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

# EEE CONSORTIUM

**FINAL EXAMINATION (2019-20)**

**CHEMISTRY THEORY MARKING SCHEME**

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|  | **SECTION A** |  |
| **1.** | Sb2O3 | **1** |
| **2.** | MgO | **1** |
| **3.** | Iodine | **1** |
| **4.** | Hydrogen | **1** |
| **5.** | **Cl –** | **1** |
|  | ***Questions 6 to 10 are one word answers:*** |  |
| **6.** | 4s | **1** |
| **7.** | In isothermal process, there is no change in internal enegy(∆U =0) | **1** |
| **8.** | BCl3 molecule has a symmetrical trigonal structure | **1** |
| **9.** | Sp3d | **1** |
| **10.** | Electrostatic force of attraction. | **1** |
|  | ***Questions 11 to 15 are multiple choice questions:*** |  |
| **11.** | (b) | **1** |
| **12.** | (b) | **1** |
| **13.** | (a) | **1** |
| **14.** | 1. 6.022 x 1023 molecules of oxygen | **1** |
| **15.** | 1. 7.83 x1023 atoms | **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.** | Both **A** and **R** are correct and **R** is not the correct explanation of **A.** | **1** |
| **17.** | (iii) | **1** |
| **18.** | (i) | **1** |
| **19.** | (a) If both assertion and reason are CORRECT and reasson is the corect explanation of the assertion | **1** |
| **20.** | (a) If both assertion and reason are CORRECT and reasson is the corect explanation of the assertion | **1** |
|  | **SECTION B** |  |
| **21.** | MgO , because each ion possesses two unit charge, whereas NaCl, each ion carries one unit charge | **2** |
| **22.** | O2 -  σ 1s 2  σ\* 1s 2 σ 2s 2 σ\*2s 2 σ 2pz2 π2px2 π2py2 π\*2px2 π\*2py1  Bond order = ½ [ Nb – Na ]  = ½ [ 10 – 7 ] = 3/2 = 1.5  The molecule is stable and paramagnetic  **OR**  HgCl2 - Linear due to sp hybridisation  NH3 -Trigonal pyramidal due to sp3 hybridisation (lp-bp repulsion is greater than bp-bp repulsion ) | **2** |
| **23.** | If collisions are not elastic, the kinetic energy and the pressure will drop to zero because molecular collisions will slowdown and ultimately stop. | **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. In MnO4-, Mn is in the highest oxidation state i.e. +7. Therefore, it does not undergo disproportionation. 2. Ag+/Ag = + 0.80V | **2** |
| **26.** | 3N2H4 +4ClO3- →6NO + 6H2O + 4Cl-  **OR**  Cl2O7 + + 4H2O2 →2ClO2-+4O2+2H++3H2O | **2** |
| **27.** | Size of K and Cs atoms are bigger than that of Li thus I.E of K and Cs are low and they are used in photoelectric cell. | **2** |
|  | **SECTION C** |  |
| **28.** | 1. Molality = 0.1/.250 =0.4m 2. Emp.formula isCH2Cl   Mole.formula is C2H4Cl2  **OR**  (i) C6H6 (ii) H2O2 (iii) C6H12O6 | **3** |
| **29.** | Uncertainty in the speed of ball =90x4/100=3.6 ms-1  Uncertainty in position =*h/4Π m Δv*  =6.626 10-34 Js/4 x 3.14 x 10x10-3 x 3.6  =1.46 × 10-33m | **3** |
| **30.** | C: 1s22s22px12py1 B: 1s22s22px1  Due to higher nuclear charge in carbon, the force of attraction of valence electron is mor3 in C hence the first IE is greater. But after the loss of one electron, the monovalent cation have the configurations,  B+ : 1s22s2 C+ 1s22s22px1  The B+ configuration is stable. hence removal of electron is difficult in comparison with C+  **OR**   1. Small size and high electron negativity of F, thus interelctronic repulsion is possible in F than Cl. 2. K+ has greater nuclear charge than Cl- thus force of attraction towards the nucleus is more in K+ 3. By gaining one electron, halogens attain noble gas configuration, thus addition of second electron is very difficult. | **3** |
| **31.** | Ans. Extensive properties: Mass, internal energy, heat capacity. Intensive properties: Pressure, molar heat capacity, density, mole fraction, specific heat, temperature and molarity. Mole fraction and molarity of a solution are same whether we take a small amount of the solution or large amount of the solution. The ratio of two extensive properties is always intensive  Extensive property/ Extensive property = Intensive property  (II)Ans. State functions: enthalpy, entropy, temperature, free energy. Path functions: heat, work | **3** |
| **32.** | pH of HOCl = 2.85  But, – pH = log [H+]  – 2.85 = log [H+]  3 .15 = log [H+]  [H+]= 1.413 × 10-3  [H+] =cα , α=[H+]/C  α = 1.413x10-3/0.08  Ka =Cα2  Ka=0.08 x | **3** |
| **33.** | 1. a. 5-oxopentanoic acid  b. 3-cyclobutylpenatane  2. | **3** |
| **34.** | 1. HCl bond is very strong so it will not form chlorine free radical but HI bond is very weak so it forms iodide free radical which combines to form iodine molecule. 2. B 3. Halogens attached to benzene rings exert – I and +R effect. +R effect dominates – I effect and increases the electron density at ortho and para positions of the benzene ring with respect to halogens. | **3** |
|  | **SECTION D** |  |
| **35.** | a.  C:\Users\sandeeppr\Desktop\bluetooth\IMG_20191120_185640.jpg | **5** |
|  | b. P1V1=P2V2  V2 = (0.820)x (200mL)/1.025  = **160 ml**  **OR**   1. P1V1/T1 =P2V2/T2   P2 = (760)X 600 X 283/(640)X 298  = **676.6 mm Hg.**  ii. d = pM/RT  d= P/T (R and M constant for a given mass)  d1/d2 = P1/P2 x T2/T1  d2 = d1 p2T1/P1 T2  = 5.46 x 1x 300/2 x 273  = **3.0g dm-3** |  |
| **36.** | a)    b) Organosilicon polymers are called silicones. State one use .  **OR**   1. Gallium has a smaller size due to the poor shielding effect of d orbitals and so the removal of the electrons becomes difficult. 2. The sum of the first three ionization entalpies are very high. 3. The expansion of the covalence takes place due to the presence of empty d orbitals in Al. 4. +2 oxidation state in Pd is more stable due to inert pair effect. 5. Pb4+ +2e → Pb2+ Due to inert pair effect. | **5** |
| **37.** | One mole of a hydrocarbon (A) reacts with one mole of bromine giving a dibromo compound, C5H10 Br2. 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).  (ii) Write structures of all the alkenes which on hydrogenation give 2-methylbutane.  (iii) Out of benzene, m-dinitrobenzene and toluene which will undergo nitration most easily and why?    (ii)    (iii) CH3 group is electron releasing group while —NO2 group is electron withdrawing group. Therefore, the electron density will be more in toluene than in benzene and the electron density in m-dinitrobenzene will be less than in benzene. Therefore, the ease of nitration decreases in the order: toluene > benzene > m-dinitrobenzene.  **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 decolourise bromine water and is oxidised 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 according to Huckel rule?  C:\Users\HP\AppData\Local\Temp\SNAGHTMLc919b46.PNG    (d)(e), (g) and (h) are aromatic. aromatic because, it has 6π delocalised electrons in planar ring, which obey Huckel rule and therefore, it is aromatic. | **5** |

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