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# FE/CH/1119A 20/02/2020

# EEE CONSORTIUM

**FINAL EXAMINATION (2019-20)**

**CLASS**: **XI**  **MAX.MARKS**: **70**

**SUBJECT : CHEMISTRY** **TIME**: **3 Hours**

**General Instructions**

(a.) All questions are compulsory.

(b.) Section A: Q.no. 1 to 20 are very short answer questions (objective type) and carry 1 mark each.

(c.) Section B: Q.no. 21 to 27 are short answer questions and carry 2 marks each.

(d.) Section C: Q.no. 28 to 34 are long answer questions and carry 3 marks each.

(e.) Section D: Q.no. 35 to 37 are also long answer questions and carry 5 marks each.

(f.) There is no overall choice. However an internal choice has been provided in two questions of two marks, two questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.

(g.) Use log tables if necessary, use of calculators is not allowed.

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|  | **SECTION A** |  |
|  | ***Read the given passage and answer the following questions 1 to 5 that follow:***  Increase in nuclear charge tends to make elements more non-metallic when going from left to right in the periodic table. However, the elements become more metallic while going down the table in the same group. Transition from non-metal to metal occurs lower in the group as one goes from left to right in the periodic table. |  |
| **1.** | Which oxide of the group-15 will have amphoteric properties?  a.) N2O5 b) P2O5 c) Sb2O3 d) Bi2O3 | 1 |
| **2.** | The most basic oxide is  a) Al2O3 b) MgO c) SiO2 d) P2O5 | 1 |
| **3.** | The most basic element is  a) Fluorine b) Iodine c) Chlorine d) Bromine | 1 |
| **4.** | Which element has the capacity to accept electrons?  a) Lithium b) Hydrogen c) Potassium d) Rubidium | 1 |
| **5.** | Which among the following has the largest size?  a) Na b) Na**+ c)** Cl d) Cl– | 1 |
|  | ***Questions 6 to 10 are one word answers:*** |  |
| **6.** | Nickel atom can lose two electrons to form Ni2+ ion. The atomic number of nickel is 28. From which orbital will nickel lose two electrons? | 1 |
| **7.** | Analyze the change in internal energy during isothermal expansion of an ideal gas. | 1 |
| **8.** | If B–Cl bond has a dipole moment, why does BCl3 has zero dipole moment? | 1 |
| **9.** | State the type of hybrid orbitals associated with Phosphorus in PCl5 | 1 |
| **10.** | Identify type of forces that hold the atoms together in ionic compound? | 1 |
|  | ***Questions 11 to 15 are multiple choice questions:*** |  |
| **11.** | Using the data provided, calculate the multiple bond energy (kJ mol–1) of a C ≡ C bond in C2H2. That energy is (take the bond energy of a C **\_**H bond as 350 kJ mol–1): | 1 |
| **12.** | The solubility product of CaSO4 is 6.4 × 10–5. The solubility of salt in moles/litre is: | 1 |
| **13.** | The orbital angular momentum for an electron revolving in an orbit for an s-electron is | 1 |
| **14.** | One mole of oxygen gas at STP is equal to  a) 6.022 x1022 atoms of oxygen b) 6.022 x 1023 molecules of oxygen  c) 22400 litres of oxygen molecules d) 16 g of oxygen molecules | 1 |
| **15.** | Calculate the number of atoms present in 52 g of Helium (atomic mass is 4g)?  a) 7.83 x1023 atoms b) 3.13 x1023 atoms  c) 52 x NA atoms d) 4 x 6.022 x1023 | 1 |
|  | ***Questions 16 to 20:***  (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 wrong statement.  (D) Assertion is wrong, but reason is correct statement. |  |
| **16.** | **Assertion** (A): alkanes having more than three carbon atoms exhibit chain isomerism.  **Reason** (R): all carbon atoms in alkanes are sp3 hybridized. | 1 |
| **17.** | **Assertion** (A)**:** An aqueous solution of ammonium acetate can act as a buffer.  **Reason** (R): Acetic acid is a weak acid and NH4OH is a weak base. | 1 |
| **18.** | **Assertion** (A**):** Pent- 1-ene and pent- 2-ene are position isomers.  **Reason** (R): Position isomers differ in the position of functional group or a substituent. | 1 |
| **19.** | **Assertion** (A): 3ClO**–**⎯→ ClO**3**– + 2Cl**–** is an example of disproportionation reaction.  **Reason** (R): ClO– gets oxidized as well as reduced. | 1 |
| **20.** | **Assertion** (A): Oxidation state of hydrogen in H2O is +1 and in CaH2 it is –1.  **Reason** (R): CaH2 is metal hydride and for hydrides, hydrogen is assigned the oxidation state of –1 | 1 |
|  | **SECTION B** |  |
| **21.** | Out of NaCl and MgO, Which has higher lattice energy and why? | 2 |
| **22.** | Using molecular orbital theory, compare the bond energy and magnetic character of O2 - species.  **OR**  Predict the shapes of the following molecules on the basis of hybridisation.  HgCl2, NH3 | 2 |
| **23.** | What would happen to the pressure and kinetic energy of a gas if the collisions were not elastic? | 2 |
| **24.** | In reaction: CO(g) + 2H2(g)🡨=🡪CH3OH(*l*) ; ΔrH = –92.0 kJ mol–1 Concentration of hydrogen, carbon monoxide and methanol become constant at equilibrium. What will happen if  (i) Volume of reaction vessel in which reactants and products are contained is suddenly reduced to half  (ii) the partial pressure of hydrogen is suddenly doubled | 2 |
| **25.** | 1. MnO42- undergoes disproportionation reaction in acidic medium but MnO4-does not. Give reason. 2. Using the standard electrode potential of redox couples given below find out which of the following is the strongest oxidizing agent.   E0 values: Fe3+/Fe2+ = + 0.77; I2(s)/I- = + 0.54; Cu2+/Cu = + 0.34; Ag+/Ag = + 0.80V | 2 |
| **26.** | Write balanced chemical equation for the following reactions:  Reaction of liquid hydrazine (N2H4) with chlorate ion (ClO3-) in basic medium produces nitric oxide gas and chloride ion in gaseous state.  **OR**  Dichlorine heptaoxide (Cl2O7) in gaseous state combines with an aqueous solution of hydrogen peroxide in acidic medium to give chlorite ion (ClO2- ) and oxygen gas. | 2 |
| **27.** | Analyze the reason why are potassium and Caesium rather than lithium used in photoelectric cells? | 2 |
|  | **SECTION C** |  |
| **28.** | 1. What is the molality of a solution which contain 18 g of glucose in 250g of water? 2. A compound contains 4.07% hydrogen 24.27% and 71.65% chlorine. It’s molecular mass is 98.Find the empirical and molecular formula?   **OR**  Give an example of molecule in which   1. Ratio of molecular formula and empirical formula is 6: 1. 2. Molecular weight is two times of the empirical formula weight. 3. The empirical formula is CH2O and ratio of molecular formula weight and empirical formula weight is 6. | 3 |
| **29.** | Table-tennis ball has a mass 10 g and a speed of 90 m/s. If speed can be measured within an accuracy of 4% what will be the uncertainty in speed and position? | 3 |
| **30.** | The first ionization of Carbon is greater than that of boron, whereas reverse is true for the second ionization energy. Explain.  **OR**  Account the following,   1. Why chlorine has higher electron gain enthalpy than Fluorine 2. Ionic size of Cl**-** ion is greater than K**+** ion, though both are isoelectronic**.** 3. Why is second electron gain enthalpy for halogens zero? | 3 |
| **31.** | 1. Identify the state functions and path functions out of the following: Enthalpy, Entropy, Heat, Temperature, Work, and Free Energy. 2. Extensive properties depend on the quantity of matter but intensive properties do not. Explain, whether the following properties are extensive or intensive. Mass, Internal Energy, Pressure, Heat Capacity, Molar Heat Capacity, Density, Mole Fraction, Specific Heat, Temperature and Molarity. | 3 |
| **32.** | pH of 0.08 mol dm-3 HOCl solution is 2.85. Calculate its ionisation constant. | 3 |
| **33.** | 1. Give the IUPAC name of the following; 3. Related image 4. Give the structure of 2-Chloro-4-nitrotoluene | 3 |
| **34.** | 1. In the presence of peroxide addition of HBr to propene takes place according to anti Markovnikov’s rule but peroxide effect is not seen in the case of HCl and HI. Explain. 2. a 3. Despite their - I effect, halogens are *o*- and *p*-directing in haloarenes. Explain. | 3 |
|  | **SECTION D** |  |
| **35.** | 1. What will be the pressure of the gas mixture when 0.5 L of H2 and 0.2 L of oxygen at 0.7 bar are introduced in a 1L vessel at 27oC? 2. A vessel of 120 mL contains a certain amount of gas at 35oC and 1.2 bar pressure. The gas is transferred to another vessel of volume 180 ml at 35oC.what would be its pressure?   **OR**   1. At 25oC and 760mm of Hg pressure, a gas occupies 600mL volume. What will be its pressure at a height where temperature is 10oC and volume of the gas is 640mL 2. Density of gas is found to be 5.46 g dm-3 at 27oC and 2 bar pressure. What will be its density at STP? | 5 |
| **36.** | 1. Identify the compounds A, X and Z in the following reactions:     **OR**  Explain the following:   1. Gallium has higher ionization enthalpy than Aluminium. 2. Boron does not exist as B3+ ion. 3. Aluminium forms [AlF6]3-ion but boron does not form [BF6]3- ion. 4. PbX2 is more stable than PbX4.   Pb4+ acts as an oxidizing agent but Sn2+acts as a reducing agent. | 5 |
| **37.** | (a) One mole of a hydrocarbon (A) reacts with one mole of bromine giving a dibromo compound, C5H10Br2. Substance (A) on treatment with cold dilute alkaline KMnO4 solution forms a compound C5H12O2. On ozonolysis (A) gives equimolar quantities of propanone and ethanal. Deduce the structural formula of (A).  (b) Write structures of all the alkenes which on hydrogenation give 2-methylbutane.  (c) Out of benzene, m-dinitrobenzene and toluene which will undergo nitration most easily and why?  **OR**  Assign structures for the following:  (a) An alkyne (X) has molecular formula C5H8. It reacts neither with sodamide nor with ammoniacal cuprous chloride.  (b) A hydrocarbon ‘Y’ decolourises bromine water. On ozonolysis it gives 3-methyl butanal and formaldehyde. Give the name of the compound.  (c) A hydrocarbon (Z) has molecular formula C8H10. It does not decolourises bromine water and is oxidized to benzoic acid on heating with K2Cr2O7. It can also have three other isomers A, B and C. Write the structures of Z, A, B and C.  (d)Which of the following compounds are aromatic compounds?  C:\Users\HP\AppData\Local\Temp\SNAGHTMLc919b46.PNG | **5** |

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