quantum number | | |
| **43.** | Why beryllium has higher ionisation enthalpy than boron ? | | | | | | |
|  | **a.** | More penetration of s-electron | | **b.** | More penetration of p-electron | | |
|  | **c.** | Large size | | **d.** | Small size | | |
| **44.** | The structure of iso-butyl group in an organic compound is: | | | | | | |
|  | **a.** | Diagram, box and whisker chart  Description automatically generated | | **b.** | CH3 – CH2 – CH2 – CH3 | | |
|  | **c.** | CH3 – CH2 – CH2 – CH2 | | **d.** | Schematic, box and whisker chart  Description automatically generated | | |
| **45.** | **Assertion**: The decomposition of hydrogen peroxide to form water and oxygen is an example of disproportionation reaction.  **Reason**: The oxygen of peroxide is in −1oxidation state and it is converted to zero oxidation state in O2 and −2 oxidation state in H2 O . | | | | | | |
|  | **a.** | Both Assertion and Reason are correct statements and Reason is the correct explanation of the Assertion. | | **b.** | Both Assertion and Reason are correct statements, but Reason is not the correct explanation of the Assertion. | | |
|  | **c.** | Assertion is correct, but Reason is incorrect statement. | | **d.** | Assertion is incorrect but Reason is correct statement. | | |
| **46.** | Assertion (A) : Combustion of 16 g of methane gives 18 g of water. Reason (R) : In the combustion of methane, water is one of the products. | | | | | | |
|  | **a.** | Both Assertion and Reason are correct statements and Reason is the correct explanation of the Assertion. | | **b.** | Both Assertion and Reason are correct statements, but Reason is not the correct explanation of the Assertion. | | |
|  | **c.** | Assertion is correct, but Reason is incorrect statement. | | **d.** | Assertion is incorrect but Reason is correct statement. | | |
| **47.** | **Assertion**: Inductive effect and resonance effect cause permanent polarisation of bond.  **Reason**: These involve electron displacements due to the influence of an atom or a substituted group present in the molecule. | | | | | | |
|  | **a.** | Both Assertion and Reason are correct statements and Reason is the correct explanation of the Assertion. | | **b.** | Both Assertion and Reason are correct statements, but Reason is not the correct explanation of the Assertion. | | |
|  | **c.** | Assertion is correct, but Reason is incorrect statement. | | **d.** | Assertion is incorrect but Reason is correct statement. | | |
| **48.** | **Assertion** :Electron gain enthalpy becomes less negative as we go down a group.  **Reason** :Size of the atom increases on going down the group and the added electron would be farther from the nucleus. | | | | | | |
|  | **a.** | Both Assertion and Reason are correct statements and Reason is the correct explanation of the Assertion. | | **b.** | Both Assertion and Reason are correct statements, but Reason is not the correct explanation of the Assertion. | | |
|  | **c.** | Assertion is correct, but Reason is incorrect statement. | | **d.** | Assertion is incorrect but Reason is correct statement. | | |
| **49.** | **Assertion** :BF3 molecule has zero dipole moment.  **Reason** :F is electronegative and BF3 bonds are polar in nature | | | | | | |
|  | **a.** | Both Assertion and Reason are correct statements and Reason is the correct explanation of the Assertion. | | **b.** | Both Assertion and Reason are correct statements, but Reason is not the correct explanation of the Assertion. | | |
|  | **c.** | Assertion is correct, but Reason is incorrect statement. | | **d.** | Assertion is incorrect but Reason is correct statement. | | |
| **SECTION C** | | | | | | | |
|  | This section consists of 6 multiple choice questions with an overall choice to attempt any5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation. | | | | | | |
| **50.** | Match the terms mentioned in column I with terms in column II.   |  |  | | --- | --- | | **Column I** | **Column II** | | (i) Carbocation | a) Delocalization of σ electrons of C – H bond of an alkyl group attached to an unsaturated system. | | (ii) Nucleophile | b) Formed during homolysis of a covalent bond. | | (iii) Hyperconjugation | c) Species capable of donating a pair of electrons. | | (iv) Free radicals | d) sp2 hybridised | | | | | | | |
|  | **a.** | (i)-d , (ii)-c , (iii)-a , (iv)-b | | **b.** | (i)-a , (ii)-c , (iii)-d , (iv)-b | | |
|  | **c.** | (i)-b , (ii)-a , (iii)-c , (iv)-b | | **d.** | (i)-c , (ii)-d , (iii)-a , (iv)-b | | |
| 51 | Which of the following analogies is correct: | | | | | | |
|  | **a.** | CH4 : tetrahedral :: SF4 : tetrahedral | | **b.** | CO2 : non polar :: CCl4 : polar | | |
|  | **c.** | N2 : diamagnetic :: O2 : paramagnetic | | **d.** | σ bond: axial overlap :: ∏ bond : lateral overlap | | |
| 52 | Complete the following analogy:  A: Group 17 elements :: B: Group 16 elements | | | | | | |
|  | **a.** | A: Halogens B: Noble gases | | **b.** | A: Halogens B: Chalcogens | | |
|  | **c.** | A: Chalcogens B: Halogens | | **d.** | A: Chalcogens B: Noble gases | | |
|  | **Read the passage given below and answer the following questions :**  The concept of electron transfer is found unable to explain the redox changes or electron shift in case of covalent compounds. To explain these changes a new concept, called oxidation number is introduced. Oxidation number is defined as the charge that an atom of the element has in its ion or appear to have when present in the combined state with other atoms. In other words, it is also defined as the charge that an atom appear to have in a compound when all other atoms are removed as ions from the compound.  **The following questions are multiple choice questions**. **Choose the most appropriate answer:** | | | | | | |
| **53.** | Highest oxidation state of Mn is present in : | | | | | | |
|  | **a.** | KMnO4 | | **b.** | K2 MnO 4 | | |
|  | **c.** | Mn2 O 3 | | **d.** | MnO2 | | |
| **54.** | Identify the element which never has positive oxidation number in any of its compound? | | | | | | |
|  | **a.** | Oxygen | | **b.** | Chlorine | | |
|  | **c.** | Fluorine | | **d.** | Bromine | | |
| **55.** | In which of the following reactions, there is no change in valency? | | | | | | |
|  | **a.** |  | | **b.** |  | | |
|  | **c.** |  | | **d.** |  | | |

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